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Undergraduate Research Participation in Electrical Engineering

John F. Vetelino

Principal Investigator; University of Maine, Orono

Fred Irons

Co-Principal Investigator; University of Maine, Orono

Donald M. Hummels

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Conrad Silvestre

Co-Principal Investigator; University of Maine, Orono

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Investigators

John F. Vetelino, Fred Irons, Donald M. Hummels, Bruce Segee, Conrad Silvestre, Gregory Grillo, Paul Millard, George Bernhardt, Scott Moulzolf, Touradj Solouki, Bronson Crothers, David Frankel, Chung Kim, Carl Tripp, Nick LeCursi, Alfred Bushway, David Kleinschmidt, Mohamad Musavi, Brian Frederick, Robert Lad, Carol Kim, David Kotecki, Mauricio da Cunha, Habtom Resson, Cristian Domnisoru, and Darrell Donahue

Final Report for Period: 06/1999 - 05/2004**Submitted on:** 06/04/2004**Principal Investigator:** Vetelino, John F.**Award ID:** 9820332**Organization:** University of Maine**Title:**

Undergraduate Research Participation in Electrical Engineering

Project Participants

Senior Personnel

Name: Vetelino, John**Worked for more than 160 Hours:** Yes**Contribution to Project:**

John Vetelino acted as the advisor for two NSF-REU students. Support for John Vetelino was obtained from sources other than the NSF-REU grant.

Name: Irons, Fred**Worked for more than 160 Hours:** No**Contribution to Project:**

Fred Irons acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Fred Irons was obtained from sources other than the NSF-REU grant.

Name: Hummels, Donald**Worked for more than 160 Hours:** No**Contribution to Project:**

Donald Hummels acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Donald Hummels was obtained from sources other than the NSF-REU grant.

Name: Segee, Bruce**Worked for more than 160 Hours:** No**Contribution to Project:****Name:** Silvestre, Conrad**Worked for more than 160 Hours:** No**Contribution to Project:**

Conrad Silvestre acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Conrad Silvestre was obtained from sources other than the NSF-REU grant.

Name: Grillo, Gregory**Worked for more than 160 Hours:** No**Contribution to Project:**

Gregory Grillo acted as the advisor for one NSF-REU student. Support for Gregory Grillo was obtained from sources other than the NSF-REU grant.

Name: Millard, Paul**Worked for more than 160 Hours:** No**Contribution to Project:****Name:** Bernhardt, George**Worked for more than 160 Hours:** No**Contribution to Project:**

George Bernhardt acted as the advisor for one NSF-REU student in the Summer of 2000. Support for George Bernhardt was obtained from sources other than the NSF-REU grant.

Name: Moulzolf, Scott

Worked for more than 160 Hours: No

Contribution to Project:

Scott Moulzolf acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Scott Moulzolf was obtained from sources other than the NSF-REU grant.

Name: Solouki, Touradj

Worked for more than 160 Hours: No

Contribution to Project:

Touradj Solouki acted as the advisor for one NSF-REU student. Support for Touradj Solouki was obtained from sources other than the NSF-REU grant.

Name: Crothers, Bronson

Worked for more than 160 Hours: No

Contribution to Project:

Bronson Crothers acted as the advisor for one NSF-REU student. Support for Bronson Crothers was obtained from sources other than the NSF-REU grant.

Name: Frankel, David

Worked for more than 160 Hours: No

Contribution to Project:

David Frankel acted as the advisor for two NSF-REU students in the Summer of 2000. Support for David Frankel was obtained from sources other than the NSF-REU grant.

Name: Kim, Chung

Worked for more than 160 Hours: No

Contribution to Project:

Chung Kim acted as the advisor for one NSF-REU students. Support for Chung Kim was obtained from sources other than the NSF-REU grant.

Name: Tripp, Carl

Worked for more than 160 Hours: No

Contribution to Project:

Carl Tripp acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Carl Tripp was obtained from sources other than the NSF-REU grant.

Name: LeCursi, Nick

Worked for more than 160 Hours: No

Contribution to Project:

Nick LeCursi acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Nick LeCursi was obtained from sources other than the NSF-REU grant.

Name: Bushway, Alfred

Worked for more than 160 Hours: No

Contribution to Project:

Alfred Bushway acted as the advisor for one NSF-REU student. Support for Alfred Bushway was obtained from sources other than the NSF-REU grant.

Name: Kleinschmidt, David

Worked for more than 160 Hours: No

Contribution to Project:

David Kleinschmidt acted as advisor for one NSF-REU student in the Summer of 2000. Support for David Kleinschmidt was obtained from sources other than the NSF-REU grant.

Name: Musavi, Mohamad

Worked for more than 160 Hours: No

Contribution to Project:

Name: Frederick, Brian

Worked for more than 160 Hours: No

Contribution to Project:

Brian Frederick acted as the advisor for one NSF-REU student in the Summer of 2000. Support for Brian Frederick was obtained from sources other than the NSF-REU grant.

Name: Lad, Robert

Worked for more than 160 Hours: No

Contribution to Project:

Name: Kim, Carol

Worked for more than 160 Hours: No

Contribution to Project:

Name: Kotecki, David

Worked for more than 160 Hours: No

Contribution to Project:

Name: da Cunha, Mauricio

Worked for more than 160 Hours: No

Contribution to Project:

Name: Resson, Habtom

Worked for more than 160 Hours: No

Contribution to Project:

Name: Domnisoru, Cristian

Worked for more than 160 Hours: No

Contribution to Project:

Name: Donahue, Darrell

Worked for more than 160 Hours: No

Contribution to Project:

Post-doc

Graduate Student

Undergraduate Student

Name: Cousins, Jesse

Worked for more than 160 Hours: Yes

Contribution to Project:

Jesse Cousins worked under the direction of John Vetelino in the Summer of 1999 and his research topic was 'Study of the AC Impedance of Metal Oxide Films for Applications in Gas Sensors.' He was supported 100% by the NSF-REU grant.

Name: Craig, Howard

Worked for more than 160 Hours: Yes

Contribution to Project:

Howard Craig worked under the direction of Conrad Silvestre in the Summer of 1999 and his research topic was 'Deposition and Analysis of Gold (Au), Platinum (Pt), and Titanium (Ti) Electrodes for Use in Metal Oxide Gas Sensors.' He was supported 50%

by the NSF-REU grant and 50% by the Laboratory for Surface Science and Technology (LASST)

Name: Grillo, Thomas

Worked for more than 160 Hours: Yes

Contribution to Project:

Thomas Grillo worked under the direction of Paul Millard in the Summer of 1999 and his research topic was 'Development of Sensors to Assay Proteolytic Activity: Steps Toward Establishment of Intellectual Property.' He was supported 50% by the NSF-REU grant and 50% by the Laboratory for Surface Science and Technology (LASST).

Name: Jean-Charles, Milagros

Worked for more than 160 Hours: Yes

Contribution to Project:

Milagros Jean-Charles worked under the direction of George Bernhardt and Scott Moulzolf in the Summer of 1999 and her research topic was 'The Structure and Topography of Metal Oxide Films Used in Chemical Sensing.' She was supported 100% by the NSF-REU grant.

Name: Johnston, Hilary

Worked for more than 160 Hours: Yes

Contribution to Project:

Hilary Johnston worked under the direction of Touradj Solouki in the Summer of 1999 and her research topic was 'Nitric Oxide Sensors.' She was supported 100% by the Laboratory for Surface Science and Technology.

Name: Kapombe, Blaise

Worked for more than 160 Hours: Yes

Contribution to Project:

Blaise Kapombe worked under the direction of Bronson Crothers in the Summer of 1999 and his research topic was 'The Development of Computer Software for the Chemical Gas Delivery System (GDS).' He was supported 100% by the NSF-REU grant.

Name: Latlippe, Traci

Worked for more than 160 Hours: Yes

Contribution to Project:

Traci Latlippe worked under the direction of David Frankel in the Summer of 1999 and her research topic was 'The Feasibility of Using Surface Acoustic Wave Sensors to Detect Pesticide Residues on Fruit.' She was supported 50% by the NSF-REU grant and 50% by the Laboratory for Surface Science and Technology (LASST).

Name: Morehouse, Rachel

Worked for more than 160 Hours: Yes

Contribution to Project:

Rachel Morehouse worked under the direction of Chung Kim in the Summer of 1999 and her research topic was 'The Testing of Metal Oxide Based Chemical Warfare Sensors to Stimulant and Potential Interferent Gases.' She was supported 50% by the NSF-REU grant and 50% by the Laboratory for Surface Science and Technology (LASST).

Name: Moyer, Jonathan

Worked for more than 160 Hours: Yes

Contribution to Project:

Jonathan Moyer worked under the direction of Carl Tripp in the Summer of 1999 and his research topic was 'Developing an Attachment Chemistry Anchoring Biological Molecules to a Piezoelectric Device.' He was supported 24% by the NSF-REU grant and 76% by a federally funded work study program.

Name: Neiling, Julie

Worked for more than 160 Hours: Yes

Contribution to Project:

Julie Neiling worked under the direction of Bruce Segee in the Summer of 1999 and her research topic was 'Data Gathering and Processing Using Embedded Systems.' She was supported 100% by the NSF-REU grant.

Name: Pitcher, Stephanie

Worked for more than 160 Hours: Yes

Contribution to Project:

Stephanie Pitcher worked under the direction of John Vetelino in the Summer of 2000 and her research topic was 'The Study of AC Impedance for a Tungsten Trioxide Ethylene Sensor.' She was supported 100% by the NSF-REU grant.

Name: Saucier, Scott

Worked for more than 160 Hours: Yes

Contribution to Project:

Scott Saucier worked under the direction of Donald Hummels in the Summer of 1999 and his research topic was 'Superheterodyne Spectrum Analyzer Design for DAC Calibration Scheme.' He was supported 50% by the NSF-REU grant and 50% by the University of Maine Department of Electrical and Computer Engineering Castle Fund.

