January 19-21, 2019

University of Malaya

Kuala Lumpur, Malaysia

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2019 the 4th International Conference on Multimedia and Image Processing

(ICMIP 2019)

2019 the 3rd International Conference on Cryptography, Security and Privacy

(ICCSP 2019)

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Welcome Letter

Dear Participants,

Welcome to 2019 Kuala Lumpur Conferences! The conferences aim to bring together international academicians, scientists and industrialists for knowledge sharing, ideas exchanging and outcomes collaborating and presenting in multimedia and image processing, cryptography, security and privacy.

We wish to take this opportunity to express our heartfelt appreciation to our Conference Advisory Committee, IEEE and IET Fellow, Prof. Ce Zhu, University of Electronic Science and Technology of China, China; Conference Chairs, IEEE and IET Fellow, Prof. Chin-Chen Chang, Feng Chia University, Taiwan and Prof. Yulin Wang, Wuhan University, China; Conference Steering Chair Prof. Liyanage C De Silva, University of Brunei Darussalam, Brunei Darussalam; Conference Program Chairs Prof. Ramayah T, Universiti Sains Malaysia, Malaysia; Prof. Shuangbao Wang, Columbus State University, USA and Prof. Hao Xiangyang, Information Engineering University, China. And our Conference Local Chair Prof. Datin Dr. Sameem Binti Abdul Kareem, University of Malaya, Malaysia.

Also, we would like to thank the committee members for their hard work in making smooth running of the conferences. Many thanks to the reviewers for their excellent job to maintain the academic quality and scholarship.

Finally, we would like to thank you, our participants, for coming to Kuala Lumpur to share your knowledge with us. We hope our conferences will prove to be intellectually stimulating to you as to us.

Hope you enjoy the conferences, the food, the hospitality, and the beautiful and charming environment of Kuala Lumpur!

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Instructions

Registration Guide:

Arrive at the Conference Venue→Inform the conference staff of your paper ID→Sign your name on the Participants List→Check your conference materials.

Checklist:

1 receipt, 1 name card, 1 printed conference abstract, 1 lunch coupon, 1 dinner coupon, 1 computer bag, 1 USB stick (paper collection).

Devices Provided by the Conference Organizers:

Laptops (with MS-Office & Adobe Reader)

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PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: 15 Minutes of Presentation including 2-3 Minutes of Q&A

Notice:

*Certificate of Listener can be collected in the registration counter.

*Certificate of Presentation can be collected from the session chair after each session.

*The organizer will not provide accommodation, so we suggest you make an early reservation.

*One best presentation will be selected from each session. The best one will be announced when each session ends and will be awarded by the session chair after each session in the meeting room.

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Agenda Overview

※Note:
4F: Lecture Hall, Conference Room (Bilik Persidangan), Cafeteria
2F: The Cube

January 19, 2019

10:00-17:00   **Participants check-in & Materials Collection—Lobby 1F**

January 20, 2019-Morning Schedule

Venue: Lecture Hall (4F)

09:00-09:05   **Opening Remark**
                    Prof. Yulin Wang, Wuhan University, China

09:05-09:45   **Speaker I**
                    Prof. Chin-Chen Chang, IEEE and IET Fellow, Feng Chia University, Taiwan
                    Speech Title: Sharing Secrets Using Authenticatable Digital Images

09:45-10:25   **Speaker II**
                    Prof. Shuangbao Wang, Columbus State University, USA
                    Speech Title: Quantum Cryptography – Security at Birth

10:25-10:50   **Coffee Break and Group Photo (Foyer 4F)**

10:50-11:30   **Speaker III**
                    Prof. Liyanage C De Silva, Dean, University of Brunei Darussalam, Brunei Darussalam
                    Speech Title: Internet of Things (IoT) Leading to Internet of Trees (IoT)

11:30-12:10   **Speaker IV**
                    Prof. Yulin Wang, Wuhan University, China
                    Speech Title: Image Authentication and Tamper Localization based on Semi-Fragile Hash Value

12:10-13:30   **Lunch at Cafeteria 4F**

January 20, 2019-Afternoon Schedule

Parallel Oral Presentation Sessions

13:30-15:50   **Session1: Communication and Information Network**   **[Lecture Hall (4F)]**

