

# Papers & Publications: Interdisciplinary Journal of Undergraduate Research

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2016

## Volume 5

Leigh G. Dillard  
*university of north georgia*

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# Papers & Publications

Interdisciplinary Journal of Undergraduate Research

**2016**  
**VOLUME 5**



**Papers & Publications**  
Interdisciplinary Journal of Undergraduate Research

**2016**  
**VOLUME 5**

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## Contents

<b>Letter from the Managing Editor</b> Anastasia Lin, PhD	<b>4</b>
<b>Letter from the Editor-in-Chief</b> Leigh G. Dillard, PhD	<b>5</b>
<b>'It Relates to My Everyday Life.' Critical Pedagogy and Student Explanations of Interest in Sociology Course Topics</b> Mindy R. Mauldin, Cullen T. O'Donnell, Chastity L. Blankenship, PhD <i>Florida Southern College</i> Jeremie Bates <i>Valencia College</i>	<b>7</b>
<b>The Puppeteer: An Analysis of the Implications of Gendered Spheres through Sadie Burke in <i>All the King's Men</i></b> Sierra Riddle <i>Lee University</i>	<b>15</b>
<b>The Gaps in Health Care of the LGBT Community: Perspectives of Nursing Students and Faculty</b> Keily Mitchell, LaKenya Lee, Ayana Green, and Jasmine Sykes <i>Georgia Southern University</i>	<b>21</b>
<b>Optimism in Independence: The European Central Bank after the 2008 Global Financial Crisis</b> Melissa D. Dixon and Jamie E. Scalera, PhD <i>Georgia Southern University</i>	<b>31</b>
<b>Computer Vision Based Object Detection and Tracking in Micro Aerial Vehicles</b> Richard F. Chapman and H. David Mathias, DSc <i>Florida Southern College</i>	<b>40</b>
<b>The Clerk Conundrum: Chaucer's Attitude towards Pilgrim and Profession</b> Amber N. Jurgensen <i>Louisiana Tech University</i>	<b>47</b>
<b>From Sensor to Street: Intelligent Vehicle Control Systems</b> Zachariah Coles, Imani Augusma, Thomas Beryl, and Valentin Sololu, PhD <i>Georgia Southern University</i>	<b>52</b>
<b>Mapping Joaquín: How Literary Cartography Opens New Perspectives on the Western Novel</b> Reinhild Kokula <i>University of North Georgia / University of Würzburg</i>	<b>59</b>
<b>Maleiwa: A Story of Creation</b> Juan Garces <i>University of North Georgia</i>	<b>66</b>
<b>Contributor Biographies</b>	<b>68</b>

# Letter from the Managing Editor

Anastasia Lin, PhD  
*University of North Georgia*

Over the last five years, *Papers & Publications* has served the southeastern region as an outlet for outstanding undergraduate students in any discipline to publish peer-reviewed manuscripts. Over these five years, the journal has also grown and shifted. *Papers and Pub(lication)s*, as it was originally denoted, was founded in 2012 by the former North Georgia College and State University. In 2013, the University of North Georgia was founded through the consolidation of NGCSU and the former Gainesville State College. This consolidation has led to many exciting new opportunities through the combined strengths of these two former universities. *Papers & Publications* is no exception.

As Managing Editor for *Papers & Publications* and director for the Center for Undergraduate Research and Creative Activities (CURCA), it is my pleasure to introduce Volume 5 of the journal as well as to introduce our new Editor-in-Chief, Dr. Leigh Dillard, assistant professor of English at UNG. Dr. Dillard brings a wealth of experience in current publishing and graphic design trends to the project, and her own scholarly work focuses on eighteenth-century print culture. *Papers & Publications* also remains indebted to the work of Miriam Segura-Totten, founding Editor-In-Chief of the journal, who remains a key resource and reviewer. We are also grateful for the pioneering work of B.J. Robinson and the UNG Press for supporting the first four volumes of the journal. Allison Galloup, a long-time *Papers & Publications* board member, has also taken over as Digital Content Editor.

Each volume of *Papers & Publications* continues to build and improve on the last, and this year is no exception. The student work showcased here underscores the increasing diversity of both content area and student home university. In the current issue, the articles cover a broad range of subjects from Engineering to British Literature, Biology to the cross-disciplinary field of Literary Cartography. In addition, student authors hail from around the southeastern region and include one international author who completed research while on study abroad in the U.S. The caliber and diversity of these submissions speak to the importance of offering a journal for the exceptional research and creative work of students in our region.

In her inaugural letter introducing *Papers & Publications*, founding editor-in-chief Totten wrote: “Our mission in creating this journal was twofold: to provide a forum for young minds to showcase the fruits of their creative and scholarly work, and to give students the experience of going through the process of peer review.” That mission has not changed; rather, we hope with this edition to show that we have intensified our focus on providing a forum to celebrate scholarly exchange and academic excellence. I invite you to peruse the current volume and to engage with our student authors’ pursuits of innovation, creativity, problem solving, and meaning-making. Thank you for your interest in celebrating and supporting these students.



Anastasia Lin, PhD  
Managing Editor  
Assistant Dean of Student Research and Scholarship  
Associate Professor of English

## Letter from the Editor-in-Chief

**Leigh G. Dillard, PhD**  
*University of North Georgia*

Undergraduate research is a popular phrase in academia at present. More than a trend, however, this growing practice affords new challenges to students and faculty alike. Conference presentations and academic publications were reserved for the select few in my undergraduate years; while the process is still selective, I am encouraged by the movement toward more avenues for presentation and publication and increasing institutional support for students across disciplines wishing to engage in these opportunities.

I am honored to begin my tenure as Editor-in-Chief of *Papers & Publications*, following in the astute leadership of past Editor-in-Chief Miriam Segura-Totten, who showed a commitment to undergraduate research through her supervision of the first four volumes. This venture would also not be possible without the ongoing support of Dr. Anastasia Lin and the Center for Undergraduate Research and Creative Activities at the University of North Georgia (CURCA). I am equally grateful to my colleagues, both at the University of North Georgia and beyond, who agreed to serve as editors and reviewers for this issue. Likewise, the faculty mentors of the students represented here deserve recognition for their encouragement and patience in creating classroom environments that reward inquisitiveness and problem solving.

The breadth of the essays presented in this volume is little surprise given our interdisciplinary focus, yet the contributions of these authors are united in their engagement in current topics and research methodologies. From pedagogical concerns in the field of nursing and technology enhancements in drone technology to discussions of European economic policy, literary cartography, and literary analysis, these essays reveal the viability of student-driven contributions to the academic conversation.

As I look to the future of this journal, I am encouraged by the opportunities it presents, chances to continue fostering and celebrating the critical efforts of undergraduate students in a way that provides them a taste of academic publishing. It is with great pleasure that I present this fifth volume of *Papers & Publications* to recognize the work of these promising young scholars with hopes that others will be similarly inspired.



Leigh G. Dillard, PhD  
Editor-in-Chief  
Assistant Professor of English





## ‘It Relates to My Everyday Life.’ Critical Pedagogy and Student Explanations of Interest in Sociology Course Topics

Educators strive to teach students about being responsible for their own learning, but they often deny the students the freedom of doing so. Although there is some disagreement over the core concepts of sociology, a sample of sociological leaders agree that the top five primary goals of an Introduction to Sociology course are (1) to understand the structural factors in everyday life, (2) to place an issue in a larger context, (3) to identify and explain social inequality, (4) to recognize the difference between empirical and normative statements, and (5) to compare and contrast one’s own experience with those of people in other parts of the United States and the world (Persell, 2010). Furthermore, in 2006, The Task Force on Sociology and General Education identified several general education learning outcomes to which sociology courses contribute, some of which include quantitative literacy, knowledge of society, diversity awareness and understanding, critical thinking, and collaboration and teamwork (Keith et al., 2007; Howard & Zoeller, 2007). From a student perspective, Howard and Zoeller (2007) indicate that students believe that Introduction to Sociology courses contribute to their general educational requirements—primarily critical thinking skills, integration and application of knowledge, and understanding of society and culture.

How do Introduction to Sociology instructors implement the necessary sociology core while keeping students interested and engaged? In any field of study, teachers may struggle to successfully do both. A teacher’s educational philosophy guides how, what, and why they teach topics related to the introductory sociology core. Educational philosophies can be student-focused or centered around the teacher; they can be pragmatic or progressive; they can prioritize the interests of society over the interests of the individual, or the other way around; they can even be a combination of some, or all, of these characteristics. Nevertheless, traditional approaches to education, such as conservative and liberal pedagogies tend to dominate classrooms throughout the country. Lecture is the pervasive teaching strategy; however, instructors also often utilize in-class discussion as well (Grauerholz & Gibson, 2006; Howard & Zoeller, 2007).

Traditionally, teachers have used a banking pedagogy, in which someone in a position of power determines what the students need to know and the teachers are expected to provide the students with that knowledge (Aslan-Tutak, Bondy, & Adams, 2011). Throughout history, educators have been solely responsible for teaching, while their pupils have only had the task of learning. Some sociologists contend that this

**Mindy R. Mauldin,  
Cullen T. O’Donnell,  
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**Jeremie Bates**  
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**MINDY MAULDIN** recently graduated with her BS in Sociology and Psychology from Florida Southern College. She is originally from and currently resides in Fort Worth, Texas. Mindy’s research interests center around the application of sociology and psychology to a variety of topics such as education, the prison system, and trauma. In the future, she intends to pursue a doctorate degree in clinical psychology. **CULLEN O’DONNELL**, a senior at Florida Southern College from Mentor, Ohio, has always had a passion for learning about society and improving social issues. He is pursuing a BS in Sociology and a BA in Psychology and Spanish. He is currently employed as a youth development professional at Boys & Girls Club, counselor at Neighborhood Ministries, and substitute teacher for Polk County. He has held several leadership positions on campus, including Founding Father and Historian of Pi Kappa Phi. He plans on getting his Masters of Social Work and is interested in joining the Peace Corps. **JEREMIE BATES** is a BFA student at the University of Central Florida. Although the study of fine arts is his main focus, he has always had a lifelong interest in human behavior. While attending Valencia State College, he took an Introduction to Sociology course to learn more on the subject. He continued his sociology studies as an intern under **DR. CHASTITY BLANKENSHIP**. He applies this knowledge to improve his work and understanding of the different cultural standards of art. Blankenship is an assistant professor of Sociology at Florida Southern College. Her teaching and research areas include educational issues, race, class, and gender inequality.

one-way approach to pedagogy creates a culture of silence that reinforces power relations and propagates conformity and passivity among the students (Freire, 1974; Martin & Brown, 2013). Furthermore, through the banking concept of education, neither the professor nor the scholar learns as much information as possible.

Critical pedagogy, on the other hand, is relatable to conflict theory because they both challenge the status quo and encourage social change. Banking pedagogy disempowers students and teachers by hindering the students' thinking and preventing them from actively engaging in their pursuit of knowledge (Aslan-Tutak, Bondy, & Adams, 2011). However, the less prevalent philosophy of critical pedagogy opposes traditional, teacher-centered perspectives of education in nearly every way, therefore offering the greatest opportunities for student advancement (Widdersheim, 2013).

While all educators face challenges in creating a curriculum that finds a balance between departmental expectations and maintaining student interest, it can be particularly challenging for professors who teach Introduction to Sociology courses. They must teach topics that will be useful to both students majoring in sociology and students of other majors who are taking the course as a general education requirement. Introductory sociology courses may include students majoring in a wide variety of subjects who have many different interests. Under the current system, Introduction to Sociology instructors require students from all majors to study the same subject matter and then test them on the subjects using the same methods of evaluation. While college courses still consist of textbook readings, lectures, and discussions, many postsecondary educational institutions are now emphasizing the need for engaged learning (Bain, 2004). Students are beginning to be encouraged to express their unique thoughts and ideas in creative ways through hands-on classroom activities. Allowing students the option to choose the course content and the teaching style, through methods of critical pedagogy, is the one way to give them true freedom to express their individuality during their education.

Not all students share the same interests and goals, so not all instructors should teach the same topics in the same ways. Teachers who use critical pedagogy strive to give the students an understanding of the connection between what they learn in the classroom and the reality of the outside world, because this teaching method emphasizes hands-on, integrative and inquiry-based learning (Howard & Zoeller, 2007). The process of critical pedagogy gives agency to both the teachers and the students, creating a partnership, which allows students to have more input in their own educations.

Despite the extensive research done on the benefits of giving more power to the students, few practical methods have been found to implement the practice in classrooms (Braa & Callero, 2006). Rather, sociologists tend to discuss critical pedagogy as a general theory that allows for flexible application to different situations (Aslan-Tutak, Bondy, & Adams, 2011). Although this method of teaching seems to aid in students' development educationally, as well as personally and emotionally, most sociology teachers are somewhat reluctant to adopt this pedagogy (Sweet, 1998). Catering to the individual wishes of students will cost professors more time and energy. The rewards for students are worth the effort, but professors may not always have the time available to do so. In today's postsecondary education system, educating students is only one of many tasks of college faculty members (Sweet, 1998). Sweet (1998) further indicates that instructors are comfortable nurturing dialogue within the classroom setting, but few abandon traditional grading practices and truly surrender their power to the students. Institutional constraints appear to be the main deterrents; most colleges and universities have rules and practices set in place that may not allow critical pedagogy, as a whole, to be put into practice (Sweet, 1998).

The time-consuming nature of the critical pedagogical teaching style, as well as the standards of productivity required by most colleges and universities, cause teachers to face tough decisions concerning educational philosophy and career advancement. Do professors sacrifice tenure and publication success

to devote all of their time and energy toward student development, or do the students suffer in another traditional classroom setting so that the professor can ensure his or her job security? This is a difficult question that a number of sociology professors likely struggle with while composing their curriculum for each semester. Sweet (1998) offers a suggestion that may help satisfy the needs of everyone: work within the confines imposed by the institution, but also get student input on some of the shortcomings. This will help satisfy the officials of the college or university, while allowing the students to openly discuss institutional constraints placed on the professors and how that may influence the subjects they learn and the methods used to teach them.

Reflecting on the balance between institutional demands and critical pedagogy, the current study explores student interest of subject areas within Introduction to Sociology courses. It seeks to answer the question: if sociology instructors gave students the power to choose, what topics would the course content include? It is important to note that Introduction to Sociology courses often include non-major students, who may not feel that sociology topics are important or that they relate to their future careers. Thus, this study, which is an example of critical pedagogy implemented within an introductory sociology course, explores the relationship between students and subject-area interest. By implementing the methods used in this study into introductory sociology classes, students will likely be granted more power and control over course content and professors can also gain an understanding of general student interests pertaining to their course.

### **Data and Methods**

This study evaluated the topics students would pick if instructors in these courses implemented a more critical pedagogical approach in the classroom. It is common for instructors to have the power to decide what topics may not be covered in order to focus on his or her preferred concepts in more detail during the term. In order to give some of the power back to the students and allow them more control over their

own learning, a questionnaire about sociological course topics was administered at the first class meeting, before the students had a chance to interact with the instructor in any meaningful way.

The current study was conducted using a sample of students in Introduction to Sociology courses at a mid-sized community college in the southeast. To encourage participation and to minimize questionnaire items, we did not collect demographic data in the survey. To give the reader an idea of the overall population characteristics, the majority of the college's student population was part-time, and the students came from a wide variety of ethnic groups: 35% were Caucasian, 31% were Hispanic, and 17% were African-American. The average age of students at this institution is 24, which is somewhat older than most traditional colleges and universities. All Introduction to Sociology courses at this institution are capped at 32 students.

During the first day of face-to-face Introduction to Sociology courses, students were asked to participate in a survey, which assessed their level of interest in potential course topics. A list of topics was provided in case students did not have any idea of the types of topics that might be included in an introductory sociology course. The questionnaire asked participants to rate their level of interest in 21 different sociology topics (e.g. global stratification, culture, and religion) using a Likert scale from zero to four: (0) not interested, (1) slightly interested, (2) neutral, (3) interested, and (4) very interested. Afterwards, participants were asked to pick three topics that they were most interested in learning about during the term. In an open-ended question, they were asked: "Based off the three you selected, why do you think you are interested in those topics?" They were then asked to identify three topics that they were not interested in learning about and asked to explain why they may not be interested in those areas.

After collecting questionnaire data, a quantitative codebook was developed to guide coding. Two of the authors independently read each open-ended response and created recurring themes based off his or her interpretation of the students' explanations of interest. Three authors

then collaborated to create the final agreed upon themes that seemed the most prevalent throughout participant responses. Ultimately, open-ended responses were organized into themes, such as “relevant to participant personally,” “controversial,” and “large societal influence.” All responses were then coded as no (0) or yes (1) based on whether or not the statement contained that theme. Responses that were left blank were coded as no response (2). Based off the coding scheme, each response could possess multiple themes. Allowing for multiple themes was necessary because sometimes a student’s response contained a variety of interests and different reasons for being interested in those topics. For example, the response “I’m an animal major, so the socialization of animals is important in my field. Environment is what drives my passions. I want to conserve and educate. I am gay so sex and gender intrigues me, because I can feel the social ‘disdain’ in public.” was coded as: “passionate,” “relevant to participant personally,” and “relevant to participant’s future life experiences/major/career.” After the initial coding was completed, two authors double-coded about five percent of the responses to verify inter-coder reliability and ensure there were no discrepancies in coding.

**Results**

The final sample size consisted of 191 students, who gave varying responses describing their interest in sociology topics. A majority of the students in our study were Undecided (N=37), followed by Medical (N=28) and General Studies (N=24) majors. We expected to have the most majors in our sample from the Undecided and General Studies categories because the community college where the data was collected from is one of the largest sources of transfer students to traditional universities in the area.

Overall students were the most interested in learning

about culture, deviance, race, and gender. Each of these topics had a mean score of 3.33 or above on our four-point scale. In contrast, students were the least interested in bureaucracy, the elderly and aging, urbanization, and the economy (mean scores of less than 2.65 for each topic). Not all student participants answered the open-ended questions regarding the reasoning behind their interest and disinterest in topics. Fifteen percent of students did not respond with an explanation for their interest and approximately 24 percent of student participants did not answer the question of why they were not interested.

Of students that explained the reasoning behind their interest, the most prominent theme was “satisfying a curiosity” (see Table 1). Approximately 38 percent of students claimed that their topic preferences were based on specific curiosities; for example, one student wrote, “I enjoy learning about how others live and what they believe is okay.” Student interest was also greatly dependent upon personal relevance to participant; 20 percent of participants responded that they were interested in specific topics because the topics related to them

**Table 1. Student Explanation for Interest by Theme<sup>1</sup>**

Interested Themes	N	Percent
To satisfy a curiosity or interest	72	37.7
Other (very specific answer)	42	22
Relevant to participant personally	38	19.9
Relevant to participant’s future life experiences/major/career	22	11.5
Controversial/multiple perspectives	17	8.9
Relevant to current issues	15	7.9
Large societal influence	15	7.9
Familiarity with topic	14	7.3
Passionate about	13	6.8
Interest without explanation or insight	12	6.3
Religious beliefs	8	4.2
Essential topic everyone needs to be aware of	7	3.7
Important to future generations	6	3.1
Not discussed often/unmentioned topics	3	1.6
Nonsense Response	2	1

<sup>1</sup> Note: 29 respondents did not provide a reason for interest.

personally. As one student explained, “As a gay man, sex and gender always interests me. Why do people call things gay that they dislike?” Aside from personal relevance, approximately 12 percent of students chose topics that they believed to correspond with their future life experiences and careers, which was often based on their college majors. One participant wrote, “I believe they will help prepare me for what and who I have to work with or help in the future.”

Frequently, responses included material that did not fall into a constructed theme yet may have captured other themes that we did not classify; therefore, these responses were coded as “other.” For example, part of a student response categorized as “other” reads, “Are we forgetting about the elderly?” For obvious reasons, this vague statement is difficult to classify and thus fit into our “other” theme. As this was a very broad theme, it ranked the second most common in both the interested (22 percent) and not interested (17 percent) categories. However, because we did not limit ourselves to classifying each response to only one theme, statements classified as “other” may also have been categorized under additional themes. The quote from the student above regarding the elderly also had one additional sentence, which stated, “I want to learn about how other countries feel about liking the same sex.” This part of the student response was coded under the “to satisfy a curiosity or interest” theme. Therefore, the student’s entire response was coded as both “to satisfy a curiosity or interest” and “other.”

Overall, students did not clarify why they were disinterested in course topics to the same degree of specificity that they used when explaining why they would be interested. Similar to the interested responses, our results showed that the greatest number of respondents indicated that they were not interested in the topics because they were just generally disinterested. Approximately 27 percent of respondents claimed that they were not interested in the topics without describing a specific reason that would allow us to categorize their response in any meaningful way besides “not interested;” for instance, “Just not interested” was one of the responses coded as this theme.

Unimportance to the student was another determining factor for disinterest, with 14 percent of respondents indicating that they were not interested because the topics were unimportant to them or they simply did not care about them. Students indicated this by writing responses like, “Because they have less impact on my life when compared to the rest of the topics” or “Bureaucracy and Formal Organizations [are] not important to me.” Additionally, nearly 8 percent of respondents indicated that they were not interested in the topics because they found them to be boring or not thought provoking. One student responded, “They don’t really grasp my attention and don’t feel their [sic] very important.”

One theme that was found that explained both interest and disinterest was the level of controversy of the topic. This was particularly true if the topic centered on personal or religious beliefs. As an educator, one topic that comes to mind would be a class discussion on an issue such as abortion. A discussion on abortion could easily fit into many different topics within an introductory sociology course, such as gender, family, race, social class, or global stratification. Controversial topics, with no clear right or wrong answer, seemed to create the greatest split in interest and disinterest among students. For example, one student explained his or her interest was due to the grey area of the topics; “they seemingly have no right answer.” In contrast, another student wrote a similar response to explain his or her lack of interest as, “those always lead to arguments, because everyone has an opinion, that’s fine, but they don’t like everyone else’s [sic].”

## **Discussion**

We found that most students were interested in specific sociology topics for reasons that would be coded under “to satisfy a curiosity or interest.” We coded these separately from the student responses that were viewed as “interest—without explanation or insight” because these students simply said that they were interested in the topics because they were interesting topics. Since general interest or curiosity is such a major factor in topic selection, course content could

vary significantly from class to class, constantly changing over time. Relevant topics students see on Facebook or other social media networks may make students feel more interested in sociological material. Of course, a lack of interest among some students is likely to occur no matter the course topic. Some students may also try to avoid certain important concepts if they find them boring.

Oftentimes, there is more material to include in an introductory course than time to do so adequately. Educators are usually the ones who determine which chapters or concepts will be cut from the curriculum. Using critical pedagogy is just a different way to address this problem that many instructors face when deciding what material to include beyond core concepts. When critical pedagogy is utilized, educators would be able to focus their teaching on topics students feel are relevant to their everyday lives. They may also be able to structure their classes to include topics that are at least slightly of interest to all of their current students, depending upon the specific interests of their students. Additionally, updating course curriculum based off student interest in topics could be conducted in any class size. This could be done through a variety of methods we did not use in our study, including the use of online methods to allow for automatic tallying of the results so students could see survey results by the next class meeting.