Name: Seitz, Jennifer

Worked for more than 160 Hours: Yes

Contribution to Project:

Jennifer Seitz worked under the direction of Gregory Grillo in the Summer of 1999 and her research topic was 'The Development of Quartz Crystal Microbalance Based Biosensors.' She was supported 50% by the NSF-REU grant and 50% by the Laboratory for Surface Science and Technology (LASST)

Name: Soucie, Rachael

Worked for more than 160 Hours: Yes

Contribution to Project:

Rachael Soucie worked under the direction of Bruce Segee in the Summer of 1999 and her research topic was 'Creating a World Wide Web Interface for Programmable Logic Controllers Used in Industrial Control.' She was supported 100% by the NSF-REU grant.

Name: Thurlow, Jason

Worked for more than 160 Hours: Yes

Contribution to Project:

Jason Thurlow worked under the direction of Nick LeCursi in the Summer of 1999 and his research topic was 'Resistance Temperature Detectors-Test and Development.' He was supported 100% by the NSF-REU grant.

Name: Tonti, Janelle

Worked for more than 160 Hours: Yes

Contribution to Project:

Janelle Tonti worked under the direction of Fred Irons in the Summer of 1999 and her research topic was 'Time Domain Characterization of Analog to Digital Converters.' She was supported 50% by the NSF-REU grant and 50% by the University of Maine Department of Electrical and Computer Engineering Castle Fund.

Name: Tsun, Peter

Worked for more than 160 Hours: Yes

Contribution to Project:

Peter Tsun worked under the direction of Donald Hummels in the Summer of 1999 and his research topic was 'Porting Real-time DSP Software (in C) for Sonar Applications.' He was supported 24% by the NSF-REU grant and 76% by another research grant.

Name: White, Ricky

Worked for more than 160 Hours: Yes

Contribution to Project:

Ricky White worked under the direction of Conrad Silvestre in the Summer of 1999 and his research topic was 'Fabrication of Acoustic Wave Devices.' He was supported 50% by the NSF-REU grant and 50% by the Laboratory for Surface Science and Technology (LASST).

Name: Carr, Crystal

Worked for more than 160 Hours: Yes

Contribution to Project:

Crystal Carr worked under the direction of Bruce Segee in the Summer of 2000 and her research topic was 'Controlling an Analog System Using Digital Microcontrollers.' She was supported 100% by the NSF-REU grant.

Name: Congleton, Christina

Worked for more than 160 Hours: Yes

Contribution to Project:

Christina Congleton worked under the direction of John Vetelino in the Summer of 2000 and her research topic was 'Determining a Useful Indicator of Lobster Health for the Development of a Biosensor.' She was supported 100% by the NSF-REU grant.

Name: Copp III, Philip

Worked for more than 160 Hours: Yes

Contribution to Project:

Philip Copp III worked under the direction of David Kleinschmidt in the Summer of 2000 and his research topic was 'Scripting Language for the Gas Delivery System.' He was supported 28% by the NSF-REU grant and 72% by a federally funded work study program.

Name: Cox, Ralph

Worked for more than 160 Hours: Yes

Contribution to Project:

Ralph Cox worked under the direction of Carl Tripp in the Summer of 2000 and his research topic was 'Development of High Surface Area Particle WO₃ for Use in Modeling Thin Film Sensors for the Detection of Biological/Chemical Warfare Agents.' He was supported 100% by the Laboratory for Surface Science and Technology (LASST).

Name: Davis, Benjamin

Worked for more than 160 Hours: Yes

Contribution to Project:

Benjamin Davis worked under the direction of Mohamad Musavi in the Summer of 2000 and his research topic was 'Development of ANN Software and Utilization in Semi-Automated Roadway Extraction from Satellite Images.' He was supported 64% by the NSF-REU program and 36% by another research grant.

Name: Jones II, Charles

Worked for more than 160 Hours: Yes

Contribution to Project:

Charles Jones II worked under the direction of John Vetelino in the Summer of 2000 and his research topic was 'Bulk Acoustic Wave Devices for Liquid Phase Sensing.' He was supported 100% by the NSF-REU grant.

Name: Klein, Todd

Worked for more than 160 Hours: Yes

Contribution to Project:

Todd Klein worked under the direction of David Frankel in the Summer of 2000 and his research topic was 'Development of a Sensor to Detect Pesticides on Blueberries.' He was supported 100% by the Laboratory for Surface Science and Technology (LASST).

Name: McCarthy, Erik

Worked for more than 160 Hours: Yes

Contribution to Project:

Erik McCarthy worked under the direction of Fred Irons and Don Hummels in the Summer of 2000 and his research topic was 'Determining Bandwidth of an ADC Using an Alternative Test Method.' He was supported 50% by the NSF-REU grant and 50% by another research grant.

Name: Ngue Mba, Joel

Worked for more than 160 Hours: Yes

Contribution to Project:

Joel Ngue Mba worked under the direction of Brian Frederick in the Summer of 2000 and his research topic was 'Optical Density as a Probe of Stoichiometry and Carrier Concentration in WO₃ Films.' He was supported 100% by the NSF-REU grant.

Name: Peters, Jeremy

Worked for more than 160 Hours: Yes

Contribution to Project:

Jeremy Peters worked under the direction of Robert Lad, Scott Moulzolf, and David Frankel in the Summer of 2000 and his research topic was 'Hall Effect Measurement in Metal Oxide Sensing Films.' He was supported 100% by the Laboratory for Surface Science and Technology (LASST).

Name: Pike, Peter

Worked for more than 160 Hours: Yes

Contribution to Project:

Peter Pike worked under the direction of Nick Lecursi and George Bernhardt in the Summer of 2000 and his research topic was 'Thin Film Adhesion.' He was supported 28% by the NSF-REU grant and 72% by a federally funded work study program.

Name: Pollard, Thomas

Worked for more than 160 Hours: Yes

Contribution to Project:

Thomas Pollard worked under the direction of Conrad Silvestre in the Summer of 2000 and his research topic was 'Fabrication Procedure for Surface Acoustic Wave (SAW) Devices.' He was supported 100% by the NSF-REU grant.

Name: Thiele, Jeremy

Worked for more than 160 Hours: Yes

Contribution to Project:

Jeremy Thiele worked under the direction of John Vetelino in the Summer of 2000 and his research topic was 'Ethylene Sensor to Monitor the Ripening Process in Fruit.' He was supported 100% by the NSF-REU grant.

Name: Thorne, Cameron

Worked for more than 160 Hours: Yes

Contribution to Project:

Cameron Thorne worked under the direction of John Vetelino in the Summer of 2000 and his research topic was 'Characterization of Metallic Glass Materials for Dispersive Delay Line Applications.' He was supported 100% by the NSF-REU grant.

Name: Torres, Manuel

Worked for more than 160 Hours: Yes

Contribution to Project:

Manuel Torres worked under the direction of Mohamad Musavi in the Summer of 2000 and his research topic was 'Intelligent DNA Base Calling.' He was supported 100% by the NSF-REU grant.

Name: Vollmers, Julia

Worked for more than 160 Hours: Yes

Contribution to Project:

Julia Vollmers worked under the direction of Robert Lad in the Summer of 2000 and her research topic was 'X-Ray Photoelectron Spectroscopy.' She was supported 100% by the Laboratory for Surface Science and Technology (LASST).

Technician, Programmer**Other Participant**

Name: Vetelino, John

Worked for more than 160 Hours: Yes

Contribution to Project:**Research Experience for Undergraduates**

Name: Bovill, Robert

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2001
REU Funding: REU site award

Name: Fernandez, Juliet

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Ferran, Angela

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Other
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Hermansen, Knud

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2001
REU Funding: REU site award

Name: McNally, Ceara

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2001
REU Funding: REU site award

Name: Mitchell, Lisa

Worked for more than 160 Hours: Yes

Contribution to Project:**Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2001**REU Funding:** REU site award**Name:** Moyer, Jonathan**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2001**REU Funding:** REU site award**Name:** Pierce, Kyle**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Sophomore**Home Institution:** Other than Research Site**Home Institution if Other:** Valparaiso University**Home Institution Highest Degree Granted(in fields supported by NSF):** Master's Degree**Fiscal year(s) REU Participant supported:** 2001**REU Funding:** REU site award**Name:** Pike, Peter**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Sophomore**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2001**REU Funding:** REU site award**Name:** Pollard, Thomas**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2002**REU Funding:** REU site award

Name: Preston, Harry

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: Benedict College

Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree

Fiscal year(s) REU Participant supported: 2001

REU Funding: REU site award

Name: Soucie, Rachael

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2001

REU Funding: REU site award

Name: Thornton, Kathleen

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2002

REU Funding: REU site award

Name: Yu, Pui

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Stevens Institute of Technology

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2001

REU Funding: REU site award

Name: Smith, Rebecka

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2001

REU Funding: REU site award

Name: Bernhardt, Michelle

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: Mount Holyoke College

Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree

Fiscal year(s) REU Participant supported: 2002

REU Funding: REU site award

Name: Bird, Nathaniel

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Ohio Northern University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2002

REU Funding: REU site award

Name: Carr, Crystal

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2002

REU Funding: REU site award

Name: Coatney, Melissa

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Other

Home Institution: Other than Research Site

Home Institution if Other: Southern University and Agricultural & Mechanical College

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2002

REU Funding: REU site award

Name: Cowperthwaite, Jacob

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Other

Home Institution: Same as Research Site

Home Institution if Other:**Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Gallimore, Dana**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Jones, Daniel**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2002**REU Funding:** REU site award**Name:** Lampron, Kenna**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2002**REU Funding:** REU site award**Name:** LeGore, Sally**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Sophomore**Home Institution:** Other than Research Site**Home Institution if Other:** Brandeis University**Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2002**REU Funding:** REU site award**Name:** McCarthy, Erik**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Years of schooling completed: Junior
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Meulendyk, Bennett