Invited Speaker: Dr. Chau Kien Tsong, Universiti Sains Malaysia, Malaysia

Speech Title: Physicality and Tangibility in Digital Multimedia

Papers: A0004 A0006 A0035 A0047 A023 A024 A034 A063

13:30-15:50   **Session 2: Cryptography and Encryption Technology**   **[Bilik Persidangan (4F)]**

Invited Speaker: Dr. Parameshachari B D, GSSS Institute of Engineering and Technology for Women, India

Speech Title: Controlled Partial Image Encryption Based on LSIC and Chaotic Map

Papers: A017 A028 A048 A059 A044 A056 A066 A057

13:30-15:45   **Session 3: Computer and Information Engineering**   **[The Cube (2F)]**

Papers: A025 A0019 A0021 A0041 A0044 A0031 A0048 A060 A064

15:50-16:10   **Coffee Break (Foyer 4F)**

16:10-18:10   **Session 4: Pattern Recognition**   **[Lecture Hall (4F)]**

Papers: A0016 A0026 A0037 A0042 A007 A015 A062 A038

16:10-18:10   **Session 5: Network and Information Security**   **[Bilik Persidangan (4F)]**

Papers: A006 A008 A040 A046 A026 A049 A052 A029

16:10-18:25   **Session 6: Image Processing Technology and Method**   **[The Cube (2F)]**

Papers: A0007 A0009 A0024 A0039 A0040 A0043 A0027 A0036 A0038-A

Poster Session

16:10-18:25   **Papers: A1001 A047 A001 A021 A012**   **[Foyer 4F]**

18:25-20:00   **Dinner at Cafeteria 4F**

January 21, 2019

09:00-17:00   **One-Day Tour in Kuala Lumpur**

Onsite registration cannot be accepted

Venue Map

"FoRent – Vehicle Forensics for Car Rental System"

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ABSTRACT

Car rental agencies primarily serve people who require temporary vehicles. However, many car rental damage scam cases involving car renter fail to present any evidence and being unfairly charged, for the damage that did not happen during rental. Concerning the current car rental systems that only allow customers to inspect the physical condition of the car, the objective of this project is to develop a mobile application for car rental system, *FoRent*, that implements the car diagnostic features. Through this system, the car owner and car renter will be able to record the physical condition and retrieve forensic data of the car using ELM327 device, before signing the rental agreement. In order to reduce security risk, this project introduces a security protocol to provide the integrity and availability of the data in *FoRent*. Enhancing the existing paper-and-pen car rental system, *FoRent* is remarkable as it introduces these special features that meet the requirement of the car rental company and customers.

CCS Concepts

Applied computing → Computer forensics → System forensics

Keywords

On-Board Diagnostic (OBD); ELM327; Car Rental System; Car Rental Agencies; Vehicle Forensics

1. INTRODUCTION

Automobile technology is up soaring and has reached a new level of data services in vehicles for further use in digital forensics. Conceptually implementing the function of Automobile Black Box which is known as Event Data Recorder (EDR) [1], *FoRent* is able to record information related to vehicle crashes or accidents and faulty components alongside its main function as a car rental system. This system, which incorporated with the existing On-Board Diagnostic (OBD) mobile application, seeks to provide a brand-new platform for people to rent a car from individual or car rental company with peace of mind.

After signing the car rental agreement, the renter has to bear full responsibility for returning the vehicle in effectively the exact same condition. Understanding the widespread of the car rental damage scams nowadays, to win a rental car damage claimed by an individual or car rental company can be very challenging without any evidences. Numerous of car rental damage scam cases involving car renter fail to present any proof or evidence to the car rental company to be exempted from being charged for damage after returning the car [2,3]. As car rental service is a well-known business nowadays, this is indeed a dire news for the people who regularly use this service.

Modern cars, precisely car later than 2008, are capable to supply diagnostic features using data logging that can be captured by ELM327. This device, which is being used by the team in this project, is a programmed microcontroller to translate On-Board Diagnostics (OBD) interface and retrieve forensic data from ECUs (Electronic Control Unit) which are embedded in the car [4]. The data will be displayed and synchronized when the device is connected to an application via Bluetooth.