In addition to topics they find generally interesting, people tend to show more interest in sociological topics that are relevant to their current lives and their futures. The results from our study showed that “relevance to participant’s future” was a major factor for student interest, but not for disinterest. For the most part, students were most interested in topics because they found them to be relevant to themselves and their futures, but they were not directly opposed to learning about topics that were not related to their futures. However, if a participant considered a topic to be “unimportant” to them, it was a major factor in determining disinterest. Thus, theoretically, the student attitudes could be reflected in student effort. Since student interest increases for topics related to the students’ futures, teachers should consider

restructuring their courses to include material relevant to common student majors indicated by the surveys conducted each semester, thus encouraging interest in the course curriculum.

Another recurring reason for disinterest is that students find topics to be boring or not thought-provoking. The prevalence of the theme “boring/not thought-provoking” among not interested responses indicates that students clearly have a desire to learn and be stimulated by course material. Topics students view as boring could influence their motivation to learn the course material. For example, it is not surprising that a chapter on research methods would rank lower in student interest than a chapter on deviant behavior. However, the core concepts of sociological research methods could be spread out and covered within a variety of other chapters such as deviance or gender. This means that the material is not lumped together in one chapter that students may find “boring,” but it still allows instructors to include the core concepts into the introductory course. Certain topics are fundamental to an introductory sociology course and educators still need to teach them, regardless of student disinterest. It is impractical to only include the topics that interest students and exclude the drier topics that may contain vital information; therefore, teachers should incorporate the core topics into a wide variety of chapters, especially into those that evoke the most student interest.

Since interest and disinterest vary so greatly from student to student, the use of this survey, and critical pedagogy in general, is important for determining course material relevant to student interest, thereby increasing student engagement, participation, and potentially student success. This approach gives agency to both the teachers and the students, and creates a partnership among them, which allows the students to have more input in their education. This survey is an easy way for students to reap the benefits of critical pedagogy without costing professors large amounts of time and energy, making it a viable option for teachers who want to use a critical approach but face institutional constraints. While this study focuses on Introduction to Sociology courses, a similar process within

introductory courses in other disciplines can be utilized to allow students to exert greater control over their own learning.

As with all studies, the researchers encountered some unavoidable limitations. A major limitation of this study was the lack of detailed responses and sometimes-tautological reasoning students provided for open-ended questions about their interests and disinterests. Many students essentially said they were interested or disinterested because they were “interested” or “uninterested” without connecting their reasoning to their personal lives, careers, or other factors. This problem did allow one author to have a teachable moment by explaining the lack of detailed responses with her class as a major downside to open-ended questions in research. One of the authors of the current study feels our questionnaire could be refined to include close-ended questions with our themes as choices for why a student is interested or disinterested in a topic. Utilizing pre-constructed themes would clarify the respondents’ reasoning for interest and noninterest in topics; however, removing open-ended questions would limit the variety and detail of student responses. In order to allow participants the same freedom to express their thoughts, we could still include a space for “other” where students can write in their own reasons.

Another limitation with the study was that only one of the participating professors actually changed the course content based on the results of the survey. All other professors let their students participate in the survey, but did not make any syllabus changes based on the findings. As a result, we were unable to conduct pre- and post-tests, which would have allowed for a stronger statistical analysis. If more instructors did change their topics based on class data, we may determine whether or not the students noticed when the course content was altered to coincide with their preferences. We would also be able to compare an experimental group to a control group to see if these changes influenced student grades or satisfaction with the course. At this point, all we have is anecdotal evidence of students noticing the shift in power, which allowed them to help choose course topics.

For example, one participant – who was in the sample of courses in which the syllabus was changed based off student data – wrote about his or her experience in an anonymous student evaluation at the end of the term. The student wrote, “I knew from the first day when she took our votes on what we wanted to learn that... she was going to be a great professor. She was able to keep a lecture interesting and engage her students through humor and relevant examples so that we could actually relate...” Overall, including more professors who are willing to alter their course content based upon survey results would strengthen future analysis.

The most frequently occurring themes between both interested and disinterested student responses were based upon specific student preferences. Our results showed a large variance from participant to participant, which means that professors could observe a noticeable difference in student interests across semesters. By implementing critical pedagogical instruction methods, such as the survey used in this study, professors will be able to determine which topics will produce the most student interest each semester and change their curriculum accordingly, thereby increasing student engagement and control in the classroom.

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## The Puppeteer: An Analysis of the Implications of Gendered Spheres through Sadie Burke in *All the King's Men*

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Robert Penn Warren is a distinguished professor, poet, and author, who is credited for being the founder of New Criticism. He is the only person in history to win a Pulitzer Prize for both fiction and poetry, and his talent for writing has been celebrated as one of the most influential models for contemporary literature. The unique analyses of moral dilemma in the South within his literature have raised the bar for Southern writers, for “he writes about such shortcomings with an eloquence and an elemental rage [that places him] worlds apart from the sordid bitterness of . . . his literary colleagues” (Prescott). The fiercely emotional and mentally stimulating nature of his novel *All the King's Men* ardently supports this assertion. Rumored to be based on the career of Louisiana politician Huey Long, this critically-acclaimed novel chronicles the journey of “The Boss,” or Willie Stark, from hick to hellfire, through the eyes of his faithful muckraker Jack Burden. Warren creates a historically-relevant political narrative that is littered with surprisingly fresh philosophical musings through the use of fiery metaphors and clever punches of sardonic humor. While both the author and various critics admit that “*All the King's Men* is really a double story,” it is clear upon further analysis that the novel is not limited to telling the stories of Willie Stark and Jack Burden alone (Prescott). In fact, Warren’s hyper-attention to the relationship between the past and present weaves the essential tale of a seemingly minor character named Sadie Burke. Often written off as a mere supporting character, her dynamism and gregarious nature mirrors the vivaciousness of Willie Stark himself, thus perpetuating her reckonable force. Sadie Burke is the token woman in a man’s world, and still she is more than that. In a fervent attempt to achieve power for herself, Burke leaves the feminine sphere in order to exercise her political prowess. It is this rejection of traditional femininity that allows Sadie Burke to transcend to the status of creator God in Warren’s narrative and her ultimate attempt to return to the feminine sphere that leads to Willie Stark’s destruction.

The relationship between male and female is colored with a tradition of separatism. Throughout the history of America, it has been agreed that “men and women’s functions [are] to be equal and complementary, not identical” (Norton 297). In other words, humanity is expected to operate with equal respects, but in separate divisions according to gender. The separatism between genders is a result of a domestic ideology that suggests the necessity for a separate male and female sphere. Although it originated much earlier, this division between male and female spheres was

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strongly reinforced during the industrial boom of the nineteenth century. During this time of economic growth, “true men,” characterized by competitiveness, intelligence, and logic, went to work in public sectors such as business and politics, while “true women,” deemed submissive, chaste, and domestic, were limited to the private sphere of organizing the household and providing maternal care to the family (Freedman 24). Historians make it clear that the division between men and women was created to shield the supposed delicacy of women from “all those stern and contaminating and demoralizing duties that devolves [sic] upon the hardier sex—man” (Elshtain 230). Indeed, it can be assumed that this gendered division suggests that the softness of the female sphere is required to make up for the hardness of the male.

Throughout history, both men and women have challenged the expectations of their respective genders through subversion and rejection. In her 1990 book titled *Gender Trouble*, Judith Butler develops her theory of performative gender by deconstructing the gendered spheres. The self-proclaimed purpose of Butler’s text is to “think through the possibility of subverting and displacing ... notions of gender ... through the mobilization, subversive confusion, and proliferation of precisely those constitutive categories that seek to keep gender in its place by posturing as the foundational illusions of identity” (44). Surprisingly, Sadie Burke does not subvert the gendered spheres like the feminist heroes of Judith Butler, but instead rejects traditional femininity by becoming defiantly masculine, and assimilates to the public sphere that is conventionally restricted to men. Although she is described as being “built very satisfactorily” with “wonderful eyes,” her “awful clothes,” “violent, snatching gestures,” and “wild, electric” black hair that is “cut off at a crazy length” and flies “in all directions in a wild, electric way” creates a character of lackluster femininity. However, the most detracting attribute is her pock-marked face, which Jack Burden describes as “a plaster-of-Paris mask of Medusa” that has “been [used] as a target for a BB gun” (Warren 170). In chapter two, readers learn that Burke’s loss and ultimate rejection of femininity began with

a childhood case of smallpox. She reveals this childhood pain to Jack Burden while pulling viciously at her scarred skin. She agonizes that her “brother died—and he ought to have lived,” and simultaneously confesses that “it wouldn’t have mattered to him—not to a man—but me, I didn’t die” it is clear that she fully understands the significance of her disfigured appearance (Warren 173). It is easy to assume that this survival of sister over brother represents a subversion of “gender within its binary frame,” by challenging the inherent weakness of women (Butler 526). However, Burke’s survival is not intended to be a social commentary on the foolishness of gendered expectations, but rather Warren’s reiteration of the importance of beauty for women, and the ultimate reason behind Burke’s choice to assume her place in the political world that is so commonly guarded by masculinity. Undoubtedly, the unflattering haircut and exaggerated lack of style Burden mocks throughout the narrative are Burke’s personal form of rejection to the femininity that was stolen from her at such a young age. Therefore, this passage enables readers to realize the significance of her loss of beauty in the creation of Sadie Burke who resides in the public sphere of politics, rather than the role of Sadie Burke in the private sphere of household civility that she could have assumed.

This passage also introduces readers to the basis of Sadie Burke’s character, which is found in Warren’s frequent allusion to the legend of Medusa. Sadie Burke is equated to the mythical Medusa in more ways than their shared tragic beauty. To begin, various ancient legends place considerable importance on Medusa’s eyes. Some legends claim that a single look from her cold eyes turned men irrevocably into stone, while others refer to her blue-green gaze as hypnotizing. She is also said to express “her wrath by making flames shoot forth from her eyes” in Virgil’s *Aeneid* (“Medusa”). Likewise, Sadie Burke’s eyes are described as a “conflagration,” which burns into the hearts and backs of anyone between herself and her goals (Warren 170). Later in the narrative, Burden even remarks that the eyes he meets in the sanatorium “did not belong to Sadie Burke,” because “There wasn’t anything

burning” (Warren 493). This observation reinforces Burke’s likeness to Medusa, for both their eyes claim great significance. Furthermore, Sadie Burke is often depicted as metaphorically guarding the door to the world of politics. In many passages, Burke is found lingering outside the doors of political negotiations and acting as the middleman who relays messages or appointments between Stark and government officials, various businesspeople, and the public. She even acts as a barrier between The Boss and the political bigwigs mulling around his house, by clearing “‘em all out ... and fast” (Warren 40). In the same way, Medusa serves as a guardian in numerous ancient legends. From Hesiod’s *Theogony* and Homer’s *Odyssey* to Dante’s *Divine Comedy* and Milton’s *Paradise Lost*, she is “the guardian of terrifying places,” including “the nocturnal borders of the world” and “the world of the dead” (“Medusa”). Surprisingly, throughout her dedication to Stark’s politics, Burke manages to maintain her own identity through her rejection of traditional femininity. Similar to Medusa’s assertion of “her ‘own’ identity,” she maintains this identity even while engaging in sexual intimacy with Willie Stark (“Medusa”). While Lucy Stark is rarely labeled anything but Mrs. Stark, and Anne Stanton is habitually referred to as Stark’s mistress, it is never explicitly stated that Sadie Burke is sleeping with The Boss. Moreover, in contrast to Sadie Burke, Lucy Stark and Anne Stanton exist solely through their male counterparts. Lucy Stark does not show up in the narrative unless context or clarification is required to paint a better picture of her husband. Similarly, Anne Stanton is only described through the terms previously assigned to her brother Adam. According to Burden’s description, her skin-tone is “brown-toned” and “golden-lighted,” but not as dark as Adam’s, her facial structure paralleled “the tension which was in Adam’s face,” her “blue eyes looked at you like Adam’s eyes,” and “They even had the same smile” (Warren 125). Undoubtedly, while Anne Stanton exists through Adam, and Lucy Stark through Willie, “Sadie Burke was just Sadie Burke” (Warren 117). Additionally, the legend of Medusa claims that her decapitated head acts as “both a mirror and a mask” (Medusa). Just

like Medusa’s double role, Sadie serves as a mask to the brutal truth behind the closed doors of Governor Stark’s political games, as well as a mirror to the pain of his careless actions. She is the perfect mask, for she is dependable, untrusting, and quiet (Warren 397). This is proven when she admits that Stark’s actions stay “in the family” when faced with yet another affair (Warren 397). Her role as a mirror intensifies when she checks into the sanatorium, in which she decides to leave the world of politics altogether. Once a burning light of political prowess and passion, the consequences of Stark’s corrupt practices leave her with “unburning eyes” (Warren 493). Clearly, Burke’s withdrawal from the masculine world of politics she had fought for so long to conquer serves as a mirror to the carelessness of Stark’s personal and political life.

Echoing Medusa’s protective powers, Sadie Burke protects Willie Stark from playing fool to Joe Harrison by exposing Harrison’s ruse. Willie Stark launched his run for Governor honestly. He began as a humble man eager to provide candid politics and create a trustworthy government. Harrison’s henchmen convinced him that he could “change things,” while actually using him to “split the MacMurfee vote,” and he “swallowed it” without complaint (Warren 110). When Burke interrupts a conversation between Burden and Stark on “how he’s not going to be Governor,” she mistakenly assumes someone has divulged Harrison’s plot (Warren 95). Caught in her blunder, she plays it off with calm flippancy and concedes, “you’ve been framed!” (Warren 97). Confessing Stark’s role as monkey-in-the-middle of Harrison and his opponent Sam MacMurfee was certainly not her intention. However, “Somewhere way back inside of Sadie Burke there had been the idea that ... somebody was going to tell Willie,” and she took this role in stride (Warren 98). Burke’s confession is marked as the pivotal moment in her transcendence to the role of creator God. It is Sadie Burke that admits Stark is framed and thus Sadie Burke who assumes responsibility for the muckraking monster present within Warren’s final chapters. Even Stark himself accredits Burke for his enlightenment in an unexpectedly fiery speech of resignation. His declaration that he would still

be a fool if it weren't for "that fine woman right there ... honest enough and decent enough to tell the foul truth" is the first step in his transformation from farmer to fascist (Warren 111). This archetype of creator God is furthered with the Judeo-Christian tradition that claims creation is made in the image of God and thus is a reflection of His Godly desires. Similarly, Stark's emboldened journey from rags to riches directly mirrors Burke's own. They have both "come a long way from the shanty in the mud flats" and are equally hungry for more (Warren 101). The difference, however, is that Burke wanted power from the beginning. Unlike the happy hillbilly version of Stark readers find at the beginning of the narrative, Burke is static in her desires. Under the guise of a powerless woman secretary, Sadie Burke is often the puppeteer guiding Stark's political puppet strings. Her innate desire for power and willingness to use men to achieve this power is made clear through her previous relationships. "Sadie was a very smart cooky," Burden surmises, confessing that she had also put her previous beau Sen-Sen Puckett "into political pay dirt," which refers to extensive profit (Warren 88). With both Puckett and Stark in mind, it is clear that Burke doesn't want to simply support the man in her life, but in fact she uses these men to achieve some semblance of power. Trapped by the limits of her gender in the society of the mid 1930s, she is willing to wait for a man with potential, through whom she can exercise her political savvy and gain power. Thankfully, "Sadie knew how to wait ... She had to wait for everything she had ever got out of the world" (Warren 398). Thus, by pulling the puppet strings of political men, Sadie achieves her own form of power.

According to *Archetypes and Motifs in Folklore and Literature*, the archetype of the creator God "combines the attributes of visibility and invisibility simultaneously" although usually "his invisibility is more significant than his visibility" (7). Burke clearly establishes her visibility both by being the only woman in the world of men, as well as through the flawless management of Stark's political affairs and constant presence at his side. However, the majority of her work and influence is behind the scenes. In fact, she is often

described as being surrounded by "a coronal of smoke" that revolves "slowly about her head" (Warren 157). She is undeniably present yet still hidden by the smolder of her cigarette. This cloud of smoke imagery that often accompanies Burke is the greatest reflection of her simultaneous visibility and invisibility. The sexual relationship between Burke and Stark is also representative of Stark's invisibility. While critics argue that the assimilation of women into male spaces causes women to give up their feminine charms, Sadie Burke does not. Although she talks like a man and looks "them straight in the eye like a man," she balances public masculinity with private femininity, a perfect equilibrium that manifests within her sexual relationship with Stark (Warren 101). Often referred to as the "only one who knew the trick" to rattle Stark's proverbial cage, and the only one who "had the nerve" to do so, it is clear that Burke exerts sexual power over her male counterpart (Warren 39). Additionally, in light of his extracurricular escapades with "sluts on skates," Sadie Burke confidently affirms that "He'll always come back" (Warren 174). This detached proclamation is clearly influenced by her participation in the masculine sphere, and readers come to find time and time again that she is truthful in her assertion. While every business trip has its fair share of sluts on skates, Willie Stark always comes crawling back. Unfortunately, these reunions are not limited to kissing and making up, and it is in one of these vitriolic fits of rage that Burke herself proclaims her role in Stark's creation. Following an eventful business trip, she is found screeching furiously at Burden, "Who made that son-of-a-bitch what he is today? Who made him Governor?" (Warren 171). These mock-inquisitions establish a level of comfort with her role as creator God and instill her significance within the minds of readers.

Sadie Burke's attempt to fully return to the sphere of traditional femininity leads to the ultimate exercise of her role as God the destroyer, namely Stark's murder. Many creation myths depict God "as both the creator and destroyer without any sense of contradiction," and it is clear through Willie Stark's assassination that Burke's role as creator God is no

different (Archetypes 6-7). Throughout her relationship with Stark, Burke walks on a tightrope between her masculine, public persona and the privately feminine creature she assumes in sexuality. However, once she discovers Stark plans to resume faithfulness to his wife, “just then like a flash [she] knew [she’d] kill him” (Warren 497). This revelation causes her to break from the masculine mold in which she dwelt and attempt to do anything she can to preserve the relationship, an attempt that possesses inherently feminine implications. Burke’s desperation to “attract and keep a man” is a “commonly accepted practice of femininity,” and serves as Burke’s attempt to cross over the return threshold into the fully feminine sphere (Discourse 274). This desperation is demonstrated when she directs Tiny Duffy to reveal Stark’s affair with Anne to Adam Stanton, which results in a bullet in the bodies of both Stark and Adam Stanton. Although she does not literally murder The Boss, her actions figuratively “put the weapon into [the killer’s] hand and had aimed it for him” (Warren 497). Furthermore, Burke threatens to kill Stark for his unfaithfulness multiple times throughout the narrative. When faced with the proposition of leaving him, she proclaims, “I’ll kill him first, I swear it” (Warren 174). Warren’s heavy use of foreshadowing perpetuates the characterization of Sadie Burke as the all-knowing Judeo-Christian God. Even when Burden suggests getting back at Duffy for his assumption of Stark’s government position, she hesitates, declaring that “the world is full of Duffy’s [sic],” and immediately admitting that she’s “been knowing them all [her] life” (Warren 499). This is a reference to her previous sexual relationship with the political bigwig Sen-Sen Puckett, and is a moment of clarity regarding her latest creation. Interestingly enough, at the beginning of the novel Puckett is credited for tricking Stark in the Harrison scheme (Warren 88). It is clear from her experience with Puckett that Burke knew from the beginning that her transformation of Stark would result in another Duffy. Warren’s final pages reiterate Burke’s omniscience, when Jack Burden’s stepfather hauntingly dictates, “The creation of man whom God in His foreknowledge knew doomed to sin

was the awful index of God’s omnipotence” (529). With the foreknowledge that creation is bound to morally fail, resulting in inevitable death, the Judeo-Christian God unmistakably acts as both a creator and destroyer. For “the wages of sin is death,” and Burke knew her creation was doomed to sin. This idea is reinforced by revisiting Burke’s aforementioned possession of a distinct identity. Warren writes that “Separateness is identity and the only way for God to create, truly create, man was to make him separate from God Himself, and to be separate from God is to be sinful” (529). By clinging to her own identity, it is clear that this separation was the only way for Burke to create, which demands the sin and ultimate destruction of her creation.

Arguably, Burke is responsible for the deaths of two Starks, both Willie and his son Tom. Tom is described as “merely an extension of the father . . . a trained-down, slick-faced, confident, barbered version” of The Boss (Warren 442). Her conversion of the father into a bloodthirsty Governor led to an outrageously lavish upbringing for the son, which in turn created an overindulged, lazy young man. If Burke had never revealed the truth of Harrison’s scheme to Willie Stark, Tom’s childhood would have replicated the youth of his father’s, spending his days cultivating the land, wearing unkempt suits, and remaining faithful to his schoolteacher-wife. However, it is clear through his insolent attitude in the midst of lavish gifts and vigorous praise that Tom Stark is a product of his father’s corruption. While Stark once “blunder[ed] and grop[ed] his unwitting way toward the discovery of himself,” it is clear that Tom didn’t share this journey of self-discovery, “For he knew that he was the damndest, hottest thing there was” (Warren 442). Rather than working to achieve his aspirations, Tom Stark was spoiled with a childhood filled with luxury and ease, a life that adolescent-Willie had only dreamt of. In fact, Stark’s own wife accuses him of ruining their son, crying that she “would rather see him dead at [her] feet than what [Stark’s] vanity will make him” (Warren 277). This harrowing admittance foreshadows their son’s early death, which can be interpreted as the outcome of Tom’s idle

selfishness. During the final game before the championship, Tom puts “on a little show for the stands,” rather than taking it seriously, which results in the careless football accident that ultimately claims his life (Warren 445). If Burke hadn’t created The Boss, presumably Tom’s childhood would have echoed the childhood of his humble father and perhaps saved him from a premature death.

In its final pages, Warren’s narrator pronounces, “This has been the story of Willie Stark, but it is my story, too” (527). However, Jack Burden fails to recognize the principal role Sadie Burke plays within their narratives, for clearly it is her story as well. Without Willie Stark’s rise to the brutal and politicized version who readers find at the novel’s closing, the story of Jack Burden would be meaningless, and this conversion did not happen with Stark alone. As demonstrated by his violent protest that “they made me!” the responsibility for Stark’s transformation lay in Sadie Burke’s hands (Warren 440). In a subconscious struggle for power, she takes advantage of Stark’s gender and uses it as a vessel to achieve the potential that is otherwise limited to her. Furthermore, Burke wholly rejects the feminine sphere and transcends to the archetype of the creator through the reinvention of Willie Stark as personified in The Boss. It is only through her return to traditional femininity that she ultimately destroys The Boss, thus fulfilling the role of destroyer in her claim to godliness.