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Freshman
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Rice, William

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore
Home Institution: Other than Research Site
Home Institution if Other: Brown University
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Spinney, Patrick

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Traxler, Adrienne

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2002
REU Funding: REU site award

Name: Whitney, Jeffrey

Worked for more than 160 Hours: Yes

Contribution to Project:**Years of schooling completed:** Other**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2002**REU Funding:** REU site award**Name:** Bell, Michael**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Carter, Caleb**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Sophomore**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Corbitt, Kimberly**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Sophomore**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Crosby, Jason**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Other than Research Site**Home Institution if Other:** The Citadel**Home Institution Highest Degree Granted(in fields supported by NSF):** Master's Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award

Name: Dawood, Jehad

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Deane, Jessica

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Delaunay, Pascale

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: University of Rhode Island

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Dunn, Tyler

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: More, Daesha

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Pinkham, Wade

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Same as Research Site

Home Institution if Other:

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Radecky, Kristen

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Lafayette College

Home Institution Highest Degree Granted(in fields supported by NSF): Bachelor's Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Scheinfeldt, Amanda

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Junior

Home Institution: Other than Research Site

Home Institution if Other: Tufts University

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Schwartz, Laura

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Other than Research Site

Home Institution if Other: University of Michigan

Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree

Fiscal year(s) REU Participant supported: 2003

REU Funding: REU site award

Name: Sells, Jeremy

Worked for more than 160 Hours: Yes

Contribution to Project:

Years of schooling completed: Sophomore

Home Institution: Same as Research Site

Home Institution if Other:**Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Tkachuk, Vitaly**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Sophomore**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Name:** Beaucage, Timothy**Worked for more than 160 Hours:** Yes**Contribution to Project:****Years of schooling completed:** Junior**Home Institution:** Same as Research Site**Home Institution if Other:****Home Institution Highest Degree Granted(in fields supported by NSF):** Doctoral Degree**Fiscal year(s) REU Participant supported:** 2003**REU Funding:** REU site award**Organizational Partners****BIODE, Inc.**

BIODE, Inc. is a small business which incubated from the University of Maine. The chief engineer at BIODE is Jeffrey Andle, a former NSF-REU participant in the summer of 1981. Several NSF-REU students received guidance from engineers at the BIODE Corporation. They also utilized BIODE facilities.

SRD Engineering Inc

Sensor Research and Development (SRD) is a small business which incubated from the University of Maine. Several NSF-REU students received financial support and guidance from engineers at SRD. They also utilized SRD facilities.

Sanders Associates Inc

Sanders Associates is a medium size electronics company which provided financial support and guidance to one NSF-REU student in the Summer of 2001.

BAE SYSTEMS

BAE Systems is a large international electronics company which provided financial support, guidance and facilities to one NSF-REU student in the summer of 2001.

RITEC Corp.

RITEC Corporation is a small ultrasonics company which provided software support, use of experimental facilities and guidance to one NSF-REU student in the summer of 2001.

Milbank, Tweed, Hadley & McCloy

Milbank, Tweed, Hadley and McCloy Inc., a New York based patent attorney firm provided financial support and expendable supplies to one NSF-REU student in the summer of 2001.

Lubrizol, Inc.

Lubrizol is a large company involved in developing lubricants for internal combustion engines, in particular, automobiles. They supplied materials and guidance to several NSF-REU students.

Mainely Sensors LLC

Mainely Sensors is a small company developing sensors for a wide range of applications. They supplied materials and guidance to several NSF-REU students.

Other Collaborators or Contacts

Collaborations and contacts have occurred with the following organizations:

Sandia National Laboratories, Albuquerque, NM
 SAWTEK Inc., Orlando, FL
 Marquette University, Milwaukee, WI
 South Dakota State University, Brookings, SD
 National Semiconductor, South Portland, Me
 Los Alamos National Laboratory, Los Alamos, NM
 Fairchild Semiconductor, South Portland, ME
 Sanders Associates, Nashua, NH
 BAE Systems, Nashua, NH
 RITEC Corporation, Warwick, RI
 Milbank, Tweed, Hadley & McCloy Law Firm, New York, NY
 University of Central Florida, Orlando, FL

Faculty in the Departments of Chemistry, Physics, Chemical Engineering, Food Sciences and Microbiology

Activities and Findings

Research and Education Activities: (See PDF version submitted by PI at the end of the report)

Findings: (See PDF version submitted by PI at the end of the report)

See attached Table 1 - Major Research Findings by 2003 NSF-REU Students

Training and Development:

Training and Development

À Project Title and Research Supervisor/s:

Refer to Table 2 (attached)

À Recruitment and Selection Process:

Project Announcement Distribution

Soon after the official announcement of the REU sites was made by NSF, written announcements were mailed to solicit applicants to the program. The announcements (see Appendix A and B attached) were mailed to department chairpersons, honors program directors and minority affairs officers at the University of Maine, neighboring schools, predominantly minority schools and other selected schools, to be distributed to qualified sophomores and juniors enrolled in Electrical and Computer Engineering, Engineering Physics, Physics and Computer Science. A listing of the schools is presented in Table 3 (attached). It was the intent of this wide distribution of the announcement to generate a significant applicant pool of qualified women, minorities and students with disabilities for the NSF-REU program.

Inquiries and Applications

Many students expressed interest in the NSF-REU program. A total of 130 students inquired about the program. Applications, which consisted

of a letter of intent and a listing of courses and grades up to and including the 2002 fall semester, were received from 94 students. It was encouraged in the announcement form that the applicants were expected to have a high degree of initiative and independence in thought, not only in laboratories but also in course work. This is reflected in the difference in the number of inquiries and applications. The widespread distribution of the announcement generated over 43 applications from qualified women, minorities and students with disabilities. A listing of the applicants, along with their university or college, their major and their class, is presented in Table 4 (attached).

Method of Participant Selection

The students applying for the NSF-REU positions has achieved at least a B average in Physics, Mathematics and Engineering courses. Primary consideration was given to the grades obtained by the students in these courses. Consideration was also given to the backgrounds of the students selected so as to give special consideration to women, minorities and handicapped students. The final selection for undergraduate participation in the NSF-REU program was made by the faculty involved in the program and the sophomore and junior academic advisors. In the case of students with about equal academic performance in courses, recommendations were sought from faculty who were acquainted with the student.

Participating Students and Faculty

A total of 18 undergraduate students and 11 faculty members participated in the NSF-REU program. In Table 5 (attached) general information relating to the student participants and faculty is summarized. Eight women (Kimberly Corbitt, Jessica Deane, Pascale Delaunay, Dana Gallimore, Daesha More, Kristen Radecsky, Amanda Scheinfeldt and Laura Swartz), and two minority students (Kimberly Corbitt and Pascale Delaunay) participated in the program. The total number of NSF-REU participants was increased to 18 by utilizing a combination of funding from workstudy, research grants and NSF.

À Number of Applicants From Host Institution and From Outside:

Twenty-seven applications were received from the host institution and 67 applications were received from other institutions.

À Adjunct Activities:

The NSF-REU students were involved in several activities related to their NSF-REU participation. Students were given special instructions relative to research activities such as library searching, laboratory safety, research ethics and report writing. Research supervisors were instructed to carefully point the relevance of the research being performed to the NSF-REU student. Particular emphasis was placed on relating the student's research to problems understood by people not in mainstream science and engineering. Students were required to attend and participate in seminars presented by faculty and outside speakers. Students were also given special instructions relative to oral presentations of their research results. In some cases students prepared abstracts for scientific meetings and some of the students will make research presentations at international scientific meetings.

À Level of Stipend Paid and other Expenses Compensated:

Several students received partial or total compensation from sources other than NSF. The stipend paid to each NSF-REU student during the 2003 summer was \$4,700. Some of the students, who were from institutions geographically removed from the University of Maine, received travel and lodging compensation. Table 6 (attached) summarizes the stipends and expenses associated with each NSF-REU student.

Outreach Activities:

In addition to presenting seminars which were open to the public on their NSF-REU projects, several Summer 2003 NSF-REU students gave presentations at local high schools. In these presentations students described the positive effect of the program on their educational development. After the presentation they met with students in an informal basis and answered questions. These high school presentations have helped the University to recruit more students into engineering. Finally, it has also helped to increase the number of females enrolling in engineering programs.

Journal Publications

Davis*, C., Zhang, C., and Vetelino, J.F., "Bulk Acoustic Wave Sensors for Sensing Measured Induced Electrical Property Changes in

Pitcher, S., Thiele, J.*, Ren, H. and Vetelino, J., "Current Voltage Characteristics of a Semiconductor Metal Oxide Gas Sensors", Sensors and Actuators, p. 454, vol. B93, (2003). Published

Thiele*, J. and DaCunha, M., "High Temperature Surface Acoustic Wave Devices: Fabrication and Characterization", Electronic Letters, p. 818, vol. 39 #10, (2003). Published

DaCunha*, M., Thiele*, J., Malocha, D., Pollard, T. and Puccio, D., "LGX Pure Shear Horizontal SAW for Liquid Sensor Applications", IEEE Sensors Journal, p. 554, vol. 03 #5, (2003). Published

Cousins*, J. and Kotecki, D., "Simulation of the Variability in Microelectronic Capacitors Having Polycrystalline Dielectrics", Electron Device Letters, p. 267, vol. 23, (2002). Published

French, L., Hu, Y., Radecky*, K., DaCunha, M. and Vetelino, J., "A Lateral Field Excited Liquid Acoustic Wave Sensor", IEEE Transactions Ultrasonics, Ferroelectrics and Frequency Control, p. , vol. , (2004). Accepted

Krassikoff, J., Dunn*, T., Call, M., Bernhardt, G., More*, D. and Lad, R., "Synthesis and Characterization of SiAlON Thin Film Coatings", Society of Vacuum Coaters Tech. Proceedings, p. , vol. , (2004). Accepted