Typically, customers are not observant about the damages and flaws of the car whether or not the car is really in a good condition without any faulty components before driving off. Thus, *FoRent* can help to provide the justifications for both parties; car owner and car renter based on the vehicle forensic data recorded and the fault code if any system faults or car accident occurs during rental. *FoRent* is an absolutely newly established project which associate the current OBD mobile application that is used to retrieve the car information using ELM327 device. The system will be managed by the administrative of the company itself.

2. RELATED WORKS

This project analysed more than ten existing OBD mobile applications which are downloaded from Google Play Store, but only three are shortlisted to have the maximum criteria and features. These mobile applications which are Torque Lite, OBD Car Doctor, and OBD Auto Doctor were tested using ELM327 device version 2.1 on an SUV Subaru XV. There are several types of interfaces, and the most common use is the chip made by ELM Electronics. The ELM327 is the most widely used, practical, and supports all OBD protocols such as Keyword Protocol (KWP), Pulse-Width Modulation (PWM), Virtual Private Network (VPN), and Controller Area Network (CAN) [5]. The other circuits are ELM 320, ELM 322 and ELM 323 only support one protocol: the ELM320 only supports PWM, the ELM322 only supports VPN, and the ELM323 only supports KWP [5]. There are four types of ELM327 interfaces which are ELM327 RS232, ELM 327 USB, ELM 327 Bluetooth and ELM327 Wi-Fi. In this project, the team use the ELM327 Bluetooth because it is affordable and the most expedient among four as it can be used as a wireless connection,

by connecting to a computer the Android smartphone. The comparison between the four types of ELM327 interfaces are listed in Table 1.

Table 1. Comparison between ELM327 interfaces

	PC Windows software	Mac OS X software	Android App.	iOS App. (iPhone / iPad)
ELM327 RS232	✓	✓	✗	✗
ELM327 USB	✓	✓	✗	✗
ELM327 Bluetooth	✓	✓	✓	✗
ELM327 WIFI	✓	✓	✓	✓

The OBD mobile applications that meet the requirement for this project are:

1)   Torque Lite (version 1.2.22) [6]
Torque Lite is the most popular OBD mobile application in Google Play Store recorded the highest number of total downloads from five million users with ratings. In terms of user-friendly, it promotes safety through Heads-up Display mode where the data reflected on the front glass of the car, so it does not require users to look away from their usual viewpoints while driving. Customizable dashboard with theme support with the gauges and dials that users want.

2)   OBD Car Doctor (version 6.4.4) [7]
OBD Car Doctor currently has been rated with a total of one million downloads. The uniqueness of this mobile application among all, it has the search engine to find the nearby garage, petrol station, parking, and carwash, however, OBD Car Doctor fail to provide Head Up Display (HUD) mode and dashboard customization.

3)   OBD Auto Doctor (version 3.6.0) [8]
The noteworthy features in OBD Auto Doctor still allow the users to communicate with the car OBD2 system and turn the mobile into a highly capable automotive scanner, despite 500 thousand downloads and 3.7 ratings. The features in this mobile application are more or less the same with Torque Lite and OBD Car Doctor. It has built-in Diagnostic Trouble Code (DTC) database with over 18000 trouble codes including thousands of manufacturer specific codes.

3. PROJECT DESCRIPTION

FoRent is a project that has been made through basic software development process which includes several software development activities such as requirement engineering process. This is important to make sure that the development process runs smoothly and comes out with the result that have been expected as well as fulfills the stakeholder needs.

3.1 Requirement Engineering

3.1.1 Methodology
This section is to discuss the methodology used in this project. The team chooses Agile Development Methodology. The methodology includes planning, analyzing requirements, development process and lastly, testing process [9]. For the planning, the team gathers the ideas on the focus and topics to

work on. The next phase is analysing requirements. The information needed is like who will use the system by providing use case scenario as shown in Figure 1 and Figure 2, and how they will use it. This phase involves requirement elicitation process to identify the project requirements. After going through the requirement analysis, the system and software design are prepared. The team needs to think about how the product and solution need to be carried out by producing use case and system flow diagram to have clearer view on how the system is going to work. Next, the team proceeds with the implementation and coding development. This is where the design is going to be developed. As for this mobile application, the team uses Android Studio as the development platform with Java Language for user interfaces while Firebase as a database platform for the system. Once the code has been developed, it is tested against the requirements to make sure the product is actually fulfilling the requirements listed and matching the user stories. During this phase, unit testing, integration testing, system testing, and acceptance testing will be carried out. After testing, the product is delivered to the customer for them to use. However, deployment is actually not the end of the project. This testing phase will let the user use the system and let the development team know if there is any problem that needs to be solved or updated.