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## The Gaps in Health Care of the LGBT Community: Perspectives of Nursing Students and Faculty

*“Their care shouldn’t differ from the average patient.”*

*“All the hours in class I have spent learning patient care: they would not be treated any different!”*

— excerpt statements from participants

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When considering American adults who choose to disclose their sexual identity, 3.8% identify themselves as being lesbian, gay, bisexual, or transgender [LGBT] (US Department of Health and Human Services, 2012). This translates to about nine million individuals in the United States (Gates, 2011). It is likely that most nurses or health care providers have encountered LGBT individuals in their practices whether they were aware of such patients’ sexual orientation and gender identities or not. Why is LGBT health important? There is a history of anti-LGBT bias in healthcare that continues to impact health-seeking behavior and access to care for LGBT individuals despite increasing social acceptance (Mayer et al., 2008; Meyer, 2003; Coker et al., 2010; Institute of Medicine, 2011; Obedin-Maliver et al., 2011; Smith & Matthews, 2007; Strong & Folse, 2015). Most importantly, healthcare providers must also be informed about LGBT health because of the numerous health disparities which affect members of this population. Sexually transmitted infections, including human immunodeficiency virus [HIV] (Workowski & Berman, 2010; CDC, 2012), eating disorders and body image disorders (Boehmer, Bowen, & Bauer, 2007), suicide (CDC, 2014; Saewyc, Konish, Rose, & Homma, 2014; Grossman & D’Augelli, 2007; Meyer, 2003;), substance abuse (Song et al., 2008), and depression (Ruble & Forstein, 2008; Birkett, Espelage, & Koenig, 2009) are major concerns among some LGBT groups.

The LGBT community is diverse. They represent people from various backgrounds differing in race, ethnicity, age, gender, socio-economic status, and identities (Chandra, 2011). Some of the common experiences they face include stigma and discrimination as they integrate into society (Mayer, 2008; Grossman & D’Augelli, 2007, Saewyc et al., 2014). They often conceal their sexual orientation for fear of retribution. Reported cases of suicide among teenagers bullied for being gay, lesbian, bisexual, or transgender have shed light on the violence and victimization experienced by LGBT individuals (Birkett et al., 2009, Russell, Ryan et al., 2011). Sexual orientation is often one of the common

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factors that motivates violence and hate crimes towards LGBT adults and youth (Espelage et al., 2008). Such events often produce an environment of stress and intimidation even for those not directly impacted. As a result, the LGBT community faces challenges in accessing culturally competent health services to achieve the highest quality level of health. Discrimination and the lack of awareness of health needs by health professionals (Cornelius & Carrick, 2015; Smith & Matthews, 2007; Strong & Folse, 2015) are barriers that need to be addressed.

Every semester over 50,000 students graduate from nursing programs. According to the American Association of Colleges of Nursing (AACN, 2012), there are approximately 674 four-year institutions in the United States that offer Bachelors of Science in Nursing (BSN) degrees. Graduating nurses must enter the workforce ready to meet the needs of a diverse population. Standards are in place to ensure that critical competencies are met and that the nursing curricula have prepared these individuals to provide safe, qualified, and skilled nursing care. Nurses are often the first point of contact when patients seek medical attention. It is essential that the nurse is culturally competent and prepared to provide care to individuals of all backgrounds.

Among many variables, cultural competence includes religion, race, ethnicity, and sexual orientation. As health care providers, nurses have an obligation to be knowledgeable about and sensitive to the health care needs of marginalized individuals. If curricula do not prepare nurses to provide optimal care, then health disparities will continue to exist for LGBT individuals (Cornelius & Carrick, 2015). Research suggests that the average time spent in the classroom covering LGBT health in BSN programs is 2.12 hours (Lim, Johnson, & Eliason, 2015). Cultural competency and the subsequent incorporation into nursing curricula are pivotal to the essence of nursing (Carabez, Pellegrini, Mankovitz, Eliason, & Dariotis, 2015; Carabez et al., 2015). Calvillo et al. (2009) outlined standards for cultural competence in their article titled, "Cultural Competency in Baccalaureate Nursing Education," which was published in

2009 in the *Journal of Transcultural Nursing*. According to Calvillo et al. (2009) existing models often fall short of the needs of nurses who encounter diverse patients in their clinical practice. They emphasized that the intent of a culturally competent curriculum is to ensure that students have the knowledge, attitudes, and skills that allow them to work effectively with patients and their families, as well as with other members of communities including the health care medical community. Cultural competence should not be an "add-on" to the existing curriculum. Total curriculum review and revision should be undertaken to address education for cultural competency (Brenna, Barnsteiner, de Leon Siantz, Cotter, & Everett, 2012; Calvillo et al., 2009).

In line with the goal of eliminating health disparities, Healthy People 2020 outlines the need to improve the health, safety, and well-being of lesbian, gay, bisexual, and transgender (LGBT) individuals. Often, sexual orientation and gender identity questions are not asked on most national or state surveys which makes it difficult to accurately estimate the number of LGBT individuals and their health needs. Furthermore, research suggests that LGBT individuals face health disparities linked to societal stigma, discrimination, and denial of their civil and human rights (Ruble & Forstein, 2008). Discrimination against LGBT persons has been associated with high rates of psychiatric disorders, substance abuse, and suicide (CDC, 2014). Experiences of violence and victimization are frequent for LGBT individuals and have long-lasting effects on the individual and the community. Personal, family, and social acceptance of sexual orientation and gender identity affects the mental health and personal safety of LGBT individuals (Espelage et al., 2008.)

In 2011, the *National Healthcare Disparities Report* stated that every day, gender non-conforming people bear the brunt of social and economic marginalization due to their gender identity. The laws centered on this population are starting to change, but changes in discrimination and attitudes towards the LGBT community are still lagging. Too often, policy-makers, service providers, the media, and society



at large have dismissed or discounted the needs of gender nonconforming people in their communities (Agency for Healthcare Research & Quality, 2014). Studies like this are an essential part in creating awareness of LGBT health disparities and their need to be eliminated. Logic dictates that in order to eliminate known disparities health care workers must first know what they are. According to Healthy People 2020, eliminating these disparities will reduce disease transmission and progression, increase mental and physical well-being, provide LGBT individuals with supportive services, and increase life expectancy.

Research points to common prejudices and false assumptions about the LGBT community that often act as barriers to quality healthcare. The attitudes of nurses and the impact of those attitudes are very relevant to the issue of LGBT healthcare (Strong & Folse, 2015; Smith & Matthew, 2008). Societal stigma, including avoidance of disclosing one's sexual minority status, threats or acts of violence, avoidance of health care providers, and risk of pregnancy among LGBT teens needs to be identified and discussed (Brennan et al., 2012). LGBT healthcare topics must be brought to the forefront and discussed. Other challenges to be addressed include the integration of spiritual and religious beliefs, self-awareness, and the fact that until recently LGBT issues have not really been approached in nursing education (Brennan et al., 2012; Carabez et al., 2015). Nursing research has inadequately addressed the health needs of the LGBT population. Between 2005 and 2009, the top 10 nursing journals published only eight articles that focused on LGBT health issues of almost 5,000 total articles (Strong & Folse, 2015). This study aimed to address the discourse of nursing programs preparing students for provision of culturally competent care for all individuals, including the LGBT community.

### **Purpose**

The purpose of this study was to explore the perceptions of nursing students and faculty on LGBT health issues in a BSN program. The far reaching purpose of this study was to increase awareness in cultural competencies specific to

the LGBT community and to increase coverage time in the curriculum. In this current health climate, LGBT individuals are identified as a priority population. This study hopes to explore the gaps, challenges, and successes in a BSN nursing educational curriculum. It is our hope that findings from this study will contribute to the existing literature and add to the discourse to improve health outcomes and reduce health disparities in the LGBT community.

### **Research Questions**

There is the need to examine the education and preparation of the nurses who will provide skilled care to the LGBT community. Educating the nurses of tomorrow to provide culturally competent care to all individuals from diverse backgrounds is essential. The research questions addressed are: (1) Are faculty incorporating LGBT topics into their nursing curriculum? (2) What is the BSN student's and faculty's knowledge and perception of specific LGBT healthcare needs, and do they feel equipped to meet them? (3) How do BSN program members view the importance of minimizing health disparities affecting LGBT individuals? (4) Do BSN students feel that their nursing curriculum successfully meets LGBT competencies and prepares them for the workforce?

The underlying assumption of the study was based on Madeline Leininger's Theory of Culture Care Diversity and Universality. Leininger's theory describes how nurses provide meaningful and culturally-competent care for a diverse population of patients (Murphy, 2006). According to the theory, understanding a person's values and cultural background is essential to influence patient outcomes. Patient care will improve and become more adept over time if nurses continuously seek knowledge, develop cultural competence, and incorporate learning into their practice. In order to effectively care for lesbian, gay, bisexual, and transgender patients, nurses must understand the culture and concerns of those individuals (Murphy, 2006).

### **Review of Literature**

The authors first began a review of literature by utilizing an online digital library and

**Table 1: Definitions**

<b>LGBT</b>	Lesbian, Gay, Bi-sexual, Transgender
<b>Lesbian</b>	An individual that identifies oneself as a woman who is primarily attracted to other individuals who identify themselves as women
<b>Gay</b>	An individual that identifies oneself as a man who is primarily attracted to other individuals who identify themselves as men
<b>Bi-sexual</b>	An individual that is attracted to both men and women
<b>Transgender</b>	Is when an individual's behavior and expressions do not identify with the traditional identities of those of the individual's birth gender
<b>Health Disparities</b>	Refers to differences in the health statuses of those that are lesbian, gay, bi-sexual and transgender
<b>Cultural Competency</b>	A term used when health care providers deliver services that are respectful of and responsive to the health beliefs, practices, cultural, and linguistic needs of diverse patients

database Galileo Scholar, EBSCO and associated databases, academic search completes, and CINAHL complete, all delivered relevant literature. Keyword searches were utilized over multiple days. A recent study published in the *Journal of Professional Nursing* describes the current sociopolitical focus on the healthcare needs of lesbian, gay, bisexual, and transgender patients, while drawing attention to the lack of basic education that nurses receive on how to provide LGBT patient-centered care (Carabez et al., 2015). In general, nursing has been slower than other health professions to address LGBT health. This study investigated the education or training of nurses on LGBT issues, attitudes, stereotypes, and comfort level. Findings of the study indicated that 71% of the nurses who responded said they were comfortable providing care to LGBT patients, 79% of respondents indicated that LGBT patient-centered training was not offered at their respective practice settings, 20% of nurses wanted training or wished that more was available, and about 30% of respondents expressed stereotypical beliefs about LGBT people (Carabez et al., 2015). The study concluded there was a need to integrate LGBT content into schools of nursing.

Cornelius and Carrick (2015) published a study in *Nursing Education Perspectives* which examined the knowledge and attitudes of nursing students in the U.S. towards providing

health care to the LGBT community. This study reported that nursing students felt that nurse educators were not proactive in addressing issues of LGBT patients. It was specifically noted that many providers and educators themselves lacked adequate knowledge in LGBT health issues to prepare students to deliver culturally competent care to the LGBT community. Cornelius and Carrick (2015) further recommended that nursing schools examine their curricula and discuss health disparities that LGBT patients face. The need to prepare the next generation of faculty and students to openly discuss health disparities with diverse clients, including LGBT clients, is essential to break down barriers. Lim, Johnson, and Eliason (2015) conducted a national survey of baccalaureate nursing program faculty that explored faculty knowledge, teaching experience, comfort, and readiness to teach LGBT Health. A total of 721 schools and 1,231 faculty members participated in the survey. Results indicated that 69% of respondents reported that they never or seldom teach LGBT health topics; 70% perceived LGBT health issues were important in nursing, and the majority of respondents indicated some degree of readiness to include LGBT health in their teaching. In conclusion, Lim, Johnson, and Eliason (2015) recommended undergraduate school of nursing programs adopt the Institute of Medicine's (IOM) four conceptual perspectives

(minority stress model, life course, intersectionality, and social ecology) as a framework for weaving LGBT issues into nursing courses with implications for curricular change.

### Methods and Research Design

This study used a cross-sectional descriptive design. The study was approved by the investigators' institutional review board. All ethical standards were followed. Data was collected from a convenience sample of 183 participants in the U.S. (167 nursing students and 16 nursing faculty members in a four year nursing degree program in rural Southeast Georgia).

Permission was granted by faculty to access students in their classrooms for recruitment and administration of surveys. Recruitment of faculty for the study was done at a monthly general faculty meeting with permission from the chair of the nursing program. Participants had to be 18 years or older and able to provide passive consent. Participation was voluntary. Qualitative comments were reflected upon and studied for their subjective value. Table 1 lists and defines key definitions for this study. The term LGBT is utilized as an umbrella term, and the authors recognize that the health needs of lesbians, gay, bisexual, and transgender people are not universally the same; each population brings forth distinct needs.

### Measures

A brief, 25-question questionnaire was used to collect data. Since a preexisting survey could not be located, a survey was developed by the investigators using information from previous research from the literature. The research was consulted in order to include current topic-related issues. Questions were formulated to elicit relevant data. Survey questions included demographic information, knowledge and interest in LGBT health issues, and personal values. Many of the questions targeted the perspective of nursing students and faculty on LGBT health in the nursing curriculum. The first survey questions addressed relevant demographic data. Twelve questions explored views on whether the participants felt competent enough to provide care to LGBT individuals. These twelve questions also

**Table 2: Sample Demographic Profile**

Items	Students (N=167) & Percent (%)	Faculty (N=16) & Percent (%)
<b>Age (Years)</b>		
18-24	156 (85.2)	0
25-31	6 (3.3)	2 (1.1)
32-38	3 (1.6)	0
39-45	1 (0.5)	1 (0.6)
46-52	1 (0.5)	4 (2.2)
>53	0	9 (4.9)
<b>Gender</b>		
Male	21 (11.5)	0
Female	146 (79.8)	16 (8.7)
<b>Religion</b>		
Christian	139 (76.0)	15 (8.2)
Spiritual	7 (3.8)	1 (0.5)
Non-Christian	13 (7.1)	0
Atheist	4 (2.2)	0
Other	3 (1.6)	0
Refused	1 (.5)	0
<b>Class Level</b> 91.9% = students (N/A to the 8.8% that are faculty)		
Juniors	90 (49.2)	N/A
Seniors	78 (42.7)	N/A
<b>Faculty Years of Teaching</b>		
≤ 8 years	N/A	6 (37.5)
≥ 8 years	N/A	10 (62.5)
<b>Estimated Number of Hours Instructed or Received on LGBT Issues Per Academic Year in the Nursing Curriculum</b>		
≤ 5 hours	136 (83)	12 (7.3)
≥ 5 hours	13 (8)	4 (2.4)

inquired about survey respondent's knowledge, interest, and personal values. Six additional Likert scale questions were used to evaluate how frequently the participants were exposed to specific LGBT health issues over the course of

**Table 3: Perceived Differences among Nursing Students and Faculty on LGBT Health Issues**

Measured Items	Participants (N=183)			
	Students N=167 (%)		Faculty N=16 (%)	
	Yes	No	Yes	No
Competent or have adequate knowledge in addressing the healthcare needs of the LGBT community	93 (55.7)	73 (44.3)	10 (62.5)	6 (37.5)
Have received appropriate information and content Instruction to meet the healthcare needs of the LGBT community	41 (24.5)	120 (75.5)	6 (37.5)	10 (62.5)
Personal views directly affect care towards the LGBT community	11 (6.6)	155 (93.4)	0	16 (100)
Interested in gaining more knowledge on how to care for the LGBT individuals in the healthcare setting	113 (67.7)	53 (32.3)	10 (62.5)	5 (37.5)
Would refuse to provide care to someone on the basis of their sexual orientation if that option was available with no recourse	5 (3)	162 (97)	0	16 (100)
Equipped with the appropriate resources to provide competent care to LGBT individuals	97 (58)	70 (42)	11 (68.7)	5 (31.3)

**Table 4: Perceptions of Nursing Faculty on LGBT Health Issues**

Perceptions of Nursing Faculty on LGBT Health Issues	Nursing Faculty Responses N=16 (%)		
	Agree	Disagree	Neutral
LGBT health topics are important	1 (6.3)	13 (81.3)	2 (12.4)
I feel uncomfortable addressing LGBT topics	3 (18.8)	11 (68.8)	2 (12.4)
I lack knowledge of LGBT health topics	4 (25.0)	9 (56.2)	3 (18.8)
I am aware of where to locate the LGBT resources I need	8 (50.0)	5 (31.2)	3 (18.8)
I think that my nursing curriculum successfully addresses LGBT cultural competencies	4 (25.0)	8 (50.0)	4 (25.0)

their nursing education. The last question gave participants the opportunity to estimate how many hours over the course of their nursing education were dedicated to LGBT individuals' health care needs. Many of the questions served to address the perspective of nursing students and faculty on the way LGBT health is incorporated into their curriculum. Collected data was entered and analyzed using SPSS 23 Statistical software program. Statistical analysis included the use of descriptive statistics and Pearson's chi-square. Open-ended comments from participants were included in the analysis.

**Results**

Sample characteristics of the participants are shown in Table 2. The majority (91.1%) of the sample were students compared to 8.8% as faculty. Greater than 80% of the sample self-reported as Christians. The majority of faculty and students surveyed indicated they have had received or provided instruction of less than 5 hours per academic year on LGBT health issues in the nursing curriculum.

Table 3 shows the perceived differences on LGBT health issues among nursing students and faculty. Among the participants, 44.3% of

**Table 5: Students Perception on Received Instruction on LGBT Health Issues**

Over the course of nursing school, indicate the frequency of receiving instruction or being taught on the following:	Nursing Students (N=167)			
	Seldom		Regularly	
Need for LGBT health research	148	(88.6)	19	(11.4)
The shortage of knowledgeable and culturally competent healthcare providers	95	(56.9)	72	(43.1)
Specific LGBT health concerns such as tobacco and alcohol use, depression, suicide, stressors, bullying, etc.	129	(77.2)	38	(22.8)
LGBT sexual education needs, knowledge and STD risk, prevention, and safety	114	(68.3)	53	(31.7)
Mental health and social issues	104	(62.3)	63	(37.7)

nursing students and 37.5% of faculty indicated they did not feel competent or have adequate knowledge in addressing LGBT health issues. Results also indicate that 75.5% of students and 62.5% of faculty have not received or been provided the appropriate information and content instruction to meet the healthcare needs of the LGBT community. Of concern is the 3% of students that would refuse care to an individual on the basis of their sexual orientation and the 32.3% of students who are not interested in gaining more knowledge on how to care for LGBT individuals in the healthcare setting. It is encouraging and worth noting that 58% of students and 68.7% of the faculty participants reported that they are equipped with appropriate resources to provide competent care to the LGBT community.

Analysis using a chi-square test of independence between participants equipped with LGBT resources and their interest to gain information to further equip them to provide culturally competent care showed a significant relationship of  $X^2(1) = 19.739$ ,  $p=0.000$ . A chi-square test of independence was calculated comparing the relationship between interest in gaining more knowledge and feeling equipped with appropriate resources. A significant interaction was found ( $X^2(1) = 19.739$ ,  $P=.000 < 0.001$ ). 35.4% of BSN nursing students and faculty reported not feeling equipped with the appropriate resources and wanting to gain more knowledge.

Table 4 focuses on faculty responses and

reports that 18.7% of faculty did not feel comfortable teaching LGBT topics and 50% reported that the nursing curriculum did not successfully address LGBT culturally competent care.

Student perceptions presented in Table 5 indicate that 77.2% of participants seldom received instruction on health issues including depression, suicide, mental health, and social issues and 68.3% of students seldom received instruction on LGBT sexual education and STD risks; these issues affect quality of life and health outcomes for the LGBT community.

### Discussion

Findings of this study indicate that education, with regard to LGBT health, is sparse in nursing school; a median of approximately 3 hours or less was devoted to LGBT issues during participants' training in nursing school. While attitudes have improved, some providers continue to harbor anti-LGBT attitudes. A few of the participants reported feeling uncomfortable treating and/or caring for LGBT patients. As a result of providers' negative attitudes, LGBT patients may be reluctant to reveal their sexual orientation or gender identity, information that may be important for their health care. Hesitancy to disclose important information to healthcare providers can affect the quality and safety of care received.

In many ways, providing culturally competent care to LGBT patients should not differ from providing patient-centered care to

any other group. Survey participant's comments such as *"Their care shouldn't differ from the average patient. Sorry"*; *"They aren't different from normal people. I mean their body works the same"*; and *"All the hours in class I have spent learning patient care: they would not be treated any different"* indicate that care for LGBT individuals should be consistent with other individuals. Consistent care does not equal the same care. Patient-centered care is just that: centered to the patient. As with all patients from diverse backgrounds, effectively serving LGBT patients requires providers to understand the cultural background of their patients' lives, modify practice policies and environments to be inclusive, take detailed and non-judgmental histories, educate themselves about the health issues of importance to their patients, and reflect upon personal attitudes that might prevent them from providing the kind of affirmative care that LGBT people need. In the absence of formal instruction in this area, nurses can turn to resources such as the Centers for Disease Control and Prevention (CDC) for national guidelines and recommendations. By taking these steps, nurses can ensure that their LGBT patients, and indeed all their patients, receive the highest possible quality of care.

### Strengths & Limitations

Study limitations include a small sample size. Data collection was cross-sectional with a convenience sample. The sample was recruited from a rural southeast university where the population could be described as homogeneous in nature. Minorities, males, and faculty participants were underrepresented. The sensitivity of the topic may have influenced sample size. The views and perspectives of nursing students and faculty in the study on LGBT health issues may not represent those of the general population. There were significant time constraints to this one-semester project. This study intended to increase understanding of the gaps in BSN nursing education and to promote awareness of the need to incorporate LGBT cultural competencies into nursing curricula. A major strength of this study was the use of nursing students and nursing faculty. The authors invite those who read the study to examine their own personal biases and

attitudes for LGBT individuals. Findings of this study support the Carabez, et al., (2015) study: "Never in all my years of nursing, 37 years in nursing I've never been educated in that subject."

### Conclusion

It is clear that the social climate, attitudes, and laws are changing with regards to LGBT awareness. There is a clear need to integrate LGBT education into schools of nursing, nursing continuing education, and institutional orientation and cultural diversity training. Paradigm shifts need to occur in BSN programs to prepare students for a nursing workforce that deals with culturally sensitive practices (Carabez, et al., 2014). The task of origination, inclusion, and determining the health of the LGBT community is a big undertaking. It cannot be disputed that nursing requires working with diverse populations and cultures; however recent literature is still lagging in regards to research, theories, and guidelines regarding the synthesis of health care needs of the LGBT community. Rising students and faculty need to be prepared to openly discuss health disparities and diversity. It is critical to design an environment for nursing students that promotes an awareness of culturally competent care. BSN nursing programs may want to address these issues and concerns but have no idea where to begin. There is a need for dialogue involving content and framework that would lead the way for incorporation of LGBT content into curricula. An invitation is extended to all nurses to become knowledgeable about LGBT health disparities, whether it is provided in their BSN curriculum or researched on their own.

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## Optimism in Independence: The European Central Bank after the 2008 Global Financial Crisis

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Nearly nine years after the 2008 Global Financial Crisis (GFC), the European Union (EU) is struggling to recover. What started as a housing crisis in the United States spilled over into Europe and grew into full-blown economic struggle for countries inside and outside the European Monetary Union (EMU). Now, the European Central Bank (ECB), the institution charged with overseeing the EMU, is charged with stabilizing the entire banking system throughout the Eurozone.<sup>1</sup> This is only the most recent effort to address what has become the “new normal” in the EMU through the expanded mandate of the ECB.