Books or Other One-time Publications

Thurlow*, J. and LeCursi, N., "A Novel Chemiresistive Test Platform", (2000). Proceedings, Published
Bibliography: International Meeting on Chemical Sensors, Basel, Switzerland, July, 2000

White*, R., Zhang, C., Marquis, B., Caron, J.J. and Vetelino, J.F., "Potassium Niobate, A New Piezoelectric Material for Liquid Phase Sensing", (2000). Proceedings, Published
Bibliography: International Meeting on Chemical Sensors, Basel, Switzerland, July, 2000

Pitcher*, S., Thiele*, J., Zhou, J., Bushway, A. and Vetelino, J., "An Ethylene Sensor for Fruit Ripening and Quality", (2000). Book, Published
Bibliography: International Meeting on Chemical Sensors, Basel, Switzerland, July, 2000

Latlippe*, T. and Frankel, D., "An Organophosphonate Pesticide Sensor", (2000). Proceedings, Published
Bibliography: International Meeting on Chemical Sensors, Basel, Switzerland, July, 2000

Grillo*, T., Seitz*, J., Zhang, C., Haskell, R.B., Grillo, G. and Vetelino, J.F., "Novel Electrode Configurations of Bulk Acoustic Wave Resonators for Liquid Sensing Applications", (2000). Proceedings, Published
Bibliography: IEEE Ultrasonics Symposium, San Juan, Puerto Rico, October, 2000

Pitcher, S., Soucie*, R., Ren, H., and Vetelino, J.F., "Impedance Based WO₃ Thin Film Gas Sensor", (2002). Proceedings, Published
Bibliography: International Chemical Sensors Meeting, Boston, MA, July 2002

Thiele*, J., Soucie*, R., Ren, H., and Vetelino J., "Current Voltage Characteristics of a Semiconductor Metal Oxide Gas Sensor", (2002). Proceedings, Published
Bibliography: International Chemical Sensors Meeting, Boston, MA, July 2002

Zhang, C., Pike*, P. and Vetelino, J.F., "Chemical Sensors Based On Electrically Sensitive Quartz Resonators", (2002). Proceedings, Published
Bibliography: IEEE Sensors Meeting, Orlando, Florida, 2002

Chen, G., Zhang, C., Pollard*, T., Frankel, D., Bushway, R. and Vetelino, J., "Liquid Phase Pesticide Detection Using A Bulk Acoustic Wave Sensor", (2002). Proceedings, Published
Bibliography: IEEE Sensors Meeting, Orlando, Florida, June 2002

- Frankel, D.F., Bird*, N., Vetelino, J., Hu, Y., and Chen, G., ""A Bulk Acoustic Wave Pesticide Sensor"", (2002). Proceedings, Published
Bibliography: International Chemical Sensors Meeting, Boston, Massachusetts, October 2002
- Pollard*, T., Vetelino, J., and DaCunha, M., ""Experimental Study of KNbO₃ as a Sensing Piezoelectric Substrate"", (2002). Proceedings, Published
Bibliography: 2003 IEEE Ultrasonics Symposium, Nov. 2003, Honolulu, Hawaii
- Gallimore*, D., Pitcher, S. and Vetelino, J.F., ""An Impedance Based Metal Oxide Semiconducting Ethylene Sensor"", (2002). Proceedings, Published
Bibliography: Presented at the International Chemical Sensors Meeting, Boston, Massachusetts, October 2002
- Hu, Y, Radecsky*, K., French, L., Millard, P., Dacunha, M., Vetelino, J., ""A Lateral Field Excited Liquid Acoustic Wave Sensor"", (2003). Proceedings, Published
Bibliography: 2003 International Ultrasonics Symposium, Honolulu, Hawaii
- Pollard, T.*, DaCunha, M. and Vetelino, J., "Pure SH SAW on Single Crystal Potassium Niobate for Liquid Sensor Applications", (2003). Proceedings, Published
Bibliography: 2003 International Ultrasonics Symposium Proceedings, Honolulu, Hawaii
- DaCunha, M., Thiele*, J., Malocha, D. and Puccio, R., "LGX Pure Shear Horizontal SAW for Liquid Sensor Applications", (2002). Proceedings, Published
Bibliography: Proceedings of the 2002 IEEE Sensors, Orlando, Florida
- DaCunha, M., Thiele*, J., Pollard*, T., Malocha, D. and Puccio, R., "High Coupling, Zero Tcd SH Wave on LGX", (2002). Proceedings, Published
Bibliography: IEEE 2002 International Ultrasonics Symposium Proceedings, Munich, Germany
- Cowperthwaite*, J. and DaCunha, M., "Optimal Orientation Function for SAW Devices", (2003). Proceedings, Published
Bibliography: 2003 IEEE Frequency Control Symposium Proceedings, Tampa, Florida
- Thiele*, J. and DaCunha, M., "High Temperature SAW Gas Sensor on Langasite", (2003). Proceedings, Published
Bibliography: Proceedings of the 2003 IEEE Sensors, Toronto, California
- ElMadi, A., Meulendyk*, B., Pilling, R., Bernhardt, G., Lad, R. and Frederick, B., "Phase and Morphology in Mixed CuO-WO₃ Films for Chemical Sensing", (2003). Proceedings, Published
Bibliography: Mat. Res. Soc. Symposium
- Linnebrink, T., McCarthy*, E., Tilden, S., Hartshorne, M., Blair, J. and Hummels, D., "After IEEE STD 1241: What's Next?""", (2001). Proceedings, Published
Bibliography: Proceedings of IMEKO TC-4 Symposium in Electrical Measurement and Instrumentation and 6th EuroWorkshop on ADC Modelling and Testing, Lisbon Portugal
- Hu, Y., Frankel, D., Pinkham*, W. and Vetelino, J., "Pesticide Detection Using a Lateral Field Excited Acoustic Wave Sensor", (2004). Proceedings, Published
Bibliography: International Chemical Sensors Meeting, Tokyo, Japan
- Hu, Y., Millard, P., Radecsky*, K. and Vetelino, J., "Lateral Field Excited Bulk Acoustic Wave Biosensor", (2004). Proceedings, Accepted
Bibliography: International Chemical Sensors Meeting, Tokyo, Japan

Web/Internet Site

URL(s):

<http://www.eece.maine.edu/URP/>

Description:**Other Specific Products****Contributions****Contributions within Discipline:****Contributions to Other Disciplines:****Contributions to Human Resource Development:**

The NSF-REU program as outlined in the original proposal proceeded in a very coherent fashion throughout. A total of 18 students which included eight women and two minority students participated in the program. Each participant chose his/her research topic and supervisor and was given preliminary reading material prior to the onset of the program. The project director held informal discussions with each participant and his/her research supervisor periodically throughout the duration of the program. Each participant kept a notebook of his/her activities which enabled other people in his/her research area to benefit from the work. At the end of the program each participant submitted a final report to the project director. In the academic semester following the program each participant also presented an oral seminar to interested faculty and students. All the on-campus NSF-REU students were required to attend each seminar and participate in the discussion period following the seminar. All of the seminars had excellent attendance. The students were graded on the basis of their day to day performance and development during the summer, their seminar presentation and their final report. The grade was determined by the project director and the student's research supervisor. The students benefited not only from the research experience but also from the technical writing and speaking required in the program.

The research atmosphere to which the NSF-REU students were exposed in the summer was not truncated at the end of the summer. All of the on-campus participants are continuing their work into the academic year. Some of the students are receiving compensation from either departmental funds or research contracts to continue their research on a part-time basis, while other students are continuing their work in the framework of the University Honors Program. The project director has contacted the advisors of the off-campus students resulting in several off-campus students continuing their work in an appropriate research group.

The project director and other faculty members participating in the NSF-REU program believe the research and educational experience gained by the students during the summer and further experience to be gained during the academic year to be an integral part of the students' education. In this light, the project director is continuing to monitor the progress of the participants throughout the academic year.

The NSF-REU program has had a noticeable effect on the undergraduate curriculum. The NSF-REU participants were awarded three academic credits for their participation in the program. They will be able to use these credits toward their B.S. degree. Students who continue their research project in the framework of the University Honors Program will receive additional academic credit. This program along with previous NSF-URP and NSF-REU programs have also had an indirect effect on the Electrical and Computer Engineering Department's acquisition of useful excess equipment. National Semiconductor Corporation, Fairchild Semiconductor, Quadric Systems, and Digital Equipment Corporation have viewed with enthusiasm the expanding graduate program along with the research atmosphere being instituted on the undergraduate level in the Electrical and Computer Engineering Department. Owing in part to these factors, they have donated a large amount of equipment and scholarships to the Department. In terms of the undergraduate curriculum, it will no doubt have a significant effect on the present sequence of courses in the area of solid state, electronics and computer engineering.

The research projects of faculty members involved in the NSF-REU program benefited in terms of the results of the research of the participants during the summer. Some of the projects will continue to benefit during the academic year since many of the students are continuing their research. Each of the involved faculty members expressed to the project director their personal enjoyment for the opportunity to work with highly qualified undergraduate students. The work of previous NSF-URP students has been extremely valuable to research at the University of Maine. The value of the contributions of these students is indicated by the numerous publications in which NSF-REU students were co-authors.

The NSF-REU program has provided a valuable boost to the student's motivation toward both present and future graduate study. It has given them the opportunity to apply advanced techniques in mathematics, physics and engineering as well as demonstrating the need for further course work to provide the necessary tools for more advanced research. The program has also caused some of the students to modify their ultimate educational goals. It has further demonstrated that highly qualified undergraduate students are capable of doing high-quality advanced work. The project director also believes that the program has had a very positive effect on the student body in general. Most of the student applicants who were not chosen voiced the opinion that the program offered an excellent opportunity for advanced study. Several others stated

a genuine desire to plan for the opportunity next year. This means a deliberate attempt to improve grades (to qualify) and therefore should have a healthy effect upon the student body in general.