3.1.2 Functional Requirement
The functional requirement is a process where the function of the system is carried out. As for *FoRent*, the team lists out eight system features, which are:

- Register new customer
- Customer login
- Book a car
- Display internal car status
- Update physical condition
- Make payment
- Print receipt
- Send feedbacks
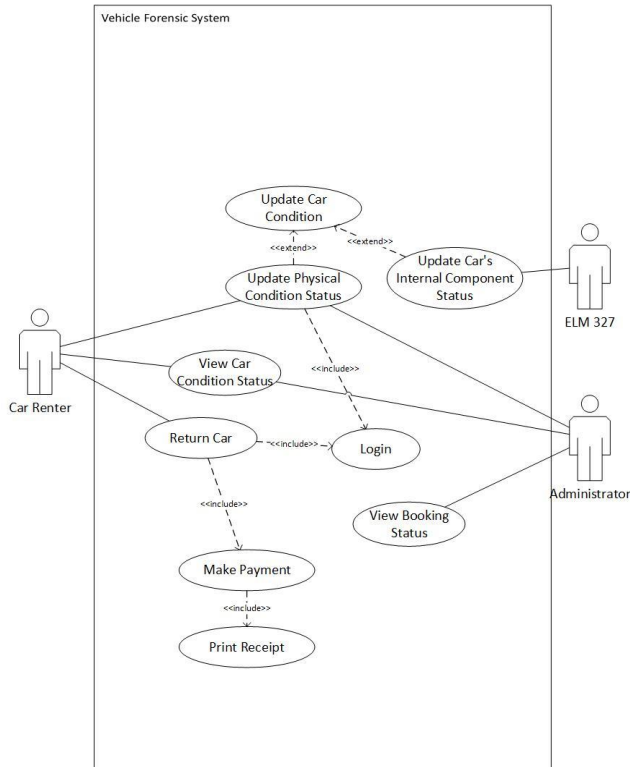
3.1.3 Use Cases
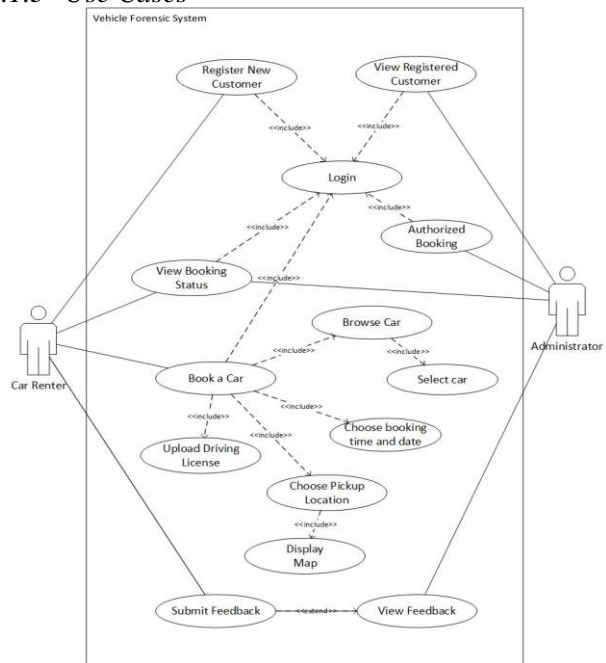
Figure 1. *FoRent* Use Case 1

Figure 2. *FoRent* **Use Case 2**

3.2 Development Requirement

Development environment: The team uses Java programming language as the main programming language.

Software: The team uses Android Studio version 3.2 software for the interfaces while Firebase platform for the database development.