In an age of globalization, the role of the ECB is greatly important to all players in the economy. The effects of the 2008 financial crisis demonstrate the dangers of contagion, especially for countries pushing for greater economic liberalization.<sup>2</sup> So, what implications do crises have for efforts to encourage economic liberalization, like encouraging central bank independence? What will these unsettling times mean for the long-term relationship between governments and independent central banks?

In this paper, we examine when political leaders will support or undermine the legitimacy of independent central banks in the aftermath of economic crises. We argue if a government is optimistic about its chances of retaining power and securing economic recovery, it will be more likely to issue positive, legitimizing statements toward its independent central bank. We evaluate this argument using the compelling and important case of the ECB following the 2008 GFC.

Our study makes a number of important contributions to both academic and policy communities. First, we highlight an important link between political and economic policy spheres using the mechanism of optimism. Previous studies have demonstrated the impact of optimism on individual activity in the economic market, but our study extends this research in a new area by using optimism to link political and economic activity.<sup>3</sup> Next, we seek to further unpack the concept of central bank independence by highlighting the small but meaningful ways legitimacy

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<sup>1</sup> Danny Hakim, “The Man Who’ll Do Triage on Europe’s Banks,” *New York Times*, 2013.

<sup>2</sup> D. Das, “Globalization in the World of Finance,” *An International Finance Reader*, New York (2003): Routledge, pp. 3-11.

<sup>3</sup> A. Cukierman, “Monetary policy and institutions before, during, and after the global financial crisis,” *Journal of Financial Stability* (2013): 8.

can be chipped away from these institutions. We are answering the call from scholars to examine how financial crises can impact these institutions.<sup>4</sup> Finally, we add to the growing literature that seeks to further explain the implications of the Eurozone crisis and the role of the ECB in resolving that crisis. By showing the importance of political optimism, we contribute to the broader discussions of how to manage the crisis and how to resolve it.

### **The Significance of Central Bank Independence**

Extant literature suggests that central bank independence (CBI) is a viable strategy for states to use to stabilize domestic economies, which could help prevent and respond to financial crises. Cukierman, Webb, and Neyapti test the relationship between legal CBI and inflation in 72 countries over four decades. The authors find higher levels of CBI have a negative relationship to levels of inflation and a positive relationship to price stability.<sup>5</sup> Thus, making the central bank an agent with a mandate for price stability allows the government to follow through with goals established in monetary policy. Therefore, if CBI were found to strengthen these long-term goals, states would be less likely to experience currency crises.

Alesina and Summers build on these findings by providing further evidence that delegating monetary policy to independent central banks promotes price stability. The authors argue the preferences of independent central banks are likely to be even more inflation averse than the preferences of society at large. Therefore, the independence of central banks from politicians with short-term goals helps to ensure long-term price stability in domestic economies.<sup>6</sup> Both of

these studies demonstrate the positive impact of CBI on domestic economic performance as well as government credibility in the international economy.

More recent scholarship has shifted the focus toward the interrelationship between CBI and political consequences. Bernhard and Leblang demonstrate expectations of a currency crisis can precipitate the end of a government and different types of governments can influence the probability of a currency crisis.<sup>7</sup> Clearly, then, governments are sensitive to financial markets and may be willing to take different political strategies to ensure political survival in the face of impending financial crises.

Pascal Petit demonstrates the strong connection between politics and economic crises in the context of the EU after the 2008 GFC. He argues, “the euro crisis is in the first place a political crisis,” rather than simply an economic crisis.<sup>8</sup> For Petit, strong political leadership is critical to resolving the crisis and allowing the ECB to function properly. Again, we see scholarship pointing to a strong connection between political choices and economic outcomes.

Our study extends previous research by emphasizing how CBI can be used specifically as a strategy to overcome financial crises. Moreover, we extend the current literature to investigate to what extent political actors attempt to legitimize or delegitimize the central bank’s efforts to respond to financial crises.

### **The Political Choice of CBI**

We conceptualize the relationship between the government and the central bank as a principal-agent framework. All governments have, by law or tradition, individuals or institutions designated as the principal policymaker for monetary and financial policy. In every case,

<sup>4</sup> W. Berger and F. Kisser. “Central bank independence and financial stability: A tale of perfect harmony?” *European Journal of Political Economy* 31 (2013): 117.

<sup>5</sup> A. Cukierman, S. Webb and B. Neyapti, “Measuring the Independence of Central Banks and Its Effect on Policy Outcomes,” *The World Bank Economic Review* 6 (1992): 353-398.

<sup>6</sup> A. Alesina and L. Summers, “Central Bank Independence and Macroeconomic Performance: Some

Comparative Evidence,” *Journal of Money, Credit, and Banking* 25 (1993): 151-159.

<sup>7</sup> W. Bernhard and D. Leblang, “Cabinet Collapses and Currency Crashes,” *Political Research Quarterly* 6, no.3 (2008): 521.

<sup>8</sup> P. Petit, “Building faith in a common currency: can the Eurozone get beyond the Common Market logic?” *Cambridge Journal of Economics* 36, no.1 (2012): 273.

principals have the capability and willingness to consider delegating this power to agents, either informally or formally, through legal processes. In the EMU, the preferred agent is a central bank, and the primary choice a principal must make in the case of delegation is to what degree they will allow this agent to have independence.

Governments will delegate monetary policy to independent central banks to increase the credibility of a state's commitments to monetary policy and to increase the ease and efficiency of the signaling process itself. By tying their hands to a specific monetary policy through increasing the independence of central banks, policymakers signal to market actors they are serious about committing to their policies without the interference of short-term political goals.<sup>9</sup> Once the goals of central banks are clearly stated and independence is established, market actors must only look to one focal point for information regarding a state's monetary policy.<sup>10</sup>

However, during monetary and financial crises, this principal-agent relationship comes under stress. Financial crises often result in price instability, inflation, and general economic instability—all of which are concerns central banks are designed to mitigate. While financial crises have severe economic consequences, these conditions are also dangerous for the political climate of states, as economic instability is known to create public dissatisfaction and unrest.<sup>11</sup>

In times of crisis, the principal-agent relationship becomes particularly salient for governments. One key benefit of making central banks independent is the insulation from short-term political goals that allow central banks to focus on long-term economic stability of their domestic economies.<sup>12</sup> However, long-term goals

can often be at odds with short-term demands by the public, such as reducing unemployment in the short term rather than controlling inflation in the long term. Thus, vulnerable governments may choose to delegitimize their independent central banks to open the possibility for short-term economic policies.

The central mechanism for determining whether governments will alter their relationship with central banks is optimism, which is an opinion by a political elite that she will remain in power. From an economic perspective, we know that optimism is a key stimulus to the economy. Consider the following quote from Cukierman:

When agents in the economy are more optimistic, they tend to borrow and lend more. This leads to larger levels of credit. At higher levels of credit, both borrowers and lenders are more exposed to negative news. Consequently, when new negative information arrives, the likelihood of a financial crisis is larger when leverage is higher. In addition the recessionary impact of the crisis is stronger when leverage is larger.<sup>13</sup>

We believe, therefore, that optimism is equally powerful in the political sphere. Just as economic agents will regain confidence in optimistic economic climates, so too will political agents respond positively to optimistic outlooks.

Therefore, if governments are optimistic that they will retain power, governments will be more likely to continue to legitimize the work of independent central banks in managing monetary policy. In these cases, governments feel they are less vulnerable to the public and are more willing to allow central banks to manage crises with a long-term outlook. However, if governments are less optimistic about their survival, we argue that governments will attempt to take back control of monetary power and seek to delegitimize independent central banks. Less optimistic governments will seek to take back control of monetary policy in an effort to show the general public it is in control of the economy. Moreover, less optimistic governments might believe they

<sup>13</sup> A. Cukierman, "Monetary policy and institutions before, during, and after the global financial crisis," *Journal of Financial Stability* (2013): 8.

<sup>9</sup> W. Bernhard, J. L. Broz and W. Clark, "The Political Economy of Monetary Institutions," *International Organization* 56 (2002): 693-723.

<sup>10</sup> D. Leblang and S. Satyanath, "Institutions, Expectations, and Currency Crises," *International Organization* 60 (2006): 245-262.

<sup>11</sup> Bernhard and Leblang, *Political Research Quarterly*, 518-530.

<sup>12</sup> W. Bernhard, J. L. Broz and W. Clark, "The Political Economy of Monetary Institutions," *International Organization* 56 (2002): 693-723.

are more politically vulnerable and will look for short-term solutions, which are less likely to be offered by independent central banks.

*H1:* High levels of government optimism will result in greater support of central bank independence.

*H2:* Low levels of government optimism will result in less support of central bank independence.

### Research Design

The European Union's response to the 2008 GFC provides an ideal case in which to evaluate our argument. The European Central Bank is the institution in the EU that has the greatest influence over monetary policy; the ECB acts as the supranational coordinating bank for the national central banks in Europe using the euro.<sup>14</sup> The primary objective of the ECB is to maintain price stability, although the ECB has also been responsible for overseeing the introduction and stability of the Euro since 1999.

Recently, the mandate and role of the ECB changed dramatically. While the crisis originated in the United States of America, it had a profound impact in Europe. In particular, the GFC caused real estate bubbles to burst in vulnerable countries like Spain and Ireland. The GFC also forced inevitable collapse in countries relying on high taxes and consumer spending to uphold their solvency. Altogether, the GFC had the strongest impact in Greece, Italy, Ireland, Portugal and Spain, which collectively have come to be known as the GIIPS countries. The interconnected nature of the Eurozone meant financial crisis in five countries now impacted eighteen countries directly, through monetary and financial policy. Additionally, the interconnectedness of the Eurozone meant the responsibility to address and resolve the crisis must come from one unified source. Consequently, the ECB has been forced to step into a crisis management role that it was otherwise unprepared to assume.

<sup>14</sup>J. Wrase, "The Euro and the European Central Bank," *Federal Reserve Bank of Philadelphia Business Review* (1999): 3-4.

To examine our hypotheses, we focus on three key states within the EMU—Germany, France, and Greece. We focus on Germany as a country that has been at the epicenter of managing the Eurozone crisis. The ECB is modeled after, and is adjacent to, the German Bundesbank in Frankfurt. Consequently, German politics play a much larger role in policies and functions of the ECB than other states in the EMU.<sup>15</sup> Additionally, German Chancellor Angela Merkel stands apart as one of the most politically secure leaders throughout the EMU. Even though Merkel faced re-election within the time frame of our analysis, few scholars or policymakers ever considered her vulnerable, which cannot be said of many politicians in the rest of Europe.<sup>16</sup>

We also focus our study on France, as it is the second most influential state in the EMU.<sup>17</sup> Moreover, considering our theoretical approach, the French case offers us the example of a politically vulnerable leader, Nicholas Sarkozy, who lost re-election to François Hollande. Thus, the French case provides an opportunity to examine behaviors of a politically vulnerable leader and a newly elected leader in the same country.

Finally, we focus on Greece as a juxtaposition to Germany and France. Greece was one of the hardest hit countries in the GFC, and its recovery has been the most difficult. Consequently, Greece has had five different leaders between 2008 and 2014, only one of which enjoyed any kind of political stability. Thus, we see all three cases as excellent examples of our theoretical approach.

We implement a qualitative case-study analysis focusing on news sources for data. To gather our sources, we ran a LexisNexis Academic search to gather a sample of news sources from 1 January 2008 through 22 October 2014. We searched within English language, major world publications to capture the largest sample of

<sup>15</sup>J. Bibow, "At The Crossroads: The Euro and Its Central Bank Guardian (and Savior?)," *Levy Institute of Bard College*, no. 738 (2012): 1-24.

<sup>16</sup>"One woman to rule them all," *The Economist*, September 14, 2013.

<sup>17</sup>A. Evans-Pritchard, "IMF: global economy faces a threatening downward spiral," *The Telegraph*, 2011.

credible news agencies and to control for any potential bias between publications of various geographic origin or political leaning.

To construct our sample, we searched for key terms related to primary concepts in our study, and we narrowed the sample to focus on the most relevant documents. First, we discarded documents that were not directly relevant to the Eurozone crisis or the ECB. Then, we eliminated documents without specific references to political leaders by name. Ultimately, these efforts left us with a sample of 16 total documents—six for Germany, four for France, and six for Greece.

Using this sample, we conducted a content analysis of our key independent variable and our key dependent variable to determine the relationship between the level of optimism expressed and its impact on the legitimacy of the ECB. To find indicators of the level of political *optimism*, our independent variable, we looked for positive or negative statements from political leaders about the economic or political status of their country or the EMU. In some cases, we substituted third-party commentary on the leaders' tone when direct quotes were not available; negative tone suggested low levels of political optimism whereas positive tone suggested high levels of political optimism.

For *central bank legitimacy*, our dependent variable, we looked for statements that emphasized de jure or de facto independence of the ECB. First, we focused on *institutional independence*, which is a form of legal independence that measures prohibition of external influence on central banks in the form of taking or seeking instruction from external institutions or from government officials. Second, we focused on *personnel independence*, which refers to the rate of turnover of central bank governors. Finally, we focused on *financial independence*, which refers to budgetary independence of central banks. Any or all of these three measures were used to assess the conditions under which leaders were seeking to legitimize or delegitimize these activities by the ECB.

### The Legitimacy of the ECB

In all cases, we see evidence that politically

optimistic leaders will be more likely to offer statements legitimizing the work of the ECB and that less-optimistic leaders will be less likely to offer statements of support.

In the case of Germany, two articles show optimism is directly tied to statements that legitimize the actions of the ECB. In the first article, Merkel expresses the positive benefits of Germany's adoption of the euro while calling for more policy control, or institutional independence, for the ECB.<sup>18</sup> In the second, Merkel, whose "popularity at home is undimmed," calls for the ECB to have more policy control over the bailouts in Cyprus, which also corresponds to institutional independence.<sup>19</sup> In both of these examples, we see Chancellor Merkel's optimism corresponds to her calls for increased institutional independence for the ECB, which supports our first hypothesis.

The second set of examples support our second hypothesis that less optimism will be accompanied by statements that seek to delegitimize the work of the politically independent ECB. The first article notes that Merkel's "popularity has sunk to its lowest level in nearly five years" and that she is vehemently opposed to the sale of Eurobonds, which would provide increased financial independence for the ECB.<sup>20</sup> In the second example, Merkel is facing potential "backlash from German voters" which has made her "reluctant" to support a common banking supervision system under the ECB.<sup>21</sup> Here, her lack of optimism about her political future in 2011 made her reluctant to support a measure that would increase the institutional independence of the ECB. In these two cases we seek a lack of political optimism tied to statements that seek to delegitimize the independent

<sup>18</sup> S. O'Grady and V. Mock, "Banks forced to share pain of bailout for Greece; Relief across Europe as deal on Greek debt is finally agreed," *The Independent*, 2011.

<sup>19</sup> D. Charter, "Angela Merkel banks on keeping voters happy," *The Times*, 2013.

<sup>20</sup> N. Barkin and G. Heller, "Germany's Eurobond debate heats up; Pressure grows; 'Downward spiral' threat to economies," *The Gazette*, Montreal, 2011.

<sup>21</sup> K. Maley, "Merkel bank stand spooks investors," *Australian Financial Review*, 2012.

functioning of the ECB.

We see similar results in two articles from 2014. In both cases, Merkel is less optimistic about her political future given the rise of the anti-euro party called Alternative for Deutschland, which “has drained votes from the Christian Democratic Union party of Ms. Merkel.”<sup>22</sup> In the first article, we see Merkel criticizing the recent bond purchases by the ECB while simultaneously feeling political pressure from the recent rise of the anti-euro party in Germany.<sup>23</sup> Then, in the second article, Merkel is seen as “stumbling” from the rise of the Alternative for Deutschland party while simultaneously showing opposition to stimulus measures the ECB is hoping to deploy. Holger Schieding, chief economist in London for Berenberg bank is quoted as saying: “German resistance against the ECB pursuing more aggressive policy is one of the things spooking markets.”<sup>24</sup> In both cases, Merkel is clearly indicating a lack of support for the work of the ECB as she faces increasing opposition at home, which supports our second hypothesis. Altogether, these examples from Merkel provide direct support for our argument about the impact of the degree of optimism on the legitimization of the ECB.

In the case of France, we examine two different leaders. First, we look at President Nicholas Sarkozy who served as President of France from May 2007 until May 2012. Next, we look at President François Hollande, who has served as President of France since May 2012. In examining the attitudes of both leaders, we find support for our argument.

For Sarkozy, we found two articles addressing the ECB. In the first, from 22 July 2011, we see a positive link between optimism and support for the ECB, which supports our first hypothesis. Sarkozy “heralded” giving more financial powers to the ECB so as to quicken

“the pace of what he called ‘European economic governance’.”<sup>25</sup> Here, Sarkozy’s optimism is linked to his push for more policy power for the ECB, which is a positive reflection on the ECB’s institutional independence.

In the second article, dated 22 October 2011, we find support for our second hypothesis. Here, Sarkozy is described as demanding French leadership in the ECB and is noted as being on the verge of “fury” and “anger.”<sup>26</sup> This article suggests that Sarkozy is waning in optimism and thus unwilling to allow the ECB to select its own leaders, which sends a clear signal that the ECB is not a legitimate actor in the eyes of the French government. Therefore, in the two examples from President Sarkozy, we see evidence supporting both of our hypotheses.

In the second French case, that of President François Hollande, we find two articles connecting him to the ECB. In the first article, we find support for our first hypothesis. Here, Hollande, who was just recently elected and thus not electorally vulnerable, is pushing for a closer banking union and additional banking supervision of the Eurozone countries under the ECB.<sup>27</sup> This push for institutional independence confirms our argument that politically optimistic leaders will seek to boost the legitimacy of the independent central bank.

In the second article, from 2014, we see a much different perspective from Hollande. Here, Hollande’s approval rating has fallen to 17%, and “the odds would currently seem to be against the sitting president.”<sup>28</sup> In this case, we see Hollande remaining “one of the key advocates of a looser approach to the austerity and fiscal orthodoxy guarded and promoted by Merkel and the ECB.”<sup>29</sup> Thus, this article

<sup>25</sup> S. O’Grady and V. Mock, *The Independent*.

<sup>26</sup> N. Squires, “Berlusconi in Sarkozy bank snub,” *The Daily Telegraph*, 2011.

<sup>27</sup> L. Armitstead and B. Waterfield, “EU Summit: Angela Merkel moves to block Hollande bank union deadline,” *The Telegraph*, 2012.

<sup>28</sup> M. Kettle, “Hollande may yet play role in Europe: Even though he lacks popularity at home, the French PM is in the right place to challenge Angela Merkel and German orthodoxy,” *The Guardian Weekly* (5 September 2014).

<sup>29</sup> M. Kettle, *The Guardian Weekly*, 5 September

<sup>22</sup> J. Yardley and J. Ewing, “Large Nations in Europe Balk at German Gospel of Austerity,” *The New York Times*, 17 October 2014.

<sup>23</sup> “ECB policies criticized by Merkel,” *The Irish Independent*, 22 May 2014.

<sup>24</sup> J. Yardley and J. Ewing, “Large Nations in Europe Balk at German Gospel of Austerity,” *The New York Times*, 17 October 2014.

suggests that as Hollande's approval continues to drop, he will continue to distance himself from the policies of the ECB and issue statements that delegitimize the role of the ECB in monetary and financial affairs. Again, we see evidence of our argument that political elites who feel less optimistic about their chances of reelection will seek to delegitimize the ECB.

In the case of Greece, we find articles for three of the five prime ministers who served from 2008-2014. First, we have three cases from George Papandreou who was an unpopular leader from October 2009-November 2011. Next, we find two cases from Lucas Papademos who was an appointed prime minister from November 2011-May 2012. Finally, we have two examples from Antonis Samaras who was prime minister from June 2012-January 2015. In all examples, we find support for our argument.

In the examples from Papandreou, we find evidence of a leader who is not optimistic about his time in office and therefore favors pulling back independence from the ECB.<sup>30</sup> Specifically, Papandreou advocated for a public vote on bailout packages, which shows his lack of concern for the political independence of the ECB.<sup>31</sup> These examples confirm our hypothesis that political leaders who lack optimism will seek to take back power from the ECB.

Next, in the examples from Papademos, we find a political leader who is unconcerned with his tenure in office and is thus supportive of the ECB.<sup>32</sup> Papademos was appointed as an interim prime minister and thus had no reason to concern himself with political vulnerability. He regularly advocated for full implementation of the policies of the ECB, including spending cuts, repaying public debt, and eventually allowing the default

to take effect.<sup>33</sup> These examples provide unique insight into our argument to a leader who is not concerned with political vulnerability and will continue to legitimize the institutional independence of the ECB.

Finally, we examine the tenure of Antonis Samaras, who was the first prime minister to win a general election since 2011. We see evidence he is very negative about the future of the Greek economy as debt was still over 150% of gross domestic product (GDP). Consequently, Samaras was arguing the northern EU countries should be held responsible for the crisis and Greece deserved a two-year extension on austerity measures.<sup>34,35</sup> Again, we see evidence of a politically vulnerable leader who is pessimistic about the national economy call for measures decreasing the legitimacy of the ECB.

Overall, these examples provide strong support for our argument linking optimism and central bank legitimacy in the areas of institutional, personnel, and financial independence. This is an important step in demonstrating how optimism can link political and economic policy spheres and the small, but meaningful, ways legitimacy can be granted to or chipped away from the ECB, particularly in the areas of policy, personnel, and finance.

## Conclusion

For central banking systems, like the EMU, to work effectively, all members must cooperate. However, the GIIPS countries effectively broke their financial and monetary agreements with the rest of the EMU.<sup>36</sup> Now, political elites throughout the Eurozone and within the ECB must make the difficult decision to cooperate on

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2014.

<sup>30</sup> B. Milner, "Europe's governments prepare to take their medicine," *The Globe and Mail* (Canada), 7 November 2011.

<sup>31</sup> H. Smith, "Lucas Papademos to lead Greece's interim coalition government," *The Guardian* (London, England), 10 November 2011.

<sup>32</sup> J. Ewing, "Papademos is known for acumen, not for flash; New leader is considered a political outsider, but that could be an asset," *The International Herald Tribune* (New York), 11 November 2011.

<sup>33</sup> C. Haritos, "World: I fear for a social explosion: Greeks can't take any more punishment: Helena Smith, who has reported from Athens for more than 20 years, says the country is falling apart at the seams as it desperately tries to solve its debt crisis," *The Observer* (England), 12 February 2012.

<sup>34</sup> J. Hurley, "'Worst is over' claims Greece as IMF backs country reforms," *The Sunday Telegraph* (London, England), 5 May 2013.

<sup>35</sup> "Eurozone crisis: Greek PM asks for more time to implement cuts," *The Scotsman* (Edinburg, Scotland), 22 August 2012.

<sup>36</sup> A. Moravcsik, *New York Times*.

behalf of and with these countries to preserve the broader economic structure.