The NSF-REU program has made many faculty realize that undergraduates can indeed make very positive contributions in research. The project director has received many e-mails, telephone calls and letters requesting further information concerning the NSF-REU program at Maine.

In conclusion, I would rate the recent NSF-REU program as being an outstanding success which has given both the student and University an excellent experience in both research and teaching. The project itself and the ensuing seminars caused many fruitful discussions and suggestions with regard to the various research projects. The opportunities for these discussions and suggestions would have perhaps not been possible if not for the unifying nature of the NSF-REU program. The publications and conference presentations and student reports attest to the high level of performance achieved in the program.

This program and previous NSF-URP and NSF-REU programs conducted at the University of Maine have been extremely vital to the education of bright undergraduate students and has guided many to advanced degrees. It has also provided an opportunity for women, minorities and handicapped students to experience research. This has motivated several students in these under represented groups to pursue advanced degrees.

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Contributions Beyond Science and Engineering - 2002:

Scott Burgess, the head of the Science Department at John Bapst Memorial High School (JBMHS), was a recipient of a Research Experience for Teachers (RET) award for a ten week period during the 2002 summer. Scott performed his research in the area of thin film deposition and photolithographic patterning of sensors, an NSF-REU research area under the direction of Dr. Robert Lad, Director of the Laboratory for Surface Science and Technology (LASST), and Professor of Physics. Scott worked closely with Dr. Lad and his graduate students and NSF-REU students. Scott learned the fundamentals of photolithography and interacted closely with John Krassikoff, an NSF GK-12 fellow. Scott, with the help of John, integrated several aspects of photolithography and sensor design into John Bapst High School, thereby extending the GK-12 program to another school.

In addition to Scott's direct involvement with Dr. Lad's group. Scott also met with the eleven other research supervisors in the NSF-REU program. He became acquainted with the research areas and students in the research groups. As a result of his interactions, he is developing with Dr. Vetelino (the current NSF-REU project director) a proposal involving research experiences for 10 Maine high school teachers which will be submitted to NSF for possible funding.

In conclusion, the involvement of Scott in the RET program resulted in a research experience for him, the extension of the NSF funded GK-12 program from Bangor High School into another school (JBMHS), and the development of a proposal which will be submitted to NSF which involves a research experience for 10 Maine high school teachers. If funded the project would allow direct involvement of many high school teachers in research which they will be able to integrate into their classrooms. This will also aid in extending the existing NSF GK-12 to other high schools in the state of Maine.

Categories for which nothing is reported:

Any Product

Contributions: To Any within Discipline

Contributions: To Any Other Disciplines

Contributions: To Any Resources for Research and Education

TABLE 2. NSF-REU PROJECT TITLE AND RESEARCH SUPERVISOR- SUMMER 2003

NSF-REU Project Title	NSF-REU Participant	Supervisor/s	Year
Measurement and Data Acquisition System for SAW Liquid Biosensor	Timothy Beaucage	Mauricio daCunha	2003
Effects of Humidity and Light Exposure on Sensor Conduction	Michael Bell	David Frankel	2003
Superlinear Parallel Processing	Caleb Carter	Bruce Segee	2003
A Chitosan Biopolymer Coated Lateral Field Excitation (LFE) Acoustic Wave Sensor	Kimberly Corbitt	Darrell Donahue John Vetelino	2003
Class 32 Piezoelectric Materials Characterization: Extracting Dielectric Parameters	Jacob Cowperthwaite	Mauricio daCunha	2003
Six Channel Gas Delivery System	Jason Crosby	George Bernhardt	2003
Perturbation of Perivitelline pH in Zebrafish Embryos	Jessica Deane	Paul Millard	2003
Software Development for Accurate DNA Base Calling: Trace Tools	Jehad Dawood	Habtom Resson Mohamad Musavi	2003
The Effects of Tungsten Trioxide Powder on Chemiresistive Sensors	Pascale Delaunay	George Bernhardt	2003
Structure, Morphology, and Wear of SiAlON Thin Film Ceramics	Tyler Dunn	Robert Lad	2003
Electron Transport Mechanisms in a SMO Film	Dana Gallimore	John Vetelino	2003
Stoichiometry of SiAlON Films Using XPS and AES	Daesha More	Robert Lad	2003
Improved Differential Signal Processing Method For Use With Chemiresistive Gas Sensors	Wade Pinkham	David Frankel	2003
Equivalent Circuit Model for the Lateral Field Excited Acoustic Wave Sensor	Kristen Radecsky	John Vetelino	2003
Regenerative Biospecific Layers: Developing a Method to Allow Regeneration of Specific Biochemical Sensing Layers on the Surface of Quartz Crystal Sensors and Surface Acoustic Wave Devices	Amanda Scheinfeldt	Paul Millard	2003
Combined Synthetic Methods Involving Emulsion Chelating Agents and an MCM-48 Recipe Used to Enhance Surface Area of Tungsten Trioxide Powders	Laura Schwartz	Carl Tripp	2003
Using Electromagnetic Acoustic Transducers to Excite Acoustic Waves for Sensor Applications	Jeremy Sells	John Vetelino	2003
Green's Function Implementation for Acoustic Wave Applications.	Vitaly Tkachuk	Mauricio daCunha	2003

Table 3. A Listing of Schools Which Received Announcements
for the 2003 NSF-REU Program

College/Univ.	City	State	Zip Code
University of Alabama, Huntsville	Huntsville	AL	35899
University of Alabama	Tuscaloosa	AL	35487-0286
University of Alabama, Birmingham	Birmingham	AL	35294-4461
Auburn University	Auburn	AL	36849-5201
Tuskegee University	Tuskegee	AL	36088
Embry-Riddle Aeronautical University	Prescott	AZ	86301
Univ. of California-Riverside	Riverside	CA	92521
University of Hartford	West Hartford	CT	06117-1599
Trinity College	Hartford	CT	06106
Univ. of Connecticut U-157	Storrs	CT	06268
Univ. of New Haven	West Haven	CT	06516
Yale University	New Haven	CT	06520
Univ. of Bridgeport	Bridgeport	CT	06602
Wesleyan University	Middletown	CT	06459-6016
Yale University	New Haven	CT	06520-8303
The Catholic University of America	Washington	DC	20064
University of the District of Columbia	Washington	DC	20008
The George Washington University	Washington	DC	20052
Southeastern University	Washington	DC	20024
Howard University	Washington	DC	20059
University of Delaware	Newark	DE	19716
University of Central Florida	Orlando	FL	32816-2450
Florida Atlantic University	Boca Raton	FL	33431
Florida Institute of Technology	Melbourne	FL	32901
Florida State University	Tallahassee	FL	32310
University of Florida	Gainesville	FL	32611-6200
University of Miami	Miami	FL	33124
University of South Florida	Tampa	FL	33620
Georgia Institute of Technology	Atlanta	GA	30332-0250
Mercer University	Macon	GA	31207
Illinois Institute of Technology	Chicago	IL	60616
University of Evansville	Evansville	IN	47722
Indiana Institute of Technology	Fort Wayne	IN	46803
Indiana Univ. - Purdue Univ. at Ft. Wayne	Fort Wayne	IN	46805-1499
Indiana Univ. - Purdue Univ. Indianapolis	Indianapolis	IN	46202
University of Notre Dame	Notre Dame	IN	46556
Purdue University	West Lafayette	IN	47907-1285
Purdue University, Calumet	Hammond	IN	46323
Rose-Hulman Institute of Technology	Terre haute	IN	47803-3999
Tri-State University	Angola	IN	46703
Valparaiso University	Valparaiso	IN	46383
University of Kentucky	Lexington	KY	40506-0046
University of Louisville	Louisville	KY	40292
Grambling	Grambling	LA	71245
Louisiana Tech University	Ruston	LA	71272
Southern Univ. and A&M College	Baton Rouge	LA	70813-0126
Xavier University of Louisiana	New Orleans	LA	70125
Harvard University	Cambridge	MA	02138
University of Massachusetts	Amherst	MA	01003

Table 3. A Listing of Schools Which Received Announcements
for the 2003 NSF-REU Program

College/Univ.	City	State	Zip Code
MIT	Cambridge	MA	02139
Merrimack College	N. Andover	MA	01845
Southeastern Mass. Univ.	N. Dartmouth	MA	02747
University of Lowell	Lowell	MA	01854
Boston University	Boston	MA	02215
Northeastern University	Boston	MA	02115
Tufts University	Medford	MA	02155-5555
Worcester Polytechnic Institute	Worcester	MA	01609
Western New England College	Springfield	MA	01119
Western New England College	Worcester	MA	01609
Rome Laboratory	Hanscom AFB	MA	01731-3010
Williams College	Williamstown	MA	01267
Johns Hopkins University	Baltimore	MD	21218
University of Maryland at College Park	College Park	MD	20742
Morgan State University	Baltimore	MD	21239
Bates College	Lewiston	ME	04240
Bowdoin College	Brunswick	ME	04011
Colby College	Waterville	ME	04901
Univ. of Southern Maine	Portland	ME	04103
Career Planning Center	Brunswick	ME	04011
University of Detroit Mercy	Detroit	MI	48219
GMI Engineering and Management Inst.	Flint	MI	48504
Lawrence Technological University	Southfield	MI	48075
Michigan State University	East Lansing	MI	48824-1226
University of Michigan	Ann Arbor	MI	48109-2122
Oakland University	Rochester	MI	48309
Saginaw Valley State University	University Center	MI	48710
Wayne State University	Detroit	MI	48202
Western Michigan University	Kalamazoo	MI	49008
Lamar University	Southfield	MI	48075
Moorehouse State	Moorehead	MN	56560
Duke University	Durham	NC	27708
North Carolina State University	Raleigh	NC	27695-7911
University of North Carolina at Charlotte	Charlotte	NC	28223
N.Carolina A&T State University	Greensboro	NC	27411
Univ. of New Hampshire	Durham	NH	03824
Thayer School of Engineering	Hanover	NH	03755
Fairleigh Dickinson University	Teaneck	NJ	07666
Monmouth University	West Long Beach	NJ	07764-1898
New Jersey Institute of Technology	Newark	NJ	07102
Princeton University	Princeton	NJ	08540
Rutgers, The State Univ. of New Jersey	Piscataway	NJ	08855-0909
Stevens Institute of Technology	Hoboken	NJ	07030
Clarkson University	Potsdam	NY	13699-5720
Columbia Univ. in the City of New York	New York	NY	10027
The Cooper Union	New York	NY	10003
Cornell University	Ithaca	NY	14853-5401
Hofstra University	Hempstead	NY	11550-1090
Manhattan College	Riverdale	NY	10471