Hardware: ELM327 version 2.1 Bluetooth Car Scanner (Figure 3) and Android Smartphone to install APK *FoRent.*

Figure 3. ELM327 device

4. PROPOSED SYSTEM

4.1 Overall System

The team has come out with overall system flow diagram as stated in Figure 4 which will give a clearer image on how the system is used and connected.
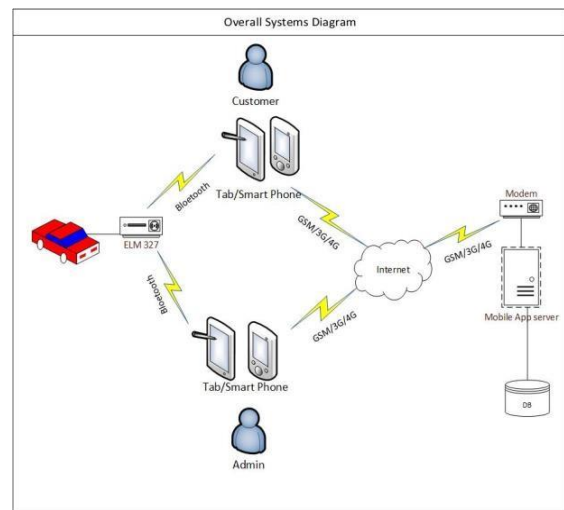

Figure 4. *Overall System Flow Diagram*

4.2 System Requirement

   i.   Each car will be provided with ELM 327 in order to allow the user to retrieve internal car condition status.

   ii.   Customers need to have *FoRent* application in their smartphone to rent and view internal condition of the car.

   iii.   Customer's details and external and internal condition of the car will be recorded into the database.

   iv.   The car will be checked by the rental company to be compared with the initial car condition before the customer make payment and return the car to ensure that the car is in the good condition.

4.3 System Flow

   i.   As for the first time users, they need to register to the application first in order to allow them to log into the system and continue with the renting process.

   ii.   After log in, system requires users to make a booking by choosing a car, date for booking and pickup location.

   iii.   System will allow the user to view the internal car condition status of the selected car.

   iv.   Users are required to confirm booking if they are satisfied with the car condition.

   v.   The payment can be made through the application and the receipt will be sent to their email.
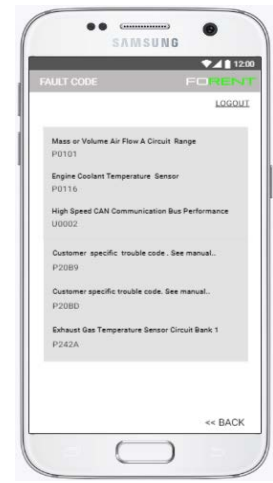
4.4 Interfaces

User Login
Login interface for
registered user

User Register
Account registration
for new user.

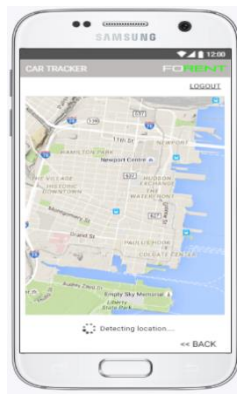**User password reset**
User might want to
change the password if
the users have
forgotten theirs.

Book a Car
User select booking
location, date and
time, take picture of
license.
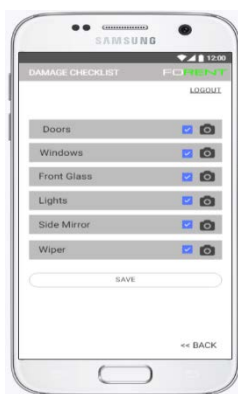
Physical Record
User inspect the condition
of the car before rent
according to the damage
checklist by taking picture
as the evidence.

Car Tracker
Car owner track the car's
whereabouts through
built-in GPS in the car.

Adapter Type
User may choose the
ELM327 interfaces;
Bluetooth, USB, or Wi-Fi.

Fault Code
Car renter and car owner
identify the component
faulty based on the
Diagnostic Trouble Code
(DTC) shown.