In this paper, we sought to determine conditions under which political leaders will support or undermine the legitimacy of independent central banks in the aftermath of economic crises. Our findings revealed more optimistic leaders have demonstrated a willingness to support efforts that give more responsibility to the ECB to manage and resolve the economic crisis. Thus, optimism is directly connected to the legitimacy of the ECB.

Unfortunately for Europe, the current economic climate remains tenuous as growth remains slow throughout the Eurozone, and political leaders throughout the EMU are increasingly less optimistic about the direction of the European economy. Calls for new directions in monetary and financial policy continue to come from key leaders, including Merkel<sup>37</sup> and Hollande,<sup>38</sup> as do threats to curb the ECB's role. These attitudes signal that recovery from the Eurozone crisis may be farther away than hoped for, which demonstrates the continued need for optimism among political leadership to spur economic recovery.

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<sup>37</sup> Neil Irwin, "The Conflict Between Germany and the E.C.B. That Threatens Europe", *The New York Times*, 24 October 2014

<sup>38</sup> William Horobin, "France Looks to ECB as Anti-Austerity Ally", *The Wall Street Journal*, 4 September, 2014.

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## Computer Vision Based Object Detection and Tracking in Micro Aerial Vehicles

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Unmanned and/or autonomous flight has applications in many forms of aviation, from remotely controlled predator drones to Amazon's much-discussed drone delivery program. One form of autonomous flight involves instructing an aerial vehicle to visually track or follow another object. Systems that successfully implement this can be used in tasks ranging from serious, such as surveillance for national security and search and rescue operations, to frivolous, such as capturing the ultimate moving selfie. In this paper, we present a system comprised of a small, camera-equipped drone and a ground-based laptop computer with software to facilitate control. In two separate though related implementations, the drone either follows a target object or finds and flies to it.

Micro Aerial Vehicles (MAVs), popularly known as drones, make unmanned flight research safe and inexpensive. While such vehicles are typically quite small, often weighing only a few pounds or less, they can be very capable. Thanks to high-bandwidth communication, even very lightweight drones with little onboard processing capability can undertake tasks that require significant computation. For example, in this work, we capture a video stream using an onboard camera but send the images over Wi-Fi to a laptop for processing. The computer uses the image data to determine flight adjustments and communicates them to the drone over the same Wi-Fi connection. This allows vehicles lacking sufficient thrust, or without connectivity options, to incorporate an onboard computer to be used for research projects such as this.

The ability to detect and track objects is an essential step in the solutions to many problems. We experience this frequently, perhaps daily, without realizing it. Object tracking is incorporated into systems designed for tasks such as surveillance, navigation, and search and rescue operations. Most of these solutions are completely reliant on the capabilities of a computer system to acquire and track objects, including people, in an environment.

Though there are multiple methods for tracking an object, visual tracking is frequently used. One reason for this is likely the affordability of cameras capable of capturing the required images and the broad array of software available of processing them. Thus, there are many instances of tracking systems based on visual data. For example, military and police operations may utilize visual tracking systems for surveillance. One such system along national borders allows for the detection and tracking of people suspected of attempting to enter a country illegally [1].

Tracking systems have also recently become prevalent in search and

rescue efforts, allowing ground crews and emergency personnel to locate individuals who may be in danger. Some applications in this domain include the ability for lifeguards to detect people who might be drowning [2], and for firefighters, using infrared and sonar, to locate people trapped in a fire [3].

Visual object detection and tracking is one part of a larger area of research known as computer vision. Computer vision is the study of analyzing, processing, and understanding images from the real world in a quantifiable manner in order to produce numerical or symbolic information [4]. Only recently has the technology reached a level of accuracy that allows integration into systems capable of navigation and control of a vehicle. New advancements will, for example, make self-driving cars possible by allowing computers to map other vehicles on the road and monitor their motions relative to the autonomous system.

In this work, we demonstrate a system that finds an object in its environment (based on color) and either flies to it or follows it. In subsequent sections of this paper, we describe the research that was our inspiration and starting point, describe our drone and other tools, outline our solution to the problem, and discuss the results and future directions.

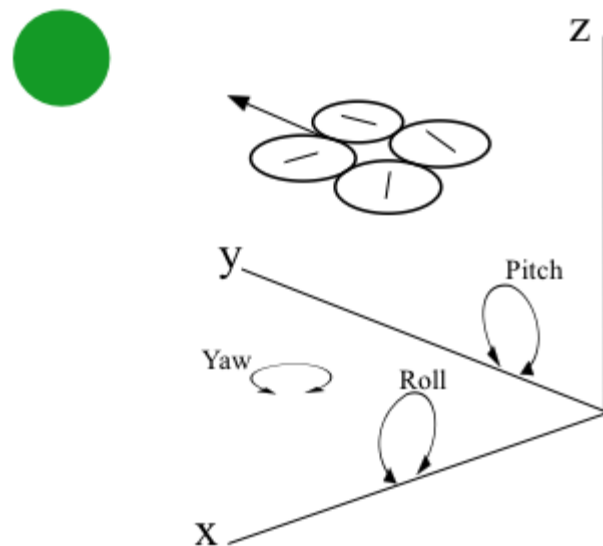
### Previous Work

MAVs have been the subject of a large body of research in several areas of computer science. Given the ease with which cameras can be incorporated into small, flying vehicles, it is not surprising that many results are related to computer vision. Many of these focus on vision-based autonomous navigation, typically in GPS-denied environments such as inside buildings [5][6][7][8][9].

Another type of problem involves visually tracking an object. This can include tracking another drone, a ground-based vehicle, a person, or an object [10][11][12][13]. Of particular interest to us is the work of Levy [14], in which a MAV visually tracks and follows a ball held and moved by a person.

Levy's system allows a drone to track a solid

**Figure 1: Orientation of the X, Y, and Z axes.** This orientation is standard in aviation at all levels. The arrow indicates the front of the vehicle and the orientation of the front-facing camera.



green ball through the environment along two axes of motion, X and Z but not Y (see Figure 1). His system does not seek the target; it must be placed in view of the vehicle's camera. He has made his software, which includes a computer vision component and a vehicle control component, available to the community. The vision component is implemented in Python; the vehicle control component in C++. We use this system as the starting point for our research.

### Flight Platform and Tools

Choosing the correct MAV for a project such as this is critical. We had a number of requirements: suitable for indoor flight, able to hover reliably, onboard camera, communication channel capable of streaming video, and an API that allows complete control via a high-level programming language. Total cost of the package was an additional constraint.

Fortunately, at least one commercially available drone met all of these criteria, including cost [15]. The Parrot A.R. Drone 2.0 (Figure 2) is a ready-to-fly, lightweight quadcopter that can be flown indoors and out. It is equipped with both forward and downward facing cameras, video that can be streamed to a smart mobile device or a computer. Though

**Figure 2: The A.R.Drone 2.0 in flight.** The front-facing camera, bottom-facing camera and ultrasound sensors.



the front camera captures images at 720p, the streamed framerate is approximately 30 frames per second. Communication is via a Wi-Fi access point created by the vehicle. The API provided by Parrot supports a C++ interface allowing direct control of roll, pitch, yaw and thrust, making possible complete control of the vehicle via software.

While relatively small, the A.R. Drone 2.0 is equipped with a full array of flight sensors. These include a 3 axis accelerometer for detecting motion; a 3 axis gyroscope for determining attitude; and a 3 axis magnetometer for determining heading. In addition, a downward facing ultrasound unit supplies altitude information when the drone is within 5m of the ground while a barometer is used for higher flight. Onboard processing, for functions such as stabilization, is provided by a 32 bit ARM Cortex A8 processor running at 1 GHz.

While the MAV is an important component of our overall system, other hardware components are necessary. First among these is a computer capable of processing the video stream, determining required navigational adjustments, and sending the corresponding commands to the vehicle. For this purpose, we used a Dell Latitude laptop with Intel Core i7 processor running at 3 GHz. On the computer,

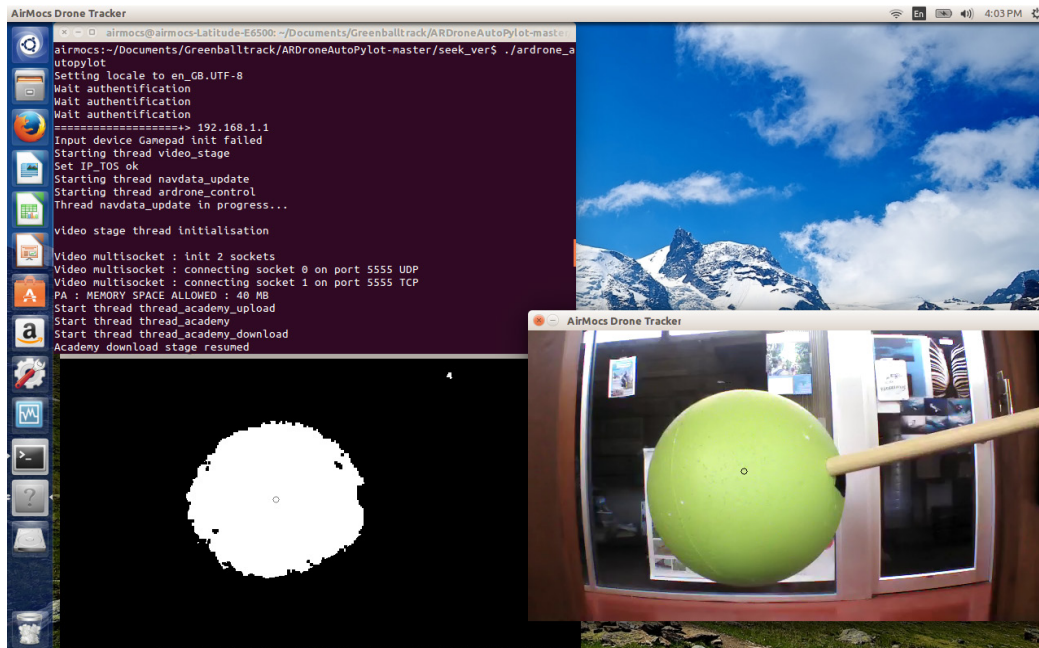
we installed Ubuntu Linux 14.04. The broad array of open source software available makes Linux a good choice for scientific research.

One important safety procedure when flying a MAV under computer control is to have backup control capability. This allows one to take control of the vehicle if the software fails to function as intended. In our case, because our missions are indoors and there is no need to return to a takeoff location, this involves only instructing the drone to land. For this purpose, we use a Microsoft Xbox controller connected to the ground-based computer via USB. This controller is also used for takeoff and to initiate computer control of the MAV.

### **Computer Vision and Object Detection**

Control of the MAV in our system is achieved by having the drone visually follow the target object. In order to accomplish this, the system must be able to distinguish that object from others in the environment. This is achieved using color. The software examines images looking for a green object. Once acquired, the object is tracked as long as it is in view. Clearly, this method has limitations. For example, outdoors there may be numerous green objects and, therefore, the drone may attempt to follow a tree. However, as we fly indoors and can control the environment,

Figure 3: Screen capture of our system in use.



this limitation is not problematic.

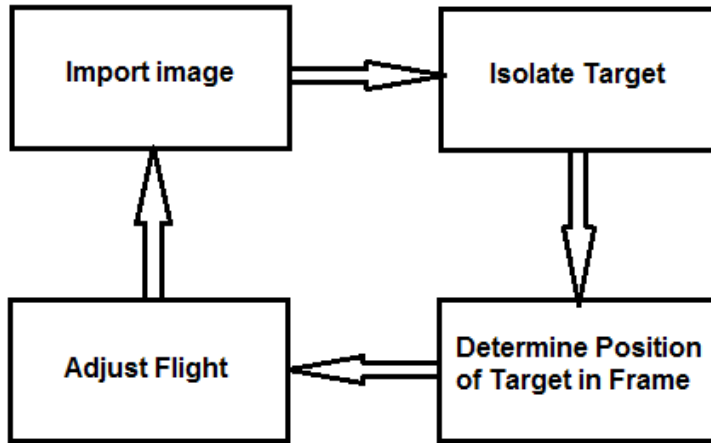
In this work, computer vision makes possible the detection and identification of the object that we want the MAV to track. Several methods could be used to achieve this; our system uses a form of *blob detection* that distinguishes objects by color. For each frame of the video stream transmitted by the MAV, the computer examines the full color image. The image is converted to monochrome by stripping away pixels that are not comprised of the pre-determined color we wish to track, or are not within a certain threshold of that color. This leaves us with a binary image representing only the pixels we do want to track in white and the pixels we do not want to track in black. An example of the result is seen in the monochrome image in Figure 3 below.

The window on the right shows the video feed from the camera on the A.R. Drone 2.0. The window on the lower left shows what the software sees as green. Shadows and highlights prevent the detected object from appearing as a complete circle. Note the small patch of green detected above and to the right. This is a green element on a poster across the hall. Detection of such small elements presents problems in some cases.

Tracking the object depends, in part, on how big it appears to be in the frame. This can be used to determine relative distance to the object. If the object appears smaller, the MAV is farther away; larger indicates that the MAV is closer. For this reason, we need an object for which the apparent size is constant, independent of viewing angle. The apparent surface area of a cube, for example, changes with one's position relative to it. A sphere, on the other hand, is not subject to this. Regardless of the angle from which a sphere is viewed, it appears as a circle with the same radius as the sphere, fulfilling our requirement. We use a 6" Styrofoam ball painted light green and mounted on a wooden rod. This provides a very inexpensive and effective target.

The computer vision heavy lifting is performed by OpenCV, an open source, widely used computer vision library. It provides C++, Python, and Java APIs on all major desktop and mobile operating systems. We use the Python library, as does Levy [14]. Available OpenCV functions used in this work allow manipulation and analysis of a video frame. These include steps for isolating objects of a given color, determining the size (in pixels) of an object, and calculating the centroid of an object. Informally, the centroid is the arithmetic mean of all points

**Figure 4: High-level schematic of the software.** This cycle is repeated many times per second, allowing fine control of the vehicle's flight.



in the object.

In aviation, the axes of 3-dimensional space are denoted  $X$ ,  $Y$ ,  $Z$ . The  $X$  and  $Y$  axes are orthogonal to the Earth's radius and run East/West and North/South respectively. The  $Z$  axis is radial. Figure 1 provides an illustration of this frame of reference. As noted in the Previous Work section, Levy [14] provides 2-dimensional control in the vertical plane defined by axes  $X$  and  $Z$ . One goal of this work is to introduce control in the  $Y$  axis.

### Depth Perception

Control in the vertical plane [14] is achieved by calculating the centroid of the target sphere and attempting to keep it centered in the camera frame. This is facilitated by sending roll (left/right) and thrust (up/down) adjustments to the vehicle. Our first result provides tracking in the  $Y$  axis as well. The goal for the third dimension, as with the first two, is to maintain, as closely as possible, a position relative to the target object. Unfortunately, position of the centroid within the video frame does not aid in this determination in the  $Y$  dimension because motion along that axis does not affect the position of the target within the video frame. We must instead attempt to determine distance to the target. We implement two solutions to this problem. Figure 4 provides an abstract outline of the software.

Determining distance to an object, a form of depth perception, is easily achieved with binocular vision. Our brains perform this task

continually. In computer vision, use of two cameras allows algorithms to leverage *binocular disparity* – the offset of features in images from cameras that are a small distance apart – to calculate the distance to target. Monocular vision makes this calculation impossible as there is only a single image and, therefore, no disparity. Because the A.R. Drone 2.0 has only a single front-facing camera, our algorithm must approximate distance using monocular vision. To achieve this, we do not attempt to

calculate distance to the object but instead track relative distance, determining only if the vehicle is moving toward or away from the target.

As soon as the target sphere is in the camera frame, OpenCV detects it. Once detected, we are able to request its apparent area in pixels. This area is stored and serves as a baseline for later comparison. In subsequent images, the current apparent area of the target is determined. If this area is greater than the baseline, the vehicle is closer to the target than it was initially. If smaller, the vehicle is farther from the target. Correcting for this difference is a simple matter of sending a command temporarily adjusting the pitch of the MAV, moving it slowly forward or backward. Calculations, and the resulting adjustments, are performed for every video frame. We refer to this as the First Area Version.

Though effective, this solution is not perfect. While calculating changes in the area of the target object will tell us if the MAV is moving closer or further away, it will not allow us to determine the actual distance to the object, nor more importantly, the rate of change of the distance. The latter point is not obvious, but the change in apparent area is not linear with change in distance. Knowing the rate of change would allow for more accurate, variable pitch adjustments which would result in more accurate tracking of the target in the  $Y$  dimension.

Our second solution, which relies on PID

control [16], addresses, to a degree, the difficulty with determining rate of change. PID, an acronym for Proportional-Integral-Derivative, is a form of feedback control. PID controllers are used in many industrial applications and are effective at generating a response to a calculated error in the system. The error, however, is not a single value. While the current error is addressed via the proportional term, past errors are addressed via the integral term and the derivative term attempts to predict future error based on the rate of change of the error value. The purpose of the integral term is to allow increased adjustment if the rate of change in the error is insufficient.

The key to achieving good PID control is determining effective coefficients for the P, I and D terms. This process, known as tuning, can be quite challenging and something of an art. A system that is not adequately tuned may exhibit symptoms such as oscillations, a common issue with PID control. Oscillation is caused by repeated error corrections that are too large, causing the system to overshoot the goal.

Levy integrated a simple PID controller, written in Python, in his system [14]. We have adapted it for the *Y* dimension and have attempted to tune it. However, oscillations are sometimes observed as the vehicle approaches the target. The effect is most pronounced in the *X* axis. Because the magnitude of the oscillations diminishes with time, the system is reasonably stable.

Thus far, the First Area implementation performs better than the PID implementation, providing a more stable result subject to less error along the *Y* axis. With further tuning of the PID coefficients, we expect to improve flight characteristics of that version which may allow it to outperform the simpler First Area version.

### Searching for the Target

In the versions described in the previous section, the target object is intentionally placed in the camera's field of view to begin the tracking task. While the computer vision algorithms must detect the target, there is no need for target acquisition. Here we describe a version that first searches for the target and then flies to it. When

this version is run, after instructing the MAV to takeoff, the software sends yaw commands so that the vehicle will slowly rotate in the horizontal plane. During this phase, the vision system attempts to detect the target object. When the target is located, the drone is maneuvered so that the object is centered in the camera frame. Once this is accomplished, it flies forward toward the object. When the target fills a predetermined percentage of the video frame, the drone is sufficiently close to the target and stops. At this point, it can enter hover mode and await further instructions or remain in autopilot mode to continue tracking the object if it should move.

One problem encountered with early versions of this implementation involved false positive identification of the target. In these cases, the vision system would sometimes detect an extremely small object of similar color, such as a detail on a poster on the wall. This did not occur in solutions to the first problem we considered because when running those versions, the much larger, intended target was always visible to the camera. To address this, we added a check to ensure that to be detected as the target, an object must exceed a size threshold. Thus we can control the environment to ensure the absence of sufficiently large objects that might result in a false positive while the system ignores small objects. With this modification, the system performs quite well.

### Future Work

The greatest weakness in our system is sensitivity to light level. In very bright light, the target can be blown-out in the image, meaning that it appears more as white than its actual color. In low light or shadow, the opposite problem may occur. In either case, the system may fail to detect the target. Another possible outcome is that it is detected but only a portion is seen as the target color. In this scenario, flight may be affected if light conditions change and the portion of the target seen as the correct color changes, causing changes in the apparent size of the target. This can cause greater than desired acceleration and an inaccurate distance to the target. This problem is likely due to the inexpensive optics in the A.R. Drone 2.0 camera. We believe that switching

to a different flight platform on which we can mount a higher quality camera will address this.

Apart from shortcomings in the project so far, there are a number of areas for future study. In the future we hope to continue to implement a system that can follow more complex targets such as people or, perhaps, other MAVs. Additionally, we would like to achieve autonomous visual navigation of more complex environments, such as obstacle courses, without following a target object.

In recent work, we have begun the process of porting our system to a different micro aerial vehicle: the 3DR Iris+. The Iris+ is a more capable vehicle better suited to outdoor flight. It does not include a camera; therefore, we have mounted a Logitech C920 webcam. This camera is of higher quality than that integrated into the A.R. Drone 2.0 and in preliminary testing appears to have solved the problem of sensitivity to light level. We have only recently begun implementing the flight control code for the Iris+ and have performed very limited flight testing at this time.

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## The Clerk Conundrum: Chaucer's Attitude towards Pilgrim and Profession

Chaucer's attitude towards clerks throughout his poetry provides a puzzling take on the profession. Jill Mann takes special note of the frame Clerk's profile in her book *Chaucer and Medieval Estates Satire* when she discusses the "emphasis on the 'moral vertu' which is the content of the Clerk's conversation, and which seems to determine the tone of his character" (75). Yet several of the clerks in the actual Canterbury stories are represented as less admirable: these men are used as vehicles of humor or mentioned with derision. Even though the clerks of the "Reeve's Tale" eventually obtain the justice they seek through underhanded methods, Chaucer pokes fun at the characters throughout the tale before they can receive their desired outcome. Crafty Nicholas of the "Miller's Tale" is portrayed as a sly and sinister fellow, quite different from the man of his trade seen on the pilgrimage. When we delve into discrepancies between the Canterbury Clerk's self-representation and Chaucer's depictions of his counterparts in other tales, a positive representation of the clerk estate rises to the surface in the *Canterbury Tales* frame. Chaucer's portrayal of the brazen attitude and negative behavior of his clerks in the "Miller's Tale" and "Reeve's Tale" is at odds with the intellectual yet morally just and considerate Clerk who takes part in the pilgrimage.

In the "General Prologue," Chaucer begins to formulate his model of the pilgrim Clerk as both a man and a general character type. The Clerk of the pilgrimage is a poor scholar, who cares for learning and his books above all other worldly things and places a high value on morality. Chaucer stresses that he "hadde geten hym yet no benefice, / Ne was so worldly for to have office" ("General Prologue" 291-92). The Clerk stresses the pursuit of knowledge so much, it seems, that it has affected his ability to procure a benefactor or secure a political office for himself. However, Chaucer continues, "Sownynge in moral vertu was his speche, / And gladly wolde he lerne and gladly teche" ("General Prologue" 307-08). This man is content to pass on the knowledge he has gleaned from his books, and he lives a simplistic life with few luxuries. The Clerk appears to see learning not as a weapon, but as a tool that he is happy to show others how to use. Indeed, as Mann notes, "The phrase 'the eternal student' aptly sums up our impression, not only of his willingness to go to learning and edifying others, but also of his slight remoteness from the world of social ends" (74). The pilgrim Clerk's apparent benevolence and physical remove will prove clearly different from the clerks in Chaucer's forthcoming tales, who use their intelligence as the method of inflicting

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shame or revenge on their hapless victims. As of yet, however, it is too soon to tell whether or not the Clerk will show any symptoms of malice when telling his own tale. In his discussion of the “General Prologue,” H. Marshall Leicester declares, “Where we are never in doubt about what we are to think of the monks or friars or townsmen in other estates satires, we are almost always unsure of exactly how good or bad their counterparts in the General Prologue are” (246). Leicester’s observation that Chaucer leaves the virtue of his characters ambiguous at the beginning of his estates satire, allowing readers to formulate their own suppositions at first, has particular relevance to Chaucer’s pilgrim clerk. Through his own speech, the Clerk still has the potential to reveal the negative characteristics which Chaucer attributes to his other fellows: only the pilgrimage and the passage of time will reveal his true character.