Table 3. A Listing of Schools Which Received Announcements
for the 2003 NSF-REU Program

College/Univ.	City	State	Zip Code
New York Inst. of Tech.-Metro Campus	New York	NY	10023
State University of New York at Buffalo	Buffalo	NY	14260
Polytechnic University	Brooklyn	NY	11201
Rochester Institute of Technology	Rochester	NY	14623
University of Rochester	Rochester	NY	14627
Syracuse University	Syracuse	NY	13244-1240
Union College	Schenectady	NY	12308
Houghton College	Houghton	NY	14744-0128
Rensselaer Polytechnic Institute	Troy	NY	12180-3590
University of Akron	Akron	OH	44325-3904
Case Western Reserve University	Cleveland	OH	44106-7221
Cedarville College	Cedarville	OH	45314
University of Cincinnati	Cincinnati	OH	45221-0030
Cleveland State University	Cleveland	OH	44115-2403
University of Dayton	Dayton	OH	45469-0226
Ohio University	Athens	OH	45701
Ohio Northern University	Ada	OH	45810
The Ohio State University	Columbus	OH	43210-1272
The University of Toledo	Toledo	OH	43606
Wright State University	Dayton	OH	45435
Youngstown State University	Youngstown	OH	44555-3012
Bucknell University	Lewisburg	PA	17837
Carnegie Mellon University	Pittsburgh	PA	15213-3890
Drexel University	Philadelphia	PA	19104
Gannon University	Erie	PA	16541-0001
Grove City College	Grove City	PA	16127
Lafayette College	Easton	PA	18042-1775
Lehigh University	Bethlehem	PA	18015
University of Pennsylvania	Philadelphia	PA	19104-6390
University of Pittsburgh	Pittsburgh	PA	15261
Pennsylvania State University	University Park	PA	16802
University of Scranton	Scranton	PA	18510-4642
Temple University	Philadelphia	PA	19122-6077
Villanova University	Villanova	PA	19085
Widener University	Chester	PA	19013
Swarthmore College	Swarthmore	PA	19081
University of Puerto Rico-Arecibo	Arecibo	PR	00613-4010
University of Puerto Rico-Mayaguez	Mayaguez	PR	00681-5000
Brown University	Providence	RI	02912
The Univ. of Rhode Island	Kingston	RI	02881-0805
Brown University	Providence	RI	02912
The Citadel Military College	Charleston	SC	29409
Clemson University	Clemson	SC	29634-0915
University of South Carolina	Columbia	SC	29208
Benedict College	Columbia	SC	29204
South Carolina State Univ. SCAMP		SC	
Christian Brothers University	Memphis	TN	38104
University of Memphis	Memphis	TN	38152
University of Tennessee, Knoxville	Knoxville	TN	37996-2100

Table 3. A Listing of Schools Which Received Announcements
for the 2003 NSF-REU Program

College/Univ.	City	State	Zip Code
Vanderbilt University	Nashville	TN	37212
George Mason University	Fairfax	VA	22030
Old Dominion University	Norfolk	VA	23529-0246
Virginia Commonwealth University	Richmond	VA	23284-3072
Virginia Military Institute	Lexington	VA	24450
Virginia Polytechnic Inst. and State Univ.	Blacksburg	VA	24601-0111
University of Virginia	Charlottesville	VA	22903-2442
Norwich University	Northfield	VT	05663
University of Vermont	Burlington	VT	05401
West Virginia University	Morgantown	WV	26506-6104
West Virginia Univ. Inst. of Technology	Montgomery	WV	25136

Table 4. List of 2003 NSF-REU Applicants

LAST NAME	FIRST NAME	SCHOOL	MAJOR	CLASS
Alderson	David	Univ. of Hartford, CT	Elec. Eng.	SO
Amatya	Reja	Smith College, MA	Engineering	SO
An	Ig	Bucknell, PA	Elec. Eng.	JR
Arbesman	Samuel	Brandeis Univ., MA	Comp. Sci./Bio	JR
Beaucage	Timothy	UMO	Elec. Eng.	JR
Bell	Michael	UMO	Physics	JR
Bernhardt	Michelle	Mount Holyoke, MA	Biology	SO
Blake	Neesha-Ann	NY University	Math/EE	JR
Brooks	Daniel	UMO	Bio-Resource	JR
Brown	Jeremy	West Virginia Univ	Computer Eng.	JR
Bushnell	Reuben	Univ. of Rochester	Elec. & Comp	SO
Cambron	Julia	UMO	Biochemistry	SO
Cambron	Sword	UMO	Biochemistry	SO
Carrillo	Rory	Azusa Pac. U., CA	Elec. Eng.	JR
Carter	Caleb	UMO	Eng. Pysics	SO
Collins	Meghan	U. of Rhode Island	Elec./Biomed.	JR
Corbitt	Kimberly	UMO	Biological Eng.	SO
Cowperthwaite	Jacob	UMO	Elec. Eng.	SR
Crosby	Jason	Citadel, SC	Elec. Eng.	JR
Dawood	Jehad	UMO	Computer Eng.	JR
Deane	Jessica	UMO	Biological Eng.	SO
Delaunay	Pascale	Univ. of Rhode Isl.	Elec. Eng.	JR
DeLuca	Raymond	Penn State	Computer Eng.	JR
Dunn	Tyler	UMO	Eng. Pysics	SO
Duy	Janice	UMO	Elec. Eng.	SO
Egeler	Teressa	UMO	Biological Eng.	SO
Eil	Matthew	Villanova Univ., PA	Computer Eng.	SO
Eriksson	Brian	U.of Misc-Madison	Computer Eng.	JR
Etefia	Basil	Loyola Marymount	Elec. Eng.	SO
Fisher	Jessica	Harvey Mudd Col	Computer Sci.	JR
Friedman	Lisa	Princeton	Elec. Eng.	JR
Gallimore	Dana	UMO	Elec. Eng.	JR
Gartner	Benjamin	U of Wisconsin-Mad	Computer Eng.	SO
Gatling	Stacie	Morgan State, MD	Elec. Eng.	JR
Gonet	Patrick	Mercer Univ. GA	Elec. Eng.	JR
Goykhman	Yuriy	Carnegie Mellon, PA	Elec. & Comp	SO
Hajimohammad	Shirin	Colorado Sch.Mines	Elec. Eng.	JR
Hall	Derek	Citadel, SC	Elec. Eng.	JR
Hockenberger	Jonathan	BJB Univ., SC	Elec. Eng.	JR
Igunbor	Osahun	Mercer Univ. GA	Computer Eng.	SR
Jones	Kirsten	UMO	Eng. Pysics	SO
Kim	Raymond	Cornell, NY	Elec. & Comp	SO
Knox	Genese	So. Univ. A&M, LA	Elec. Eng.	JR
Koster	John	Bowdoin Coll., ME	Math/Physics	JR
Labbe	Raymond	UMO	Computer Eng.	JR

Table 4. List of 2003 NSF-REU Applicants

LAST NAME	FIRST NAME	SCHOOL	MAJOR	CLASS
Matiyabo	Alfred	UMO	EET	JR
Matson	Brian	Fort Hays State U.	Physics/EE	JR
Melcher	Michael	Louisiana Tech U.	Physics	JR
Moore	Helen	U. of Liverpool, ENG	Integrated Eng.	JR
More	Daesha	UMO	Eng. Pysics	SO
Moretti	Adam	Lehigh Univ., PA	Elec. Eng.	JR
Murray	Jonathan	Univ. of Pittsburg	Comp. Eng.	JR
Nuzzo-Jones	Goss	Worcester Polytech	Comp. Science	JR
Parichand	Martin	U. of Mass.Amherst	Elec. Eng.	SO
Parpia	Zaheer	Linfield Coll., OR	Computer Sci.	JR.
Patel	Vishal	Clarkson Univ. NY	Elec. Eng.	JR
Patel	Vinesh	NJ Inst. Of Tech.	Elec. Eng.	JR
Pinkham	Wade	UMO	Elec. Eng.	JR
Radecsky	Kristen	Lafayette Coll., PA	Elec. Eng.	JR
Ramirez	Juan	Purdue Univ., IN	Elec. Eng.	JR
Reddy	Rakesh	Carnegie Mellon,PA	Elec. & Comp	SO
Remus	James	Grove City Coll.,PA	Elec. Eng.	JR
Rodgers	Chris	Purdue Univ., IN	Elec. Eng.	SO
Rouse	Joshua	Appalachian St, NC	Physics	SO
Sander	David	Penn State	Elec. Eng.	JR
Savory	Joshua	Kalamazoo Coll, MI	Physics	JR
Scheinfeldt	Amanda	Tufts Univ., MA	EE/Biomed	JR
Schmidt	Karl	NYU	Physics/EE	JR
Schofield	Terence	Villanova Univ., PA	Computer Eng.	SO
Schwartz	Laura	Univ. of Michigan	Chemistry	SO
Sells	Jeremy	UMO	Elec. Eng.	SO
Shah	Ronak	U. of Texas, Dallas	Elec. Eng.	JR
Shih	Laura	Princeton	Elec. Eng.	JR
Sligar	Anthony	Seattle Pac. U., WA	Elec. Eng.	JR
Spinney	Patrick	UMO	Elec. Eng.	SR
Stackhouse	Robert	Villanova Univ., PA	Computer Eng.	JR
Stoica	Maria	Univ. of Maryland	Elec. Eng.	SO
Sverduk	Leroy	Messiah College,PA	Elec. Eng.	JR
Ta	Tuan	Univ. of Florida	Elec. Eng.	SR
Tan	Bijun	Cooper Union, NY	Elec. Eng.	SO
Tkachuk	Vitaly	UMO	Elec. Eng.	SO
Traxler	Adrienne	UMO	Physics	JR
Vereen	Danny	Florida A&M	CPU/Elec. Eng.	SR
Viles	Abraham	UMO	Physics	SO
Walizer	Nathaniel	U. of Evansville, IN	Computer Eng.	JR
Wark	Mitchell	UMO	Computer Eng.	FR
Williams	Richard	FAME-FSU, FL	Elec.Comp. Eng	SR
Woods	Scott	Case Western, OH	Physics	JR
York	Christopher	UMO	Elec. Eng.	JR
Young	Paul	Univ. of Maryland	Computer Eng.	JR