5. CONCLUSION AND FUTURE WORK
5.1 Conclusion

In conclusion, *FoRent* is a mobile application that can help to improve the current car rental services. It is primarily to reduce the widespread of car rental damage scams cases in Malaysia where both parties; the car renter and car owner will be able to provide the evidences based on the data recorded. It is also providing few features such as book a car, view internal car condition status which can be tracked by connecting the mobile application to the ELM 327. This device is used to retrieve programmed microcontroller to translate On-Board Diagnostics (OBD) interface and retrieve forensic data from ECUs (Electronic Control Unit) which are embedded in the car. This paper has demonstrated how *FoRent* functions and how it can benefit the society. *FoRent* is aimed to contribute to car rental company as well as the customers who are going to use the service. This will lead to the ability to solve any problem that might occur during the renting process for the customer and the company itself.

5.2 Future Work

The team addresses the problem of the privacy and security concern for Bluetooth as future extension to this project. The team will be introducing another layer of security for Bluetooth connection between ELM327 device and *FoRent* mobile application since Bluetooth can be vulnerable point of access and data manipulation. Practically, this ELM327 Bluetooth provides only the surface layer of security where only one device can be connected at one time. In order to connect with another device, the device that is currently connected to ELM327 must be unpaired and the OBD mobile application running in the background must be closed. However, to maintain the data integrity, the team introduces another layer if Bluetooth security protocol to prevent both car renter and car owner to alter the data captured by the ELM327. These parties are only allowed to view the current data retrieved from the vehicle and are not be able to change the data by any means. They need to pair a passcode key whenever both parties are in the radius feet from the vehicle. Therefore, both

parties do not have the chance to change the data without each other's conscious.

6. REFERENCES

[1] J. Comeau, D. Dalmotas and S. Schramm, "The Application of Event Data Recorders to Vehicle Safety Research," presented at the 27th CARSP Conference, June 18-21, 2017, Toronto [Online]. Available: http://www.djdsafety.com/Application_of_EDRs_to_Vehicle_Safety_Research.pdf. [Accessed: 20 December 2018].

[2] "Warning: Rental car scam - Penang Island Forum," *TripAdvisor*, 15-Feb-2016. [Online]. Available: https://www.tripadvisor.com.my/ShowTopic-g660694-i11609-k9265656-o10-Warning_Rental_car_scam-Penang_Island_Penang.html. [Accessed: 11 May 2018].

[3] "Forums Archive," *Whirlpool.net.au*, 07-Apr-2016. [Online].Available:http://forums.whirlpool.net.au/archive/2191110. [Accessed: 11 May 2018].

[4] M Awais Khan Niazi, Anique Nayyar, Ali Raza, Asad Ullah Alwan, Muhammad Hamid Ali, Nasir Rashid, and Javaid Iqbal, "Development of an On-Board Diagnostic (OBD) Kit for Troubleshooting of Compliant Vehicles," in Proc. of the 2013 International Conference on Emerging Technologies (ICET), December 2013, doi:10.1109/ICET.2013.6743551 [Online]. Available: https://www.researchgate.net/publication/271553013_Development_of_an_On-Board_Diagnostic_OBD_kit_for_troubleshooting_of_compliant_vehicles. [Accessed: 24 May 2018].

[5] Alex E, "ELM327 Review & About ELM 327 OBD2 Interface | Car OBD Diagnostics, ECU Chip Tuning & Auto Repair Support," *Total Car Diagnostics*, 01-Oct-2014. [Online]. Available: http://www.totalcardiagnostics.com/support/Knowledgebase/Article/View/72/15/elm327-review--about-elm-327-obd2-interface. [Accessed: 11-May-2018].

[6] Ian Hawkins. (2010). Torque Lite (OBD2 & Car) (1.2.22) [Mobile application software]. Retrieved from https://play.google.com/store/apps/details?id=org.prowl.torquefree.

[7] PNN soft. (2012). OBD Car Doctor|ELM327 OBD2 (6.4.4) [Mobile application software]. Retrieved from https://play.google.com/store/apps/details?id=com.pnn.obdcardoctor.

[8] Creosys Ltd. (2012). OBD Auto Doctor (3.6.0) [Mobile application software]. Retrieved from https://play.google.com/store/apps/details?id=com.obdautodoctor.

[9] J. A. Livermore, "Factors that Significantly Impact the Implementation of an Agile Software Development Methodology," Journal of Software, Vol. 3, No. 4, April 2008 [Online]. Available: http://www.jsoftware.us/vol3/jsw0304-04.pdf. [Accessed 24 December 2018].