It would seem that the Clerk’s character portrait in the “General Prologue” lacks an accurate description of the clerk’s occupation. In his description of the actual lay clerk John Carpenter, George Shuffelton provides some of this much-needed historical context for our understanding of fourteenth-century clerks. He notes, “If we break down the term . . . and consider clerk as a general term for anyone possessing clergie or learning, the category . . . include[s] virtually any literate layman of the period” (Shuffelton 435). The Canterbury pilgrim Clerk has studied at Oxford, and his portrayal clearly reveals his learning and skills. The Clerk’s status is not so elevated as others in his profession because he is not engaged in learning as a stepping-stone to the higher institutional levels of employment; as Shuffelton stresses, “Lay clerks performed crucial social functions that had been largely dominated by the Church, such as education and the administration of charity” (436). Thus, the Clerk clearly still occupies an important niche in society as an instructor and provider of moral guidance who is not necessarily affiliated with the Church and other clergymen, although he does carry the potential for church connections as a learned scholar. This intellectual’s prowess in that regard is clear through his possession of “twenty books, clad in blak or reed,

/ Of Aristotle and his philosophie” (“General Prologue” 294-95). This collection is easily comparable to John Carpenter’s in Shuffelton’s study, as this clerk, who served as the Common Clerk of London, owned “at least twenty-five texts in fifteen different volumes” as seen in his will (446). Although Chaucer’s pilgrim does not possess political power like that of Carpenter, the fictional man’s collection of books almost rivals what the actual man had gathered upon his death. Clearly, clerks have various methods of utilizing their skills, and this notion of extensive potential shall become even more apparent as Chaucer’s stories unfold.

In the story that draws the ire of the Reeve, Nicholas the clerk is portrayed as a crafty character from the start of the “Miller’s Tale.” Unlike the clerks who appear in the “Reeve’s Tale,” this man lives in Oxford, giving him slightly more similarity to the actual pilgrim Clerk depicted in the “General Prologue.” Knowledge seems to be of more import to him than it was to Aleyne and John, as Chaucer tells of his

Almageste, and bookes grete and smale,  
His astrelabie, longynge for his art,  
His augrym stones layen faire apart.  
(“Miller’s Tale” 3208-10)

In a sharp contrast from the actual Clerk, Nicholas’ interests lie in stargazing and astrology, not philosophy and other such teachings that would provide moral education. In addition, before the actual plot of the tale takes place, the Miller ensures that his audience knows Nicholas has made a cuckold of the carpenter. As a man of morality, the pilgrim Clerk would shy away from such scandalous behavior. Yet Nicholas’ plot to sleep with Alison while publicly humiliating her husband shows an innate, although cruel, depth of thought that has clearly been honed by a high level of education.

Although Chaucer’s readers will note that Nicholas’ intellectual interests tend toward the questionable science of astrology, the carpenter is clearly impressed by his education. In fact, he believes Nicholas studies too much: “Me reweth soore of hende Nicholas. / He shal be rated of his studying” (3462-63). While looking

at the comedic aspects of Chaucer's tales, A. Booker Thro remarks, "Chaucer is concerned to accentuate the cleverness rather than the cuckolding, and thus causes his clerk to conceive of a stratagem wholly gratuitous in its complexity to the practical needs of the situation" (98). To this end, Nicholas constructs an elaborate plot to convince John the carpenter that he has seen a vision of Noah's flood, and that they must prepare for the worst and protect Alison from danger. The unassuming man follows Nicholas' strange requests to the letter, never once guessing the clerk's true intent even when he blatantly drops hints about Alison's affair. When first setting up the trick, Nicholas awakes from a fake stupor to tell the carpenter that he will "speke in pryvetee / Of certeyn thyng that toucheth me and thee" ("Miller's Tale" 3493-94). Again, the clerk is using double entendre, outwardly referring to the plan he has concocted but really talking about Alison's private parts. Nicholas is telling the carpenter that he is sleeping with his wife, and the poor fool has no idea of the subterfuge. Thro is therefore correct when he declares that the carpenter's "mental deficiencies define the clerk's brilliance by contrast" (101). Nicholas is highly intelligent, but he uses his skills to manipulate those around him into giving him what he wants, therefore serving as an example of a scholar searching for entertainment even though he still has an interest in gaining knowledge.

As the Reeve begins his tale, his audience is treated to a depiction of clerks John and Aleyn, manipulated scornfully by the pilgrim as instruments of revenge against the Miller. Yet these clerks orchestrate their own revenge for their humiliation at the hands of the fictional miller Symkyn. From the very beginning of the tale, these clerks are noticeably different from the humble Clerk of the pilgrimage. While the Clerk received training at Oxford, John and Aleyn studied at "Cantebregge," although they share their counterpart's poverty. Of these young men, Chaucer declares,

Testif they were, and lusty for to pleye,  
And, oonly for hire myrthe and revelrye  
[...]  
goon to mille and seen hir corn ygrounde.

("Reeve's Tale" 4004-05; 4008)

These men pursue not knowledge but amusement. They are obviously intelligent and are working towards receiving an education that will afford them lucrative job opportunities, but their main joy is seeking out sources of entertainment. In an essay which discusses these young adults as the stereotypical "class clowns," Ethan K. and Kipton D. Smilie remark, "The students, or clerks, as they were more commonly called in Chaucer's day ... are undoubtedly clowns, who 'work the system' for the sake of leisure and to show off" (38). This flippant attitude towards education is evident in their reaction to the discovery of their college maunciple's grave illness. The clerks use this opportunity to leave their studies and journey to the mill to see their corn ground.

When John and Aleyn arrive at the mill, Chaucer plays up their Northern dialect tremendously. This distinction in speech creates a joke at the young men's expense and tricks Symkyn into thinking that these young students can be easily fooled. In his discussion concerning Chaucer and dialect, Robert Epstein asserts that "however accurately he portrays the regional dialect of the clerks, Chaucer is inviting laughter at their unfamiliar speech and encouraging the reader to assume that they are comically rustic rubes" (101). In this way, Chaucer ensures that Symkyn is not the only one who is fooled by the two young men. Although the clerks do not anticipate the brief loss of their horse or the necessity of staying the night in the miller's house, they twist the insulting situation for their own benefit, highlighting their own intelligence through their method of revenge. Epstein continues, "John and Aleyn's subsequent conversations are marked by ... academic reasoning, [which seems] unnecessarily complex and hermetically theoretical" (102). It is no wonder the miller and his family find these clerks' ideas and behavior puzzling. This type of long, drawn-out discussion is most clearly present in Aleyn's justification of sleeping with the miller's daughter. He tells John, "And syn I sal have neen amenment / Agayn my los, I will have esement" ("Reeve's Tale" 4185-86). This "esement" is used

as a double entendre, meaning both a repayment for the loss of pride dealt to Aleyn and his own physical gratification with the miller's offspring. Although the two scholars are Northerners, the miller's misunderstanding of their intent and their true personalities leads to the loss of everything he once prized: his mastery of the situation, his stolen goods, and most importantly, his daughter's virtue.

When the Clerk himself is granted an opportunity to speak, his knowledge and moral values are apparent in the tale that he tells. Before he can begin his story, however, the Host entreats him to tell the tale in a manner that anyone can understand, urging him to stay away from "youre termes, youre colours, and youre figures" ("Clerk's Prologue" 16). In other words, the Host fears that the scholarly man will use language and discourse that the other members of the pilgrimage will find difficult to follow; thus, he asks the Clerk to make his tale simple. The Clerk is only too happy to oblige, taking a Petrarchan tale that was once embellished with flowing rhetoric and simplifying it slightly. Leah Schwebel discusses Chaucer's translation of the tale of Griselda and Walter from Petrarch's version, which was in turn a translation from the original by Boccaccio. She declares that "by translating Petrarch's words into English, a vulgar un-literary tongue, [the Clerk] conforms to the Host's injunction to tell a tale that common folk can understand" (Schwebel 290). Although the Clerk admits that the story was first told in the sort of high style the Host does not want to hear, he assures his audience of plain speech and clear understanding. To Schwebel, this emphasis means that "Chaucer progressively aligns Petrarch with a method of writing useless to anyone but the most elite" (288). This focus also highlights the Clerk's own social status as a scholar who is not elite but who still possesses more knowledge than his peers on the pilgrimage. In short, the Clerk is a pilgrim who can serve as a bridge between social classes depending upon the state of his career.

Although the "Clerk's Tale" is a controversial one that features a husband who repeatedly tests his wife's loyalty and honesty in an unfathomably cruel manner, the pilgrim makes his

opinions heard even through the source material of his story. In a thorough examination of the tale, Michael Raby notes, "The Clerk weaves strands of commentary into his translation of Petrarch's story, interjections that vary between outrage, admiration, and rationalization" (223). Most of the Clerk's verbal asides are necessary because of the actions of Walter, the perpetually paranoid husband who fails to trust his wife until she undergoes years of his emotionally brutal testing. Over the course of the tale, Walter fakes the murders of both of his children and casts Griselda out of both their home and marriage, all to test her devotion to him. However, throughout the narration, the Clerk offers qualifying commentary that clearly shows his disdain for these events, his respect for Griselda, and his understanding of Griselda's willingness to comply with her husband's demands. As Walter begins his first test, taking his infant daughter away from Griselda and pretending to have the newborn slain, the pilgrim remarks,

I seye that yvele it sit  
To assaye a wyf whan that it is no need,  
And putten hire in angwyssh and in drede.  
("Clerk's Tale" 460-62)

The Clerk vehemently denounces Walter's tests, stating the futility of causing pain to a virtuous wife for no reason. Again, when the couple's son is born and Walter repeats his child-snatching and false murder, the pilgrim narrator voices his opposition. Before Walter begins his final and most elaborate torment, the Clerk pauses again to pass judgment on the nobleman's decision-making skills. This intelligent narrator poses a rhetorical question, asking,

What koude a sturdy housbonde more  
devyse  
To preeve hir wyfhod and hir steadfastnesse,  
And he continuyng evere in sturdinesse?  
("Clerk's Tale" 608-700)

Raby suggests that comments such as these, which simultaneously praise Griselda and scorn Walter, also serve another purpose for the pilgrim. He believes that with these interjections

“the Clerk tries to dispel some of the scandal embedded in his source material” (Raby 224). Again, a marked difference is visible between the pilgrim Clerk and his fictional brethren. This Clerk seems to be attempting to give Griselda some compensation for the abuse she suffers within his tale by thoroughly apologizing for it.

In fact, the Clerk may be guiding his audience towards an allegorical interpretation of the tale through the method of description. Walter tests his wife’s loyalty, devotion, and faith in him, and Griselda remains steadfast in her responses to her lord. Griselda’s stoicism in the face of extreme hardship may bring to mind Job: like that Old Testament model, she loses her children, her status, and her self-worth. Additionally, the Clerk’s version of the tale allows the notion of the earthly lord to translate to the Lord of Heaven, which would resonate with both his audience in the pilgrimage and actual medieval readers of Chaucer’s work. This allegorical interpretation also allows Chaucer’s Clerk to justifiably lament the lack of women like Griselda while reassuring the women in his audience that they should not feel the need to emulate her. Peggy Knapp notes in her book *Chaucer and the Social Contest* that “the Clerk himself ... seems to encourage only the allegorical lesson about the soul, finding it ‘inportable’... for women to be so humble in relation to their husbands,” therefore rejecting the notion that he believes the women outside his story should act as Griselda does towards their own husbands (131). The morality of Chaucer’s Clerk, then, seems to be on display, and so, too, is his desire to educate without tricking or belittling his audience, which sets him clearly apart from the clerks in the stories his companions on the pilgrimage have told. While Nicholas, John, and Aleyen revel in scandal in their own various ways, the pilgrim Clerk actively seeks to avoid it, even going so far as attempting to at best denounce or at least apologize for plot points in his story that might offend his fellow pilgrims and Chaucer’s audience as a whole.

Throughout the pilgrimage depicted in the *Canterbury Tales*, Chaucer presents fictional clerks whose scandalous personalities conflict with that of his pilgrim Clerk, a kind and moral

scholar with a penchant for reading extensively and sharing his knowledge. John, Aleyen, and Nicholas use their intelligence for their own devious ends of obtaining revenge and duping foolish men, but the Clerk looks down on such behavior and strives to aid others instead of disrupting their learning. This strange inconsistency in the depiction of Chaucer’s clerks ultimately foregrounds the positive character of the Clerk as a pilgrim and allows Chaucer to satirize the profession without causing extensive damage to its reputation.

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# From Sensor to Street: Intelligent Vehicle Control Systems

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**I**ntelligent vehicle technology is the next major frontier of automotive engineering. For the past century, automobile operator interface has evolved slowly. Driver controls function in very much the same manner long after mechanical systems have evolved past the original design constraints.

A new wave of intelligent vehicle technologies will enable automakers to challenge the status-quo of automotive operator interface, and eventually enable driverless transportation. While driverless vehicles may eventually increase occupant safety and reduce operator stress, the greatest benefits lie in vastly increased infrastructure capacity and reduced energy consumption (Curley, 2008; Sauck, 2009).

The main source of traffic congestion is not a lack of capacity, but the cumulative effects of localized traffic density (Bertini, 2005). These are exacerbated by the cognitive delay present in each driver's reaction to changing conditions. An intelligent vehicle's ability to communicate with infrastructure will enable rapid traffic routing adjustments, and eliminate the localized traffic slowdowns that most contribute to wasted fuel and travel (Geller, 2015).

This research focuses on the challenge of fusing multiple sensor inputs to create a coherent strategy for dynamic vehicle control, which will either serve to aid a human driver or to control a vehicle intelligently. The inputs from these myriad of sensors must then be fused together to form a virtual representation of the terrain surrounding the vehicle, creating a model from which to draw guidance information. This can vary from simple highway lane guidance assistance, to autonomous off-road navigation.

By leveraging the strengths of individual sensors, the vehicle central computing system will fuse the raw data into a series of points and lines, which can be used to infer the optimal path ahead. Once this path is determined, a reverse kinematics approach can be used to actuate the steering, brake, and motor controls. These will enable active management of vehicle dynamics, preventing unnecessary lane wandering, and providing rapid recovery of unexpected movement due to un-sensed road conditions (Demirci and Metin, 2013).

When a human driver chooses to control the vehicle, the sensor-driven virtual world construct can provide collision warning, active avoidance, adaptive cruise control, and lane guidance.

## Nomenclature

- ABS*: Anti-lock Brake System
- RADAR*: Radio Detection and Ranging
- LiDAR*: Light Detection and Ranging
- IMU*: Inertial Measurement Unit
- Reverse Kinematics*: a mechanical approach to controlling actuator inputs based on actual vehicle position and attitude

## Intelligent Vehicle Dynamic Situational Awareness

Intelligent vehicle subsystems have been part of consumer vehicles for decades. The first electromechanical cruise control systems began a long slide toward removing physical control of the vehicle from the human driver. Ever since, intelligent systems have provided enhancements in both convenience and safety. Anti-lock brakes can take control of braking when wheel lock-up is detected. These systems enable a panicked driver to both brake and steer at the same time, an impossibility with locked brakes (Jing et al., 2014). Back up and blind spot sensors, initially features of luxury brands, are now ubiquitous on cars at even basic trim levels. They provide situational awareness and warning to drivers of nearby objects or imminent collisions. The logical next generation of this technology lies in backup cameras, which enable drivers to

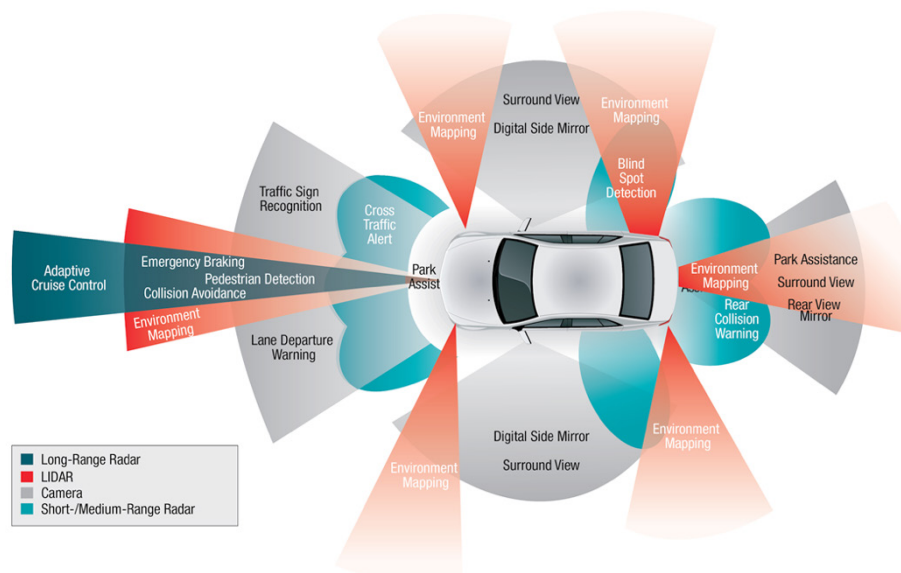
totally rely on the car's sensors, driving in reverse using only an image on a dashboard screen for guidance.

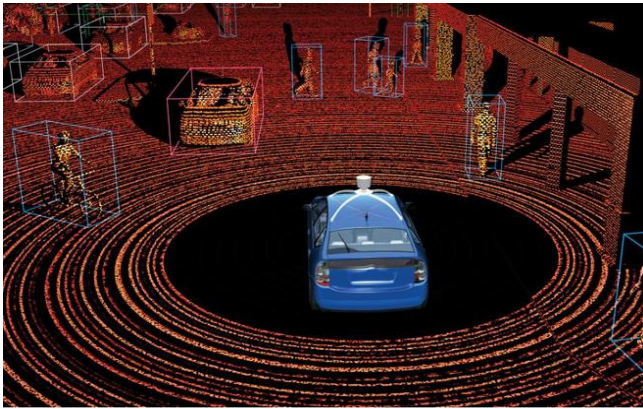
Adaptive cruise control now keeps a constant following distance despite other vehicle's varying speeds. Satellite navigation and communication systems enable some vehicles to transmit and receive accurate location and other telemetry information. Near field sensors in select vehicles enable automatic parallel parking, completely hands free.

The combination of all of the above systems means that some vehicles already possess the ability to navigate, accelerate, steer, and brake, all without direct driver input. The greatest barrier to full intelligent control, virtual autonomy, is accurate lane guidance, and replicating the driver sense, necessary to navigate busy highways and inconsistent infrastructure.

Intelligent lane guidance, via image processing or infrastructure cues, is advancing rapidly, but replicating driver sense still presents a challenge. Human drivers can best process challenging conditions, and make decisions based on information not immediately apparent to a sensor array. One aspect of human driver sense, which computers can effectively substitute for, is slip recovery. This is an aspect not heavily explored by previous research into intelligent

**Figure 1. A visual representation of sensor fusion** (Staszewski, and Estl, 2013)



**Figure 2. LiDAR Virtual world** (ODYSSEUS LiDAR, 2015)

vehicle navigation (Curley, 2008).

### Sensors

Intelligent vehicles rely on an overlapping group of sensors, which together fuse to create a virtual operating environment. For the purpose of this research, sensors fall into two categories: external and internal.

External sensors provide information about the world around the vehicle, enabling the computation of a safe and efficient trajectory toward a destination. They primarily include RADAR, LiDAR, ultrasonic, GPS, and a day camera. Figure 1 shows all of these systems fused together and each sensors' strengths and weaknesses.

RADAR sensors, currently used in some adaptive cruise control systems, provide the greatest clarity for relative speed. Utilizing the Doppler Effect, they can determine the relative speed of objects around the vehicle. Depending on model and placement, their wide field of view can detect objects of interest both in and around the vehicle's planned path. The main drawback of RADAR is the clarity of the data received. Because of the broad beam, RADAR cannot adequately discern the shape and contour of smaller objects. Its best use on an intelligent vehicle is rapid determination of rate of closure and long-distance object sensing (Lundquist and Schön, 2009).

LiDAR (Figure 2) provides a more precise virtual image of the world immediately around the vehicle. Due to the narrow beam width of the laser, a mechanical scanner is necessary to cover the target area. This results in some latency compared to RADAR, but together,

they provide a fused image of a vehicle's surroundings. Precision, range, cost, and speed are all tradeoffs with LiDAR. An intelligent vehicle may incorporate multiple LiDAR sensors to enhance the quality of the virtual world model.

Ultrasonic sensors are currently in use in most reverse detection systems. They provide accurate, low cost, range detection of near obstacles, and will inform the fused virtual image of near obstacles around the entire vehicle. This will enable lane changes and emergency swerve maneuvers without unintentionally impacting near objects.

GPS provides an absolute position, navigation, and speed reference. It will enable macro-scale acceleration and speed calculations based on map data and road models, as well as provide continuous calibration of the Inertial Measurement Unit (IMU) and speed sensors. It does not however, provide the accuracy necessary to maintain lane guidance.

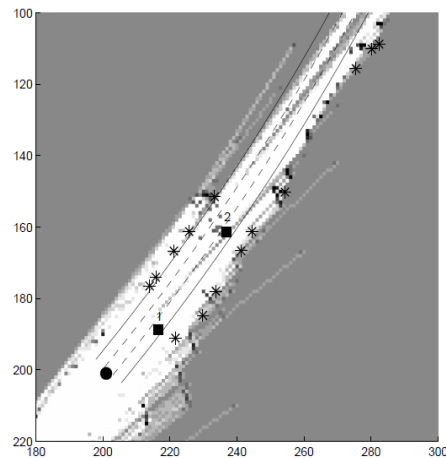
Internal sensors include the host of vehicle sensors, which inform the vehicle computers of the operating state of various subsystems. The key sensors related to intelligent vehicle operation are: wheel speed, steering angle, yaw rate, and acceleration.

Wheel speed and steering angle are used in concert to provide closed loop feedback to the vehicle controller. When a trajectory is commanded, the steering wheels will turn, and differential torque will be applied to the drive wheels. Sensor feedback will aid in preventing wheel slip and allow the virtual model to compute absolute vehicle position.

Finally, the yaw and acceleration sensors, combined into an IMU, provide a measure of error correction to the above speed and angle sensors. Under load, the dynamic performance of a rubber-tired vehicle will not exactly match simple kinematic models. This inertial measurement will enable closed loop feedback to correct for slip, and prevent loss of control. Doing so is critical because the inertial sensors provide a much faster feedback loop than the refresh time of the virtual fused model (Jing et al. and Liu, 2014).



**Figure 3. A representative fused guidance model**  
(Lundquist and Schön, 2009)



### Current Intelligent Operating Concept

The majority of research on intelligent vehicles focuses on either the sensors necessary to enable autonomous driving, or the infrastructure network required for large scale implementation (Curley, 2008; Sauck, 2009). This research focuses on the logical process and implementation of multiple sensor inputs, to ultimately control a four-wheeled vehicle. An intelligent vehicle with real-time control of steering, braking, and individual wheel power can provide an unprecedented level of safety and performance through varying conditions. This is accomplished by fusing inputs, determining optimal trajectories, and maintaining closed-loop control of vehicle dynamics.