Table 5. General Information on 2003 NSF-REU Students

Participant	Academic Class, Department and University	Home Address	Research Topic	Research Supervisor/s
Timothy Beaucage	Junior Electrical Engineering University of Maine	18 Nicole Ct., Apt. 7A Bangor, ME 04401	Measurement and Data Acquisition System for SAW Liquid Biosensor	Mauricio daCunha
Michael Bell	Junior Physics University of Maine	916 Main Street, Unit 1 Old Town, ME 04468	Effects of Humidity and Light Exposure on Sensor Conduction	David Frankel
Caleb Carter	Sophomore Engineering Physics University of Maine	RR1, Box 3300 Sedgwick, ME 04676	Superlinear Parallel Processing	Bruce Segee
Kimberly Corbitt	Sophomore Biological Engineering University of Maine	23 Red Fox Drive Albany, NY 12205	A Chitosan Biopolymer Coated Lateral Field Excitation (LFE) Acoustic Wave Sensor	Darrell Donahue John Vetelino
Jacob Cowperthwaite	Junior Electrical Engineering University of Maine	30 Sugarloaf Street Houlton, ME 04730	Class 32 Piezoelectric Materials Characterization: Extracting Dielectric Parameters	Mauricio daCunha
Jason Crosby	Junior Electrical Engineering The Citadel, SC	2811 Peniel Road Walterboro, SC 29488	Six-Channel Gas Delivery System	George Bernhardt
Jehad Dawood	Junior Computer Engineering University of Maine	95 Park Street, Apt. #16 Orono, ME 04473	Software Development for Accurate DNA Base Calling: Trace Tools	Mohamad Musavi Habtom Resson
Jessica Deane	Sophomore Biological Engineering University of Maine	18 Woodlawn Drive Winslow, ME 04901	Perturbation of Perivitelline pH in Zebrafish Embryos	Paul Millard
Pascale Delaunay	Junior Electrical Engineering University of Rhode Island	173 E. Arrow Hwy. Claremont, CA 91711	The Effects of Tungsten Trioxide Powder on Chemiresistive Sensors	George Bernhardt
Tyler Dunn	Sophomore Engineering Physics University of Maine	PO Box 3024 Skowhegan, ME 04976	Structure, Morphology, and Wear on SiAlON Thin Film Ceramics	Robert Lad
Dana Gallimore	Junior Electrical Engineering University of Maine	29 Madison Street Bangor, ME 04401	Electron Transport Mechanisms in a SMO Film	John Vetelino
Daesha More	Sophomore Engineering Physics University of Maine	7A Nicole Court Bangor, ME 04401	Stoichiometry of SiAlON Films Using XPS and AES	Robert Lad

Participant	Academic Class, Department and University	Home Address	Research Topic	Research Supervisor/s
Wade Pinkham	Junior Electrical Engineering University of Maine	431 Biscay Road Damariscotta, ME 04543	Improved Differential Signal Processing Method for Use with Chemiresistive Gas Sensors	David Frankel
Kristen Radecky	Junior Elec. & Comp. Engineering Lafayette College, PA	174 Pinebank Road Flemington, NJ	Equivalent Circuit Model for the Lateral Field Excited Acoustic Wave Sensor	John Vetelino
Amanda Scheinfeldt	Junior Elec. Eng./Biomedical Eng. Tufts University, MA	70 Milwood Road East Hartford, CT 06118	Regenerative Biospecific Layers	Paul Millard John Vetelino
Laura Schwartz	Sophomore Chemistry University of Michigan, MI	1241 Bonnie Sue Drive Flushing, MI 48433	Combined Synthetic Methods Involving Emulsion Chelating Agents and an MCM-48 Recipe Used to Enhance Surface Area of Tungsten Trioxide Powders	Carl Tripp
Jeremy Sells	Sophomore Electrical Engineering University of Maine	PO Box 8311 St. John, VI 00831	Using Electromagnetic Acoustic Transducers to Excite Acoustic Waves for Sensor Applications	John Vetelino
Vitaly Tkachuk	Sophomore Elec. Engineering/Math University of Maine	9 Fellows Place Orono, ME 04473	Green's Function Implementation for Acoustic Wave Applications	Mauricio daCunha

Table 6 - 2003 NSF-REU Awards and Distribution

NAME	TRAVEL	LODGE	NSF	OTHER DIST.	DISTRIBUTION
Beaucage, Timothy			2,350	2,350	50% NSF, 50% Other
Bell, Michael			4,700		100% NSF
Carter, Caleb			2,300	2,350	50% NSF, 50% Other
Corbitt, Kimberly	200		4,700		100% NSF
Cowperthwaite, Jacob			2,350	2,350	50% NSF, 50% Other
Crosby, Jason	200	300	4,700		100% NSF
Dawood, Jehad			2,350	2,350	50% NSF, 50% Other
Deane, Jessica		300	2,350	2,350	50% NSF, 50% Other
Delaunay, Pascale	200	300	4,700		100% NSF
Dunn, Tyler				4,700	100% Other
Gallimore, Dana			4,700		100% NSF
More, Daesha				4,700	100% Other
Pinkham, Wade			4,700		100% NSF
Radecsky, Kristen	200	300	4,700		100% NSF
Scheinfeldt, Amanda	100	300	4,700		100% NSF
Schwartz, Laura	200		4,700		100% NSF
Sells, Jeremy	200	300	4,700		100% NSF
Tkachuk, Vitaly				4,700	100% Other

Appendix A

January 13, 2003

Dear Fellow Educator:

A science education program entitled, Research Experience for Undergraduates (REU), which places undergraduate students in research in the Electrical and Computer Engineering (ECE) Department at the University of Maine has received continuous funding by the National Science Foundation (NSF) for several years. This program encourages highly qualified college sophomores and juniors majoring in electrical and computer engineering, engineering physics, physics and computer science to participate actively in state-of-the-art research in the summer. The ECE Department is particularly interested in recruiting women, minorities and persons with disabilities into the program. It anticipated that if members of these groups are involved in meaningful research they may be motivated to enter graduate school and actively pursue an MS and Ph.D. degree. It is well known that these undergraduates, many of whom come from economically and culturally disadvantaged backgrounds, are severely under represented at the MS and PhD level. In order to promote equal educational opportunity, the NSF-REU program will provide the opportunity for students to work under the close guidance of ECE faculty members in one of the following areas: environmental sensors; robotics; intelligent systems; neural networks, fuzzy logic, and genetic algorithm; communications devices and applications; microprocessor/instrumentation applications; growth and characterization of thin film materials; microwave devices; and biosensors.

The NSF-REU Program awards the participating student a \$4700 stipend for a period of ten weeks during the 2003 summer. Students will be eligible for travel support to the research site and a subsistence award. It is expected that the students applying for the available REU positions will have achieved at least a "B" average in engineering, physics and mathematics subjects. Further it is expected that the student will be of a high caliber and have displayed a high degree of initiative and independence in thought, not only in laboratories, but also in course work. It should be clearly understood by the student that this position is not merely a "summer job" but rather an educational experience where the students are treated as junior colleagues. Three undergraduate credits will be awarded to the student for his/her undergraduate research participation.

Applicants must submit an application form, two letters of recommendation and a listing of courses and grades, up to and including the 2002 fall semester as soon as possible and no later than March 10, 2003. Awardees will be notified about March 17, 2003.

If you need additional information please do not hesitate to contact me via mail, e-mail, FAX or telephone. Thank you for your prompt cooperation and assistance in encouraging women, minorities and persons with disabilities to apply for the NSF-REU Program at the University of Maine.

Sincerely yours,

John F. Vetelino, Professor of Electrical Engineering
Project Director
Telephone: (207) 581-2224; Fax: (207) 581-4531
E-mail: vet@eece.maine.edu

Appendix B
== PLEASE POST ==

National Science
Foundation Research
Experience for
Undergraduates



Department of Electrical
and Computer Engineering
University of Maine

June 2 - August 8, 2003

During the Summer of 2003, the Electrical and Computer Engineering Department at the University of Maine will offer the opportunity for a limited number of highly qualified undergraduate students to participate in research under the guidance of various faculty in the department. This program is under the sponsorship of the National Science Foundation and awards the participating student a stipend of \$ 470/ week for a period of ten weeks. Students who live on campus will also be eligible for a subsistence award which will help defray expenses for lodging, meals and travel from the student's home to the University of Maine. It should be clearly understood by the student that this position is not merely a summer job but rather an educational experience where the students are treated as junior colleagues. Three undergraduate credits will be awarded to the student for his/her undergraduate research participation. Women, minorities and /or handicapped are strongly urged to apply to the program. **Undergraduate student applicants must be citizens or permanent residents of the U.S. or its possessions.**

Open to students entering their Junior or Senior year in September, 2003.
Selection based on applicant's record and faculty recommendations.