Various sensors provide the inputs necessary for the vehicle's computer to construct a virtual image of the world around it. Current production road-going vehicles already contain accurate vehicle speed sensors to control the automatic transmission and individual wheel speed sensors to enable the ABS system. Many also include ultrasonic or camera-based backup warning/guidance systems, and similar side blind-spot detection systems. Acting independently, these sensors provide the driver directly, or indirectly, with information on their specific measurements. An intelligent vehicle with sensor fusion will combine these inputs with longer range forward looking speed and distance sensors to create a virtual model of the

objects around a vehicle (Lundquist, and Schön, 2009). Rather than individually warn the driver of impending collision hazards, fused together, these sensors will provide the constraints necessary to form a solution vector, which will either steer the vehicle autonomously or provide tactile sensory assistance (similar to a "stick shaker" in modern aircraft) to alert and assist the driver in immediate evasive action.

Active lane guidance, as part of sensor fusion, will enable the vehicle to maintain a center position between lanes based on image analysis of the lane markers and input from the rest of the vehicle's fused sensors. From this input, optimal trajectories will be computed, either to follow road curvature or avoid hazards within the road. Figure 3 shows a model developed by Lundquist and Schon, which infers a safe path between lane markers, with obstacle overlays.

The squares represent other vehicles, with the other icons indicating various sensor returns. The dark areas represent areas of uncertainty, while the white path is determined clear.

By reacting to a consolidated virtual model, the vehicle will continuously update its optimal trajectory with minimal computing overhead (Zhenhai and Bing, 2009). Under ideal conditions, the vehicle's color day camera, informs an image processor of the positions of the lane markers. These are overlaid on the virtual model, with a recommended trajectory directly down the center. As the lanes curve, the trajectory also

curves. Vehicle speed is modulated so as not to exceed a safe stopping distance within the plotted clear trajectory.

If an obstacle were to appear in front of the vehicle, the obstacle detection sensors would provide its size and location to the virtual model. Development of this model is a key element of this research. If this obstacle impinges on the planned trajectory, a new course is plotted to avoid it with minimal course deflection (left or right). If such a deflection would result in the vehicle leaving the defined road surface (fused from the camera), an evasive maneuver will then be chosen from a menu of decreasingly desirable options, in the same way a human driver performs, but with significantly less delay. The fused model balances vehicle speed, radius of trajectory curvature, and expected stopping distance to determine – near instantaneously – if an emergency braking maneuver, swerve into unobstructed space, or combination of the two presents the option with the greatest margin for error. If a human driver were in control at the time of the obstacle presentation, an audible and tactile warning, similar to aircraft terrain avoidance systems, would provide the best option, without the usual cognitive delay.

After determining which course of action to execute, the intelligent vehicle must then use a reverse kinematic approach to control the vehicle's brakes, motors, and steering. A high-speed braking maneuver would demand input from all four wheel speed sensors to sense wheel slip, a yaw sensor to sense vehicle attitude disruption, and an accelerometer to compute absolute position along the trajectory. These feed directly into the virtual model, ensuring all vehicle control inputs are informed of the current vehicle attitude and acceleration (Jing et al. and Liu, 2014).

If operated by a human driver, such algorithms will provide a measure of stability control in case the vehicle loses traction while maneuvering.

### **Next Steps in Intelligent Vehicles**

Many automakers are integrating automatic object avoidance into their entire product lines. Such a system will use sensors to indicate an

impending collision, and apply the vehicle brakes, as necessary, to prevent impact. The greatest hurdle to still achieve is the development of an intelligent system capable of reading the surface of the road, enabling the vehicle to remain in its lane, and following traffic signals (Curley, 2008; Sauck, 2009). Rather than make the leap directly to autonomous vehicles, the adoption and acceptance of intelligent driver aids will continue to ease the task load of drivers. Just as cruise control eases highway travel, lane guidance and GPS linked traffic management will allow discrete stretches of autonomous highway. Human drivers will still navigate in urban and surface street environments until these systems demonstrate overwhelming success on simpler terrain.

The next challenges that engineers have to face include the transition from the current transportation system to an intelligent vehicle-based transportation system. Current infrastructure may require upgrades to enable full integration of intelligent vehicles, while remaining useful to conventional vehicles. Engineers will soon be confronted with the economic, environmental, and societal challenges that are inherent with intelligent vehicle design, as current driving paradigms will likely have to change with technology. These transitional challenges will present unique opportunities to increase both the safety and efficiency of road networks. This research delimits at these issues; however, this field presents an excellent opportunity for investigation from multiple angles.

### **Current Research**

This research focuses on the application of intelligent control systems to improve automotive efficiency, performance, and safety. Such systems include:

*Sensor fusion:* A computer model which combines the input from multiple discrete sensors to provide a virtual image of the surrounding environment.

*Fully electric drive:* A drive system which eliminates the transmission, driveline, and axle shafts from the vehicle, enabling total control over individual wheel speed and

torque, using individual wheel motors.

*Differential torque stability control:* The ability to modulate torque at each drive wheel, to enhance vehicle stability, reduce wheel slippage, and aid traction on uneven or slippery surfaces.

*Steering yaw rate control:* In conjunction with the stability control, yaw rate control compares vehicle yaw rate with expected yaw rate, based on steering input and speed. This differential indicates the amount of over-steer or under-steer, and can adjust power and braking to prevent loss of vehicle control.

Sensor fusion provides two critical capabilities to an intelligent vehicle. Foremost, it reduces the computational overhead of each sensor answering a query for its specific purpose. The following is just one example: Utilizing sensor fusion, a rear obstacle avoidance sensor will provide situational awareness input used for forward obstacle avoidance. If the model identifies a forward obstacle requiring emergency braking, a close following vehicle would present an additional hazard. By maintaining full situational awareness in one virtual model, the optimum trajectory calculation is simplified.

The second advantage of sensor fusion is information redundancy. Each sensor has a primary purpose, but many can produce overlapping information. Rather than slow the computing cycle with burdensome error correction, the virtual model will plot the overlapping sensor data. The aggregate of this plot becomes the single model presented for trajectory calculations. If a sensor were to malfunction, it would present an anomalous series of data points, which can be immediately rejected, by comparison to the whole of the fused inputs and the operator warned of system impacts. This graceful degradation is critical to ensure safe operation.

A fully electric drive system enables all of these advanced control subsystems to function at a much higher level than current mechanically driven vehicles. Conventional vehicles can only modulate individual wheel torque through

selective brake application, wasting energy, and acting indirectly to only approximate torque variations. A direct drive electric traction motor may be modulated much more rapidly than a conventional drivetrain, with absolute torque control.

A fully electrically driven vehicle may still utilize an engine/generator, battery pack, or any combination of the two systems to provide primary power, without concern to the intelligent control systems. The traction motors may be located within the wheel hubs, or mounted inboard to facilitate a more conventional suspension and brake arrangement. The use of a constant velocity axle shaft would maintain direct drive functionality, while reducing un-sprung weight and allowing for greater protection of the motor.

The differential torque stability control provides a synthetic differential capability, which will prevent wheel slippage during tight cornering. In cases of reduced or uneven traction, the wheel speed and steering angle sensors will provide data used to prevent wheel spin but maintain the commanded acceleration or deceleration rate. In conjunction with the steering yaw rate control, this system will provide unparalleled traction and stability control. Such a system will prevent the wheel slippage required to activate conventional stability controls (Jin and Li, 2015; Jing et al., 2014). In the event wheel slippage occurs, the system will modulate individual wheel torque and steering angle to maintain the commanded vehicle path, while regaining traction.

The most significant application of dynamic control lies in coupling steering output with yaw rate sensing and applied wheel torque. If the vehicle computer senses a yaw rate inconsistent with the steering angle and vehicle speed (over or under steer), it will modulate the steering along with wheel torque to maintain the intended road position (Liu, 2014). In practice, such a maneuver is similar to an experienced driver steering into over-steer and “drifting” around a corner. The initial loss of vehicle control is quickly regained as yaw rate again matches input expectations, and the vehicle settles into a safe driving attitude. Such a system is essential in any

fully intelligent vehicle because the driver will not be prepared to recover from an unexpected loss of traction. The alternative would be for an intelligent vehicle to operate at vastly reduced speeds in order to maintain an acceptable margin of safety. This system is critical for an intelligent vehicle, which relies on adherence to a planned trajectory for safe avoidance of obstacles (Lundquist and Schön, 2009).

## Conclusion

As intelligent vehicle subsystems increasingly enhance driver control and safety, vehicle operators become more indirectly in control of their vehicles. As a result, fused sensors and vehicle control responses must be a consideration for intelligent control. The sensor and stability control systems overviewed herein will provide a layer of safety and enhanced performance when operating a vehicle in real-world conditions on varying road surfaces.

When actively driving, a vehicle operator will have advanced warning and traction control systems which aid decision making and prevent loss of control through haptic and audible feedback and individually tailored wheel torques. If emergency conditions arise, the systems will provide quick recovery and prevent a loss of control.

Intelligent vehicles will someday be capable of functioning without direct driver input. As such, they will require these capabilities to ensure occupant safety and graceful recovery from unexpected situations.

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## Mapping Joaquín: How Literary Cartography Opens New Perspectives on the Western Novel

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With literary cartography increasingly on the forefront in European literary criticism, its seldom use in the United States despite its many benefits is surprising. The following essay will show its importance to academia and apply it to the novel *The Life and Adventures of Joaquín Murieta, the Celebrated California Bandit* by John Rollin Ridge, published in 1854, further referred to as *Joaquín Murieta*.

To do this, the term *literary cartography* must first be established. Barbara Piatti, a leading critic in the field, describes literary cartography as “being able to provide one possible *method*, more precisely: *tools* in order to explore and analyse the particular geography of literature” (2009, p. 3). This means that critics must look at the geography described in a literary text in order to fully understand it. In particular, the researcher creates maps out of geographical points gathered from a literary work and then interprets them.

Now that the term has been defined, it is crucial to understand why it is such an interesting field to pursue. The use of literary cartography tools helps open up to new points of view on literature, therefore providing new ways of analyzing even canonic literature. Moreover, it helps understand certain points in well-known works that were not able to be understood before. Sadly, the tool of cartography in literary analysis has been widely ignored by critics and even openly discouraged; Virginia Woolf is one of them: “A writer’s country is a territory within his own brain, and we run the risk of disillusionment if we try to turn such phantom cities into tangible brick and mortar” (1905, quoted from Piatti 2009). With this she means that critics will destroy the world of fiction created by the imagination by trying to connect it to reality. However, luckily, there are also advocates of literary cartography, for example James Joyce. According to Piatti, he wishes to create images of geography that are so realistic it could be entirely recreated by someone who has not seen it (Budgen 1934, quoted from Piatti 2009). A further explanation is given by Peter Turchi. He explains that the purpose of maps is “to help people find their way and to reduce their fear of the unknown” (2004, p. 7). Maps created from literary works have the exact same purpose: They help the reader to orientate him- or herself by providing reality to the fictional world. It is therefore important to consider the relationship between literature and geography to fully understand the meaning behind a work.

Literary geography is a field that, although only recently established

**REINHILD KOKULA** was born in and raised near Würzburg, Germany, alongside three siblings. After skipping a year of elementary school, she attended the Friedrich-Koenig Gymnasium Würzburg and graduated in 2012. In the same year she started attending the Julius-Maximilians-Universität Würzburg and studies teaching at grammar schools in the subjects of English, Math, and Computer Science. In Fall 2015, she spent a semester abroad in the USA at the University of North Georgia; during this time she learned about the subject of literary cartography and created this essay which she presented at the Georgia Undergraduate Research Conference 2015 in Statesboro, GA. She is expected to complete her studies at the University of Würzburg in July 2017.

in academic discourse, has a long tradition (Piatti 2009, p. 2) in Europe. An example is the Expressionist period at the beginning of the twentieth century in Germany. During this time, writers intensely described the urbanization and the problems of big cities, guiding the focus onto particular real geographies for the first time. Since German high school students as well as German literature majors in college are therefore forced to interact with geography in literature when they cover this epoch, it is no surprise that German language scholars and other scholars all around Europe are interested in pursuing this field. Since many early works that are considered American literature describe the geography of the country, it is especially surprising that American scholars use literary cartography as little as they do.

For the purpose of this project, the novel *Joaquín Murieta* will be mapped and interpreted as an example. It tells the story of a Mexican of the same name who initially comes to California looking for success in the Gold Rush. However, after he is beat up, his wife raped and his half-brother killed by Euro-Americans, Murieta swears to kill everyone involved in the mob as revenge. He establishes a gang, consisting only of Mexicans, with whom he steals horses and money. The narrative stresses that Murieta doesn't kill unless he can't rob, but does not hesitate to take care of people who stand in his way. While he is initially described as kind and noble, especially when compared to the other members of his gang, the character grows darker throughout the novel. A valley at the Arroyo Cantoova serves as a sort of headquarters where he stores his loot of horses and money. There, Murieta reveals his plan of arming 2000 men to ride to the southern counties and kill all "Americans 'wholesale'" (Ridge, p. 60). After this, they shall live in peace. On multiple accounts, groups of white Americans try to stop these bandits; however they are unsuccessful. A man named Prescott even manages to catch and shoot Murieta in the chest, but he miraculously survives and is able to flee. Finally, a man named Henry Love is contracted to kill Murieta; he succeeds almost by accident and is able to catch him by killing his horse. After the battle, the bandit's head is cut

off and displayed, preserved in alcohol.

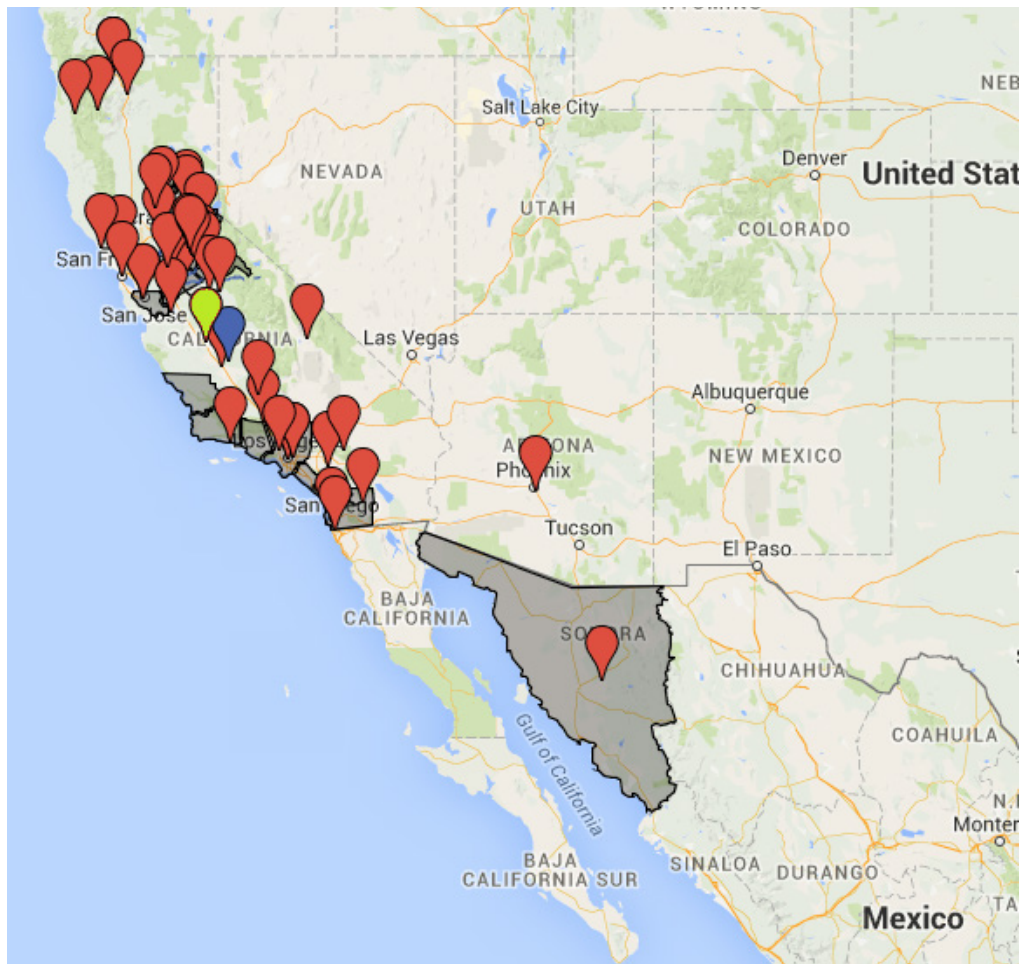
Even though this novel was originally published to be sold as a dime novel and is barely discussed in today's literary criticism, it is of historic significance: *Joaquín Murieta* is the first novel to be published in the state of California and is also the first published novel written by a Native American. Furthermore, it provides a lot of information on the geography<sup>1</sup> of California, allowing critics to draw connections between today and over 165 years ago.

Different critics offer diverse interpretations on the meaning of this novel. Some argue closely to the text, namely that it is a novel on classism.<sup>2</sup> Other critics come to the conclusion that it is supposed to be a sensation novel, basing their reasoning on the preface: It makes the novel out to be an adventure just because it was written by a Native American, even referring to the author by his Native name Yellow Bird although he generally goes by John Rollin Ridge. Other critics in turn interpret *Joaquín Murieta* as allegorical in several different ways. One is an allegory to Ridge's move to California which supposedly created an identity-break within himself,<sup>3</sup> another allegory is that of the Cherokee struggle and their removal to the West through the Trail of Tears, yet another is to make the reader sympathize with Mexico for losing large amounts of land in the American-Mexican War. Although these are all valid interpretations that are mostly based in solid evidence, the tools of literary cartography will help interpret this novel

<sup>1</sup> While landscapes mostly stay the same overtime, literary cartography allows critics to follow Murieta's travel routes and compare them to today's major roads.

<sup>2</sup> This means the regard of social classes as well as treating others according to those classes. At first glance, one may view *Joaquín Murieta* as a novel on racism; however Murieta is described much like a Euro-American and as having a lot of money. Furthermore, he treats other minorities in the same negative fashion as the Americans treat him, therefore showing the class-focus of the novel rather than one on racism.

<sup>3</sup> Although this move to California did not happen because he was forced by an entity but rather because he was being criminally prosecuted for killing someone in Georgia (Payne).

**Figure 1: Mapping of the geographical positions in Joaquín Murieta.**

in more ways and further establish the novel as a travelogue.



There are multiple approaches to creating a map. The suitability of the approach depends on the effort researchers are willing to put in and the scale of the project. Obviously, there is the well-tried *pen and paper* method in which a physical paper-map is marked with pens or push-pins. This method is very simple; however the map itself cannot be distributed easily and is therefore only accessible to a limited number of people (this can be enlarged only through digitalization). Furthermore researchers have to decide on a scale at the beginning of the project and stick with it – realizing that a different scale is more suitable means starting the map over. This

method also has the disadvantage of imprecision; therefore it is not well-suited for academic settings. Despite these negative aspects, *pen and paper* mapping does offer some advantages, especially when using literary cartography in teaching; this will be discussed later.

One of the best ways of creating maps is using a Geographic Information System, shortened to GIS. Besides using it to create maps, it can be used to layer data on top of it, analyze it, manipulate it, etc. Even though those programs can handle large amounts of data, they still work very precisely and are therefore a great choice for work in academia. However, the use of GIS is often expensive, and the programs are difficult to use because of their many features. This means that there often needs to be interdisciplinary cooperation with researchers working in geographical disciplines. Since the use of

GIS is frequently linked to high costs, it is not suitable for small-scale projects.

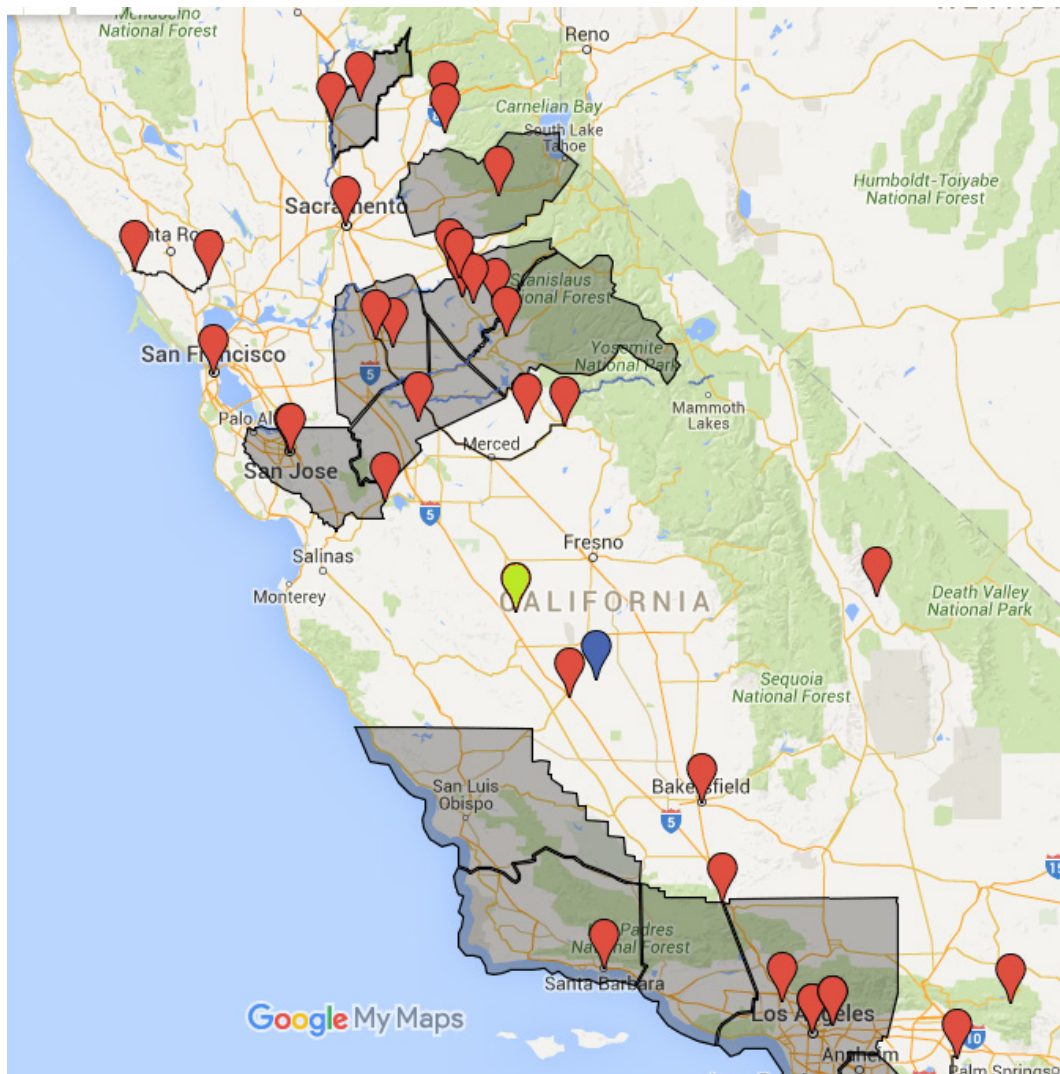
In contrast, an option well-suited for projects of small scale and which was also used for this project is Google Maps. The *My Maps* feature lets the user create a map and then pinpoint places, trace areas and lines (for example for roads and rivers), add directions and measure distances on top of the regular map material used by Google Maps. Apart from being completely free of charge, maps created with this feature can be easily shared through a Google Account and make collaborations – and even simultaneous work on the same map – possible and simple.

First, however, the geographic information must be collected from the text. When creating a map of a novel, it is helpful to collect

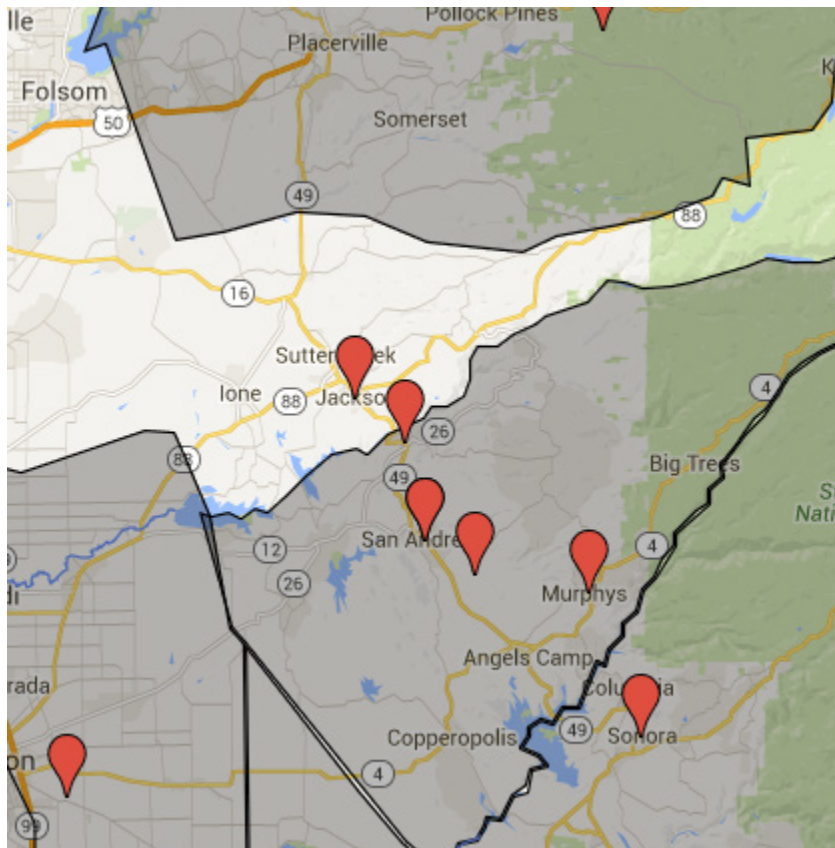
the geographical points during the initial read-through; this makes the reader inherently more aware of the traveling aspect of the novel and keeps the imagined and real geography from drifting apart. Now a decision must be made on which types of geographical information will be included. Specific locations like “Murphy’s Diggings in Calaveras County” (Ridge, p. 4) will obviously be included. However, there are also less specific locations like “a little stream about fifteen miles from the capital” (ibid., p. 25) which can be located on the map but allow for interpretation through the mapmaker.<sup>4</sup>

<sup>4</sup> Here it is important to note that such locations can be easily accurately placed if the mapmaker has knowledge of the geographical region. Researchers

**Figure 2: A closer view on the Sacramento and San Francisco area.**





**Figure 3: A closer view at the modern-day California State Road 49.**

Unspecified locations like “on the highways” (ibid., p. 6) completely rely on the mapmaker’s interpretation of the journey. If this information is included in the map, the researcher must acknowledge the fact that different mapmakers have different interpretations and therefore the resulting maps will vary. Since the goal is to map as many places as possible in this project, these unspecific points will be included wherever feasible and simply must be considered during the interpretation of the final product.

While the issue of precision is one of the only problems that applies to mapmaking in general, there are many more problems that occurred during this project due to the maturity of this novel. *Joaquín Murieta* was originally published as a dime novel; it may therefore occur that the

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who have never visited the target geography of their novel (here: California) can also achieve this by partnering up with someone who does have knowledge of the area. Another solution is to research the geography of the state; however it makes the task more complicated.

author did not do appropriate research and simply made some places up. It is surprising, though, that virtually all places mentioned in the novel do exist.<sup>5</sup> Furthermore, since *Joaquín Murieta* is such an old novel, it must be considered that some places may not exist anymore or have been renamed. However, many such places can still be ascribed a location by using modern technology. Even though Wikipedia is disdained as an unreliable source for academic work, it does provide great help along with Google, especially when considering the ranchos that Joaquín visits. Streets, areas, and certain locations can also be placed through Google, as modern sites

often incorporate the names used in the past. In the case of small towns being incorporated into bigger cities, the districts often keep their original name or schools are named after them. Some places were renamed due to a change of prevailing languages and are therefore hard to find, e.g. the river that is called Arroyo Cantoava from Ridge’s novel is most likely the Cantua Creek because of its geographical location and similarity in name. These problems should also make researchers aware of the fact that not every point that exists can be mapped precisely and that sometimes “close enough” will have to be sufficient.



The map in Figure 1 above shows all specified geographical locations that were visited throughout the novel, with the pins being points and the

<sup>5</sup>The means of travel were by far not as developed as today; the same goes for acquiring information.

areas being counties. It shows at first glance that while Murieta and company traveled through all of California, they mainly visited places in the greater Sacramento and San Francisco area in the center of the state. Figure 2 shows the area of greatest concentration.

Going from the assumption that the Cantua Creek is the Arroyo Cantoova, in both maps marked in green, it becomes obvious why he chose it as his headquarters. The valley is in the center of California and is therefore easily accessible – no matter if he rides south or north, he will not have to travel further than half the state to store his loot. Furthermore, while it is relatively close to San Francisco, San José, and Sacramento, it is far enough away so as to not be discovered, therefore being a perfect hiding spot. This also means that Murieta is able to start his final attack on Euro-Americans at any given moment and is able to reach big cities after only a short journey.

A closer look at what is now the California State Route 49 (Figure 3) reveals that Murieta travels along this road a lot, too – Sonora, Murphy's Diggings, San Andreas, and Jackson are all places that he visits multiple times. This lets us deduct that there already must have been a well-populated road at that place in the 1850s, even though the 49 wasn't built until 1934.

Furthermore, taking this map into consideration shows that, apart from one visit to Phoenix (Arizona), and one to Tijuana (Mexico), Murieta stayed exclusively in California after his initial departure from Mexico. The fact that he does not travel further into Mexico is especially confusing since he is portrayed as a proud Mexican. However, keeping in mind that he travels only because he needs money and horses clears up the confusion quickly. His scorn is only towards Euro-Americans and not towards Mexicans; stealing from his fellow countrymen would not help further his cause. This instance shows that researchers must always keep the story in mind when interpreting maps created from novels.

Layering outside data<sup>6</sup> on top of the maps

<sup>6</sup>The sort of data used is completely up to the researcher and what he or she sees as helpful. For example, the data may be of socio-economic, linguistic, historic, or geographical importance.

provides additional insights: Murieta only steals horses on soil that used to belong to Mexico and was given up to the USA after the Mexican-American war. Therefore it makes sense that he does not steal from Euro-Americans e.g. in Oregon. However, the states of Nevada, Utah, Arizona, New Mexico and parts of Colorado used to belong to Mexico as well and were given up at the same time as California in the Treaty of Guadalupe Hidalgo of 1848, making it unclear why Murieta does not travel there. This map suggests the possible interpretation that the mobs of Euro-Americans that beat up Murieta at the beginning of the novel were from California.

Additionally, these maps can be interpreted more closely intertwined with the text: very few Mexicans appear in the novel that are not part of Murieta's following. Since California has a long north-south-stretch, without a doubt more Mexicans live in the south than in the north. Nevertheless, they all have the same means of transportation at their disposal as Murieta who travels through the whole state. This makes the rare appearances of other Mexicans hard to believe. It may be possible, though, that the narrator does not mention them because they seem "normal" to him, and humans are more inclined to mention the extraordinary rather than the ordinary. Since most of the Mexicans that appear in the novel work for Murieta, this may mean that they invaded the country in secret, all spying on the Euro-Americans and secretly in favor of his war against white people.

The aforementioned interpretation that *Joaquín Murieta* is supposed to be allegorical of the Cherokee struggle, whose removal to the West can now be dismissed almost entirely when considering the map. The Cherokees had a set destination, the West, which was enforced by the Euro-Americans. In contrast, Murieta does not have a set destination or direction; he travels sometimes south, other times north, at his own will, only coming back to the Arroyo Cantoova to quarter the stolen horses. Much rather than a set destination he has a goal, and that is to kill all Euro-Americans.

Lastly, the map provides the conclusion that John Rollin Ridge must have either traveled a lot around California himself, or have had access

to a lot of source material in order to be able to describe such a wide space of geography so specifically.<sup>7</sup>



Looking at these new interpretations makes it obvious that using literary cartography as a tool in literary criticism facilitates discourse and opens the mind to new interpretations. Nevertheless, they have benefits in academic settings as well. Employing maps to graph a character's movement gives students an opportunity to visualize the geography or a character's movements better. If the story is set in a place that the students have never visited, they let their imagination run wild and make wrong connections within the story; having maps at their disposal can help them keep track of reality. While presenting completed products of literary cartography to the students can be impressive and helpful, it is even better to create a map together as a class. This makes for a fun project and is a productive exercise because the students are deeply immersed in the text and may already come to conclusions while they are still evaluating the geographical points. This makes a subsequent interpretation easier. For younger students, e.g. in middle school or for in-class projects it is advisable to use paper-maps because giving the students something they can actually hold in their hands – or hang up in the classroom when it's finished – achieves higher motivation among students. For older students I recommend using the Google *My Maps* feature because it allows the students to work independently, meaning that creating a map or interpreting it can be assigned as homework. Furthermore, working with technology may be more appealing to older students.

This shows that literary cartography has many benefits and should be employed more frequently, in academia as well as in school

teaching. It provides useful information and helps the reader and interpreter connect fiction and reality. As the above rough mapping of *Joaquín Murieta* shows, literary cartography can further discourse, and it especially helps laymen keep their imagination in check. Knowing that Murieta stays almost entirely in California makes for a much more pleasant reading experience compared to believing that he travels throughout the United States only to be snapped back to reality when the truth of his geographic wanderings are realized.

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I want to thank Dr. Anastasia Lin for introducing me to literary cartography and supporting me during every step of this journey! I also want to thank my parents for always believing in me and making this journey possible in the first place.

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<sup>7</sup> Here, the latter definitely seems more accurate since the novel is based on the legendary Mexican bandit Joaquín Murrieta Carrillo, which would provide Ridge with many accounts on the bandit's whereabouts that he would be able to use as resource material.

## Maleiwa: A Story of Creation

**Juan J. Garces**  
*University of North Georgia*

**M**y art often reflects my native roots and history. Inspired by the native pre-Colombian cultures, I try to express the influence they still have on the modern Colombian culture. Even though I wasn't born into indigenous tribal culture, their history, folkways and art have a profound influence on my work. In Colombia, there are over 87 indigenous ethnic groups and over 64 native languages that belong to 22 linguistic families. However, many aspects of the indigenous group's culture were lost during the Spanish Conquest and Inquisition. My mission is to show all of the beauty and cultural information that my country has to offer through my artwork.

"Maleiwa" is the Wayuu word for creation, and the word for God. The Wayuu's are an indigenous group that lives in the Gujara desert in the northeast region of the Colombian territory. This group is one of the few that have survived into the present day and is one of the few groups that one can still interact with. My painting "Maleiwa" tries to recreate their creation legend. This indigenous group is very peculiar. They have many beliefs in common with Western Christianity, specifically the creation story found in the book of Genesis. They believe in one God, which is the creator of everything, and that beginning, there was nothing but God. His process of creation was not smooth or simple. The universe was first compressed and then exploded, also strikingly similar to our modern "Big Bang" theory.

The piece uses primary colors to illustrate the beginning of everything. These colors are a metaphor for creation. The blues represent the water; the living energy that allow us to life. Red represents fire and the creation of life. The brown the earth that provide us with everything humans need. The spiral motif represents air: the last element in the recipe for the creation of the humans. I chose to make the painting abstract creating an intentional movement throughout the painting that expresses a feeling of chaos.

In short, this work is a symbol of my roots, the indigenous culture from which they spring, and an exploration of contemporary artistic styles and technique that tell an ancient story of creation, beginnings and elemental power. In is my hope that they viewer can sense the raw power of this beautiful narrative called "Maleiwa."

**JUAN JAIRO GARCES** is an International Art Marketing Student at the University of North Georgia. He was born on November 27, 1993 in Barranquilla, Colombia. Maleiwa, the piece presented here and on the cover of this journal, was featured in the 2016 Hal B. Rhodes III Juried Student Exhibition.

Oil & Plasticine on canvas  
18" x 30"



## Contributor Biographies

### Computer Vision Based Object Detection and Tracking in Micro Aerial Vehicles

**RICHARD CHAPMAN** is an undergraduate Computer Science major at Florida Southern College. In addition to CS, he is interested in Math, Physics, and Astronomy. He is an executive in the campus Astronomy Club as well as the Computer Science Club, and is involved with many events in the department. Some of his non-academic interests include graphic design, films, and reading. Richard is entering his senior year at Florida Southern. After graduation, he plans to attend graduate school to obtain a Master's of Science degree, perhaps continuing his research in computer vision. **DR. DAVID MATHIAS** is chair of Computer Science and the Charles and Mildred Jenkins Chair in Mathematics and Computer Science at Florida Southern College. He received a B.S. in Computer Science from the University of Delaware and M.S. and D.Sc. degrees in Computer Science from Washington University in St. Louis. His primary research area is genetic algorithms. He teaches a wide array of courses but has a particular fondness for teaching Analysis of Algorithms.

### From Sensor to Street: Intelligent Vehicle Control Systems

**ZACHARIAH COLES** graduated from Georgia Southern University May of 2016 with a Bachelor of Science in Mechanical Engineering. Zach is a veteran of the USAF. After serving for eight years, he worked as a Ski Lift Mechanic at The Canyons Resort in Park City Utah for three years. In the spring of 2012 before Zach began his college journey. He is currently beginning his career as a Project Engineer with Shaw Floors in Dalton, Georgia. **TOM BEYERL** is an active duty Major in the United States Army. He is pursuing a master's of science in applied engineering at Georgia Southern University. He served as the Assistant Product Manager for Maneuver Targeting Systems for Product Manager Soldier Precision Targeting Devices at Ft. Belvoir, VA. He holds a master's degree in administration from Central Michigan University and a bachelor's degree in mechanical engineering from Norwich University. **IMANI AUGUSMA** is a very bright Electrical Engineer who graduated from Georgia Southern University in 2015. **DR. VALENTIN SOLOIU** is Professor at Georgia Southern University. He has 30 years of experience in Automotive Engineering teaching and research. During his career he produced 130 peer reviewed papers and studies, and 9 textbooks.

### Optimism in Independence: The European Central Bank after the 2008 Global Financial Crisis

**MELISSA DIXON** is a 2015 graduate of Georgia Southern University. She holds a Bachelor of Arts in Political Science with a minor in Business. Melissa has presented her research at the 2013 and 2014 annual meetings of the Georgia Political Science Association. **DR. JAMIE SCALERA** is an Assistant Professor in the Department of Political Science and International Studies at Georgia Southern University. She teaches and researches in the field of International Relations, with a focus on international organizations, international political economy, and European Union politics.

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**JUAN JAIRO GARCES** is an International Art Marketing Student at the University of North Georgia. He was born on November 27, 1993 in Barranquilla, Colombia. Maleiwa, the piece presented here and on the cover of this journal, was featured in the 2016 Hal B. Rhodes III Juried Student Exhibition.

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### The Clerk Conundrum: Chaucer's Attitude towards Pilgrim and Profession

**AMBER JURGENSEN** is pursuing an MA in English Literature at Louisiana Tech University. In May 2016, she graduated summa cum laude in English and History from Louisiana Tech, and she continues to work in the Louisiana Tech Writing Center as a graduate assistant. Amber was proud to serve as the 2015-2016 Student Representative of the Southern Region and President of the Rho Gamma Chapter of Sigma Tau Delta International English Honor Society, continuing her service as the 2016-2017 Vice President of the Rho Gamma Chapter. She also enjoys membership in Phi Alpha Theta National History Honor Society as well as the Honor Society of Phi Kappa Phi, Lambda Sigma National Honor Society, and the National Society of Leadership and Success. Amber has presented academic papers at her university's annual research symposium, the Southeastern Medieval Association Conference in 2015, and the Sigma Tau Delta 2016 International Convention. Her goal is to obtain a PhD in English with a focus in nineteenth-century British literature, Victorian culture, and the history of the novel. In her free time, Amber enjoys traveling, reading, and watching movies and musicals.

### Mapping Joaquín: How Literary Cartography Opens New Perspectives on the Western Novel

**REINHILD KOKULA** was born in and raised near Würzburg, Germany, alongside three siblings. After skipping a year of elementary school, she attended the Friedrich-Koenig Gymnasium Würzburg and graduated in 2012. In the same year she started attending the Julius-Maximilians-Universität Würzburg and studies teaching at grammar schools in the subjects of English, Math, and Computer Science. In Fall 2015, she spent a semester abroad in the USA at the University of North Georgia; during this time she learned about the subject of literary cartography and created this essay which she presented at the Georgia Undergraduate Research Conference 2015 in Statesboro, GA. She is expected to complete her studies at the University of Würzburg in July 2017.

### 'It Relates to My Everyday Life.' Critical Pedagogy and Student Explanations of Interest in Sociology Course Topics

**MINDY MAULDIN** recently graduated with her Bachelor of Science degree in Sociology and Psychology from Florida Southern College. She is originally from and currently resides in Fort Worth, Texas. Mindy's research interests center around the application of sociology and psychology to a variety of topics such as education, the prison system, and trauma. In the future, she intends to pursue a doctorate degree in clinical psychology. **CULLEN O'DONNELL**, a senior at Florida Southern College from Mentor, Ohio, has always had a passion for learning about society and improving social issues. He is pursuing a Bachelors of Science in Sociology and a Bachelor of Arts in Psychology and Spanish. He is currently employed as a youth development professional at Boys & Girls Club, counselor at Neighborhood Ministries, and substitute teacher for Polk County. He has held several leadership positions on campus, including Founding Father and Historian of Pi Kappa Phi. He plans on getting his Masters of Social Work and is interested in joining the Peace Corps. **JEREMIE BATES** is a Bachelor of Fine Art student at the University of Central Florida. Although the study of fine arts is his main focus, he has always had a lifelong interest in human behavior. While attending Valencia State College, he took an Introduction to Sociology course to learn more on the subject. He continued his sociology studies as an intern under **DR. CHASTITY BLANKENSHIP**. He applies this knowledge to improve his work and understanding of the different cultural standards of art. Blankenship is an assistant professor of Sociology at Florida Southern College. Her teaching and research areas include educational issues, race, class, and gender inequality.

## Contributor Biographies

### **The Gaps in Health Care of the LGBT Community: Perspectives of Nursing Students and Faculty**

**KEILY MITCHELL, LAKENYA LEE, AYANA GREEN, and JASMINE SYKES** are Georgia Southern University nursing students who investigated this topic as a component of their research course. They will graduate in the fall of 2016 with a Bachelor's of Science in Nursing. The authors are residents of Georgia and passionate about patient centered care, especially pertaining to patients in rural areas and those who fall into health disparity populations. After graduating the authors' plans include further involvement in the future of nursing practice. A poster presentation of this research was presented at the 2016 National Conference on Health Disparities and the 2015 Georgia Undergraduate Research Conference.

### **The Puppeteer: An Analysis of the Implications of Gendered Spheres through Sadie Burke in *All the King's Men***

**SIERRA D. RIDDLE** is a senior Presidential and Honors Scholar at Lee University in Cleveland, Tennessee where she majors in English with a concentration in literature. Sierra serves as the secretary for the Society for Law and Justice, as well as the prosecuting attorney for Lee University's Competitive American Mock Trial Association Team, and as a judge for the National Christian Forensics and Communications Association. She is also a member of the Sigma Tau Delta International English Honor Society. In her free time Sierra interns at the 10th Judicial District Attorney's Office, with a particular interest in the Juvenile Division, as well as volunteers at her local animal shelter and equine therapy center. Upon the completion of her bachelor's degree in the summer of 2016, Sierra plans to backpack South America before attending law school to pursue the study of public interest law, and hopes to one day serve as a Juvenile Court Judge. In addition to literature, Sierra enjoys intersectional feminism, social justice, yoga, hiking, and hoop dance.



# Papers & Publications

Interdisciplinary Journal of Undergraduate Research

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*Papers & Publications*, volume 6 (2017)

Submissions for the sixth volume of *Papers & Publications* will be accepted **1 November 2016** through **28 February 2017**.

*Papers & Publications* is a regional, peer-reviewed journal of undergraduate research. Now in its sixth year, *Papers & Publications* promotes student learning by disseminating undergraduate research and creative works that make an intellectual or creative contribution to the discipline or to applied practice. This journal is published annually by the Center of Undergraduate Research and Creative Activities (CURCA) at the University of North Georgia with support by the UNG Libraries.

### Submission Guidelines

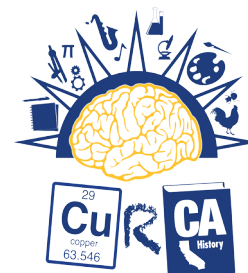
Students may submit original work that has been presented at a conference, showcase, or capstone course either on their own campus or at a regional/national conference site. The work must have been completed while the student was an undergraduate; the student may submit research within a year after graduating. Original research papers, including those developed in collaboration with faculty mentors, are welcome from all departments and disciplines. Creative works—fiction, creative non-fiction, works of art and poetry—are also welcome, providing the work has been presented at a conference, class, or showcase. Submissions are welcome from students affiliated with colleges and universities in the southeastern United States, including Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. The work may not be printed or under consideration by other publications. Faculty in the appropriate discipline will review all submissions.

Typed manuscripts should be submitted as MSWord files by **28 February 2017 at 5 p.m. (ET)**. They should be single-spaced, fully justified, with one-inch margins, 12 point Times New Roman font, and numbered pages. Illustrations, tables, and figure legends should be embedded within the text at the locations preferred by the authors. Length: 5,000 words maximum. Citations should be formatted in the most recent editions of the citation style appropriate to their academic disciplines, e.g. MLA, Chicago, APA, etc. The chosen format must be used consistently throughout the manuscript.

Visual arts entries to be considered for the volume cover should include an artist's statement and image files in a single PDF.

All submissions must include an abstract of 250 words (maximum), keywords, and a student author biography of 300 words (maximum).

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