Available research areas include:

- environmental sensors
- robotics
- intelligent systems
- neural networks, fuzzy logic, and genetic algorithm
- communications devices and applications
- microprocessor/instrumentation applications
- growth and characterization of thin film materials
- microwave devices
- biosensors

Award Includes:

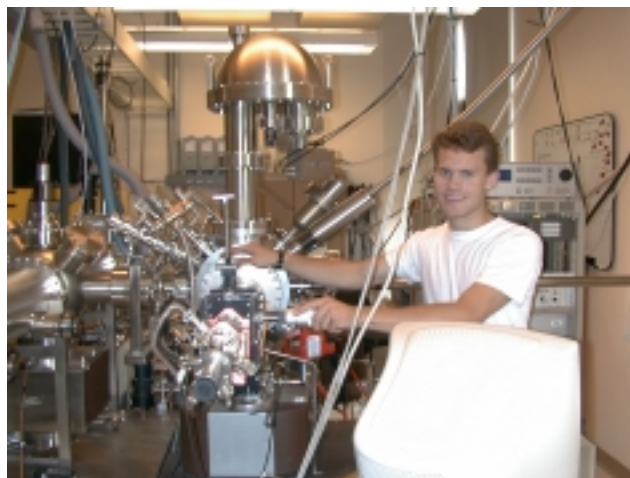
- \$4,700 stipend
- 3 academic credits

Application Deadline:

- March 10, 2003

Announcement of Awards:

- March 17, 2003



2002 NSF-REU Participant, Bennett Meulendyk,
in the Sensor Laboratory

For Information and Application Contact:
Department secretary or Susan Niles
Electrical and Computer Engineering
5708 Barrows Hall
University of Maine
Orono, Maine 04469-5708

Phone: (207) 581-2224, Fax: (207) 581-4531
Email: susan@eece.maine.edu
<http://www.eece.maine.edu/URP/>

PROJECT ACTIVITIES AND FINDINGS

Summer 2000

Research and Education Activities

The NSF-REU program as outlined in the original proposal proceeded in a very coherent fashion throughout. A total of 17 students which included four women and three minority students participated in the program. Each participant chose his/her research topic and supervisor and was given preliminary reading material prior to the onset of the program. The project director held informal discussions with each participant and his/her research supervisor periodically throughout the duration of the program. Each participant kept a notebook of his/her activities which enabled other people in his/her research area to benefit from the work. At the end of the program each participant submitted a final report to the project director. The titles of the NSF-REU reports summarized in Table 1 clearly illustrates the wide variety of NSF-REU student projects. In the academic semester following the program each participant also presented an oral seminar to interested faculty and students. All the on-campus NSF-REU students were required to attend each seminar and participate in the discussion period following the seminar. All of the seminars had excellent attendance. The students were graded on the basis of their day to day performance and development during the summer, their seminar presentation and their final report. The grade was determined by the project director and the student's research supervisor. The students benefited not only from the research experience but also from the technical writing and speaking required in the program.

The research atmosphere to which the NSF-REU students were exposed in the summer was not truncated at the end of the summer. All of the on-campus participants are continuing their work into the academic year. Some of the students are receiving compensation from either departmental funds or research contracts to continue their research on a part-time basis, while

other students are continuing their work in the framework of the University Honors Program. The project director has contacted the advisors of the off-campus students resulting in several off-campus students continuing their work in an appropriate research group.

The project director and other faculty members participating in the NSF-REU program believe the research and educational experience gained by the students during the summer and further experience to be gained during the academic year to be an integral part of the students' education. In this light, the project director is continuing to monitor the progress of the participants throughout the academic year.

TABLE 1. NSF-REU REPORT TITLES – SUMMER 2000

Title NSF-REU Report	NSF-REU Participant	Advisor/s	Year
Controlling an Analog System Using Digital Microcontrollers	Crystal Carr	Bruce Segee	2000
Determining a Useful Indicator of Lobster Health for the Development of a Biosensor	Christina Congleton	John Vetelino	2000
Scripting Language for the Gas Delivery System	Philip Copp III	David Kleinschmidt	2000
Development of High Surface Area Particle WO ₃ for Use in Modeling Thin Film Sensors for the Detection of Biological/Chemical Warfare Agents	Ralph Cox	Carl Tripp	2000
Development of ANN Software and Utilization in Semi-Automated Roadway Extraction from Satellite Images	Benjamin Davis	Mohamad Musavi	2000
Bulk Acoustic Wave Devices for Liquid Phase Sensing	Charles Jones II	John Vetelino	2000
Development of a Sensor to Detect Pesticides on Blueberries	Todd Klein	David Frankel	2000
Determining Bandwidth of an ADC Using an Alternative Test Method	Erik McCarthy	Don Hummels and Fred Irons	2000
Optical Density as a Probe of Stoichiometry and Carrier Concentration in WO ₃ Films	Joel Ngue Mba	Brian Frederick	2000
Hall Effect Measurement in Metal Oxide Sensing Films	Jeremy Peters	Robert Lad, Scott Moulzold and David Frankel	2000
Thin Film Adhesion	Peter Pike	Nick LeCursi and George Bernhardt	2000
The Study of AC Impedance for a Tungsten Trioxide Ethylene Sensor	Stephanie Pitcher	John Vetelino	2000
Fabrication Procedure for Surface Acoustic Wave (SAW) Devices	Thomas Pollard	Conrad Silvestre	2000
Ethylene Sensor to Monitor the Ripening Process in Fruit	Jeremy Thiele	John Vetelino	2000
Characterization of Metallic Glass Materials for Dispersive Delay Line Applications	Cameron Thorne	John Vetelino	2000
Intelligent DNA Base Calling	Manuel Torres	Mohamad Musavi	2000
X-Ray Photoelectron Spectroscopy	Julia Vollmers	Robert Lad	2000

TABLE 1. MAJOR RESEARCH FINDINGS BY 2003 NSF-REU STUDENTS

Student	Supervisor/s	Research Findings
Beaucage, Timothy	Mauricio daCunha	Development of a measurement and data acquisition system for a surface acoustic wave liquid biosensor.
Bell, Michael	David Frankel	Mike thoroughly examined our WO ₃ sensor films for stability. He found that the film eventually would stabilize, but that the time frame was very long.
Carter, Caleb	Bruce Segee	Focused on the effect of parallelizing a memory intensive algorithm. Results showed that it is possible for N computers to be more than N times faster, contrary to Ahmdal's law.
Corbitt, Kimberly	Darrell Donahue John Vetelino	(a) Tested the LFE-QCM and found that in the PBS medium that frequency response is directly proportional to gap size. (b) All LFE sensors tested have a higher frequency than the normal QCM. Therefore, the LFEs are more sensitive than standard QCMs and might be better at recognizing biological substrates. (c) There are visual (through SEM and light microscopy) that chitosan did bond to the surface of the LFE, however, this could not be verified through frequency experiments. If chitosan has bonded then it will provide a substrate to attach the antibodies for further research.
Cowperthwaite, Jacob	Mauricio daCunha	Extraction of the dielectric constants of the piezoelectric crystals.
Crosby, Jason	George Bernhardt	Jason finished a new testing apparatus, including software control, for sensors. The new testing system is far superior to our old system as his tests clearly showed.
Dawood, Jehad	Mohamad Musavi Habtom Resson	The objective of this project was to improve the performance of new DNA base calling software <i>Trace Tools</i> that is being developed at UMaine's Intelligent Systems Laboratory. In particular the project focused on 1) detecting and cleaning bugs to make sure the software is stable and does not crash, 2) improving the user interface to the software, and 3) implementing a fuzzy logic-based confidence measure for each base called by the software. Through various debugging schemes, bugs were detected and cleaned. Also, the software was optimized to improve its robustness and perform more efficiently. The user interface of the software was enhanced by adding some features such as vertical scroll bar and by enabling the user to edit base calls. A previously developed fuzzy logic-based confidence measure was fine-tuned to provide more accurate confidence values for the bases called by the software.
Deane, Jessica	Paul Millard	Utilization of zebra fish embryo as a model to test for molecules in the perivitelline fluid.
Delaunay, Pascale	George Bernhardt	Pascale tested sensors on which a powder film was placed and found that the sensitivity of such films was very good. However, she also found that the powders, a very porous material, would undergo changes with time.

TABLE 1. MAJOR RESEARCH FINDINGS BY 2003 NSF-REU STUDENTS

Student	Supervisor/s	Research Findings
Dunn, Tyler	Robert Lad	Advancement of the structure, morphology and mechanical wear of SiAlON ceramics over a range of compositions.
Gallimore, Dana	John Vetelino	Determination of the I/V characteristics from multiple WO ₃ film sensors in order to identify the electron transport phenomena taking place.
More, Daesha	Robert Lad	Evaluation of the chemical composition of silicon/aluminum/oxygen/nitrogen (SiAlON) thin films.
Pinkham, Wade	David Frankel	He developed a system called an Anderson loop for better measurements of a differential sensor. Wade also tested a variety of differential, or four point, sensors and showed that we can practically make two sensors on one chip.
Radecky, Kristen	John Vetelino	Development of an equivalent circuit model for the lateral field excited acoustic wave sensor.
Scheinfeldt, Amanda	Paul Millard John Vetelino	Evaluation of the regenerative biospecific layers on the surface of bulk and surface acoustic wave quartz devices.
Schwaratz, Laura	Carl Tripp	New methods for synthesing mesoporous WO ₃ particles with controlled pore size were investigated. By combining an emulsion based synthetic methodology with chelating agents, she was able to obtain particles that were a factor of 3 times higher surface area than obtained using only emulsion based methods. This represents a significant increase surface area and SMO sensors fabricated with these powders have shown a size selective detection capability. This work will be submitted for publication.
Sells, Jeremy	John Vetelino	Utilization of electromagnetic acoustic transducers to excite acoustic waves for sensor applications.
Tkachuk, Vitaly	Mauricio daCunha	Implementation of Green's function for acoustic wave applications.