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Motorcycle Contra Robos Device With Mobile-Based Application

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Abstract
As a result of motorcycle theft, many motorcycle riders are experiencing troubles with their motorcycles. Thieves are growing more sophisticated when stealing motorcycles from riders in today's world. Many outcomes, ramifications, and possible solutions for motorcycle riders and the anti-carnapping task force where anti-theft systems in the Philippines are increasingly developed were addressed in this study, such components related to preventing theft.This study was conducted to help motorcycle owners and riders prevent their bikes from being stolen by developing and designing a Motorcycle Contra Robos Device with a Mobile-Based Application.This research also sought to establish the system's project success in terms of the ISO 25010 software quality model's primary features, which include functionality suitability, compatibility, usability, security, maintainability, and portability.The descriptive method was used by the researchers to describe the respondent's assessments of the Motorcycle Contra Robos Device with Mobile-based Application in Barangay Maharlika Village Taguig City. The participants' evaluations were based on the Anti-Carnapping Task Force and Motorcycle riders. The researchers used a systematic approach to system development from idea to implementation.The test of differences in the assessment of the two groups of participants (Motorcycle Rider and Anti-carnapping Task Force) regarding the measuring tool using T-Test achieved at 0.008 T ratio where there are two groups of respondents, and there are six criteria per group. The computed value was compared to the tabulated/T-critical value at a 0.05 level of significance which shows the T-ratio is less than the computed value. Thus, the null hypothesis is accepted that "There is no significant difference between the perceptions of the two groups." This means that the group participants agreed upon the testing of the system based on the criteria of ISO 25010." This shows that the participating groups of respondents agreed on the criteria set by ISO 25010.

I. INTRODUCTION

Outside of our homes, we do the majority of our everyday activities. Similarly, transportation has an impact on all elements of our lives, particularly our daily routines, such as going to work, school, shopping centers, the bank, and others, as well as, shockingly, coming home. Due to a lack of transportation, we were unable to participate in a number of

activities. By improving their condition, the vehicle has made major contributions to the monetary, social, political, and social fields. In today's Philippines, the motorcycle is one of the most prevalent vehicles of transportation, and it has progressively become the most well-known mode of transportation. Several strategies have been observed.

Nowadays, security is crucial. Vehicle safety is critical for all owners of private and public vehicles. As a result, numerous security systems have been adopted, although most are costly, intricate, and best suited to automobiles. In the case of motorbikes, a basic and low-cost security system will just provide a siren warning and make a lot of noise, which will bother people. The alert will not sound if the person is too far away from the motorcycle. Physical countermeasures, such as padlocks, disk brake locks, and other similar devices, are also employed to prevent theft, but they are insufficiently secure. The Scorpio Ride "Core" Cellular Motorcycle Alarm and GPS Tracking System is one of the available motorcycle napping solutions on the market today. It makes use of an iOS or Android app as well as a module installed inside the bike. If the motorcycle has been tampered with, it gives the user SMS alerts. It can also track the location of a vehicle. For these reasons, this study recommends motorcycle riders be provided with vehicle security system solutions. This study aimed to enhance and improve its operations in order to better fulfill its goal. To expand on past studies, the researchers are working on a system that will integrate face recognition, allowing the device to record unknown people who may steal their motorcycle. To improve the effectiveness of their alarm system, which will be employed in their proposal system, the researchers will also improve it. As a result, motorcycle theft is avoided.

Furthermore, the researchers' security system includes locating the motorcycle to aid in searching for and recovering stolen motorcycles. The Global System for Mobile Communication (GSM), GPS technology, sensors, a system immobilizer, and a camera are used to accomplish this. The user can control the entire system by using a mobile application.

II. LITERATURE REVIEW

Design and Build a Motorcycle Security Controller Using the IoT-Based GPS Tracking Method

Dimyati and Rasjid (2021) claimed that motor vehicle theft cases are still widespread in our area due to a lack of security systems in motorized automobiles that rely solely on ignition keys and key covers, where thieves have exploited loopholes in standard security systems. To address this, the researchers created an IoT-based GPS tracking system to aid in preventing and recovering stolen vehicles Most motorcycle safety precautions, such as attaching safety locks to discs or chaining, are still adequate, but owners usually forget to install locks or vehicle alarms. This research has resulted in the development of a controller design tool and motorcycle safety and GPS monitoring to provide information on the last location of motorized vehicles, as well as the ability to manage them remotely via IoT, as experienced by motorized vehicle users.

Implementing Anti-theft Systems for ATM and Vehicles

According to Mahalakshmi (2018) Anti-theft technology can be utilized in various systems, including ATMs, automobiles, and mobile phones. Conduct research on implementing anti-theft procedures for ATMs and vehicles. ATM security is enhanced by the

researchers' use of quiet indicate systems, integrated video surveillance cameras, and other M2M communication technology. Because M2M necessitates a new system design, the Raspberry Pi created a low-cost embedded web server based on an ARM11 CPU and the Linux operating system. The features are web-enabled control, sensors, shutter lock, and camera control. Anti-theft in autos can be implemented using GSM, GPS, and Bluetooth technology. They also use GSM and GPS to develop a tracking system and fingerprint verification. A single-board embedded system with GSM (Global System for Mobile) and GPS capabilities is used to do this (Global positioning system). Employ an Arduino board in a master mode in the Bluetooth low energy module, with the BLE agent device reading the MAC address. Anti-theft systems employ a variety of ways; however, in this study, we concentrated on the following strategies.

Face Recognition for Motorcycle Engine Ignition with Messaging System

Austria et al. (2019), according to their study "Face Recognition for Motorcycle Engine Ignition with Messaging System." To prevent thefts, for example, many security measures have been devised. There are CCTVs (closed-circuit television) that can be found in most commercial establishments because of their high effectiveness in preventing and solving crimes, burglar alarms that sound a loud alarm to help prevent burglary thefts and unauthorized access, button alarms that automatically alert the nearest police station that a crime was attempted or is currently occurring, and many more. Many sorts of authentications are used to strengthen security features in many types of devices, including fingerprint, retinal, iris, and facial recognition.

Develop a Vehicle Security System for Motorcycle Vehicles that uses Short Message Service (SMS) as a Danger Warning

According to Astuti et al. (2020), The purpose of this study is to create a tool that can use a GPS module (Neo 6) to monitor the location of a lost vehicle, as well as a software design for a tool that can display the vehicle's site as a map on the vehicle owner's smartphone using the Google Maps application (user). The goal of this study, according to the problem formulation and research objectives, is to develop a vehicle safety system that uses SMS as a hazard warning on motorcycles.

III. RESEARCH METHODOLOGY

Methods of Research

Developmental research has been characterized as the systematic study of creating, producing, and assessing instructional programs, procedures, and products that must meet internal consistency and effectiveness requirements.

The researchers employed both descriptive and developmental research methodologies. The research was classified as developmental because the researcher examined how the system must be formed, conducted a systematic assessment of how the system is being built, analyzed and evaluated the system's development process. The descriptive research will detail the system development model, user guide, respondents' assessments, and differences in respondents' assessments.

Population of Respondents

Forty-five (45) respondents are coming from the motorcycle owner, five (5) from the anti-carnapping task force.

Data Gathering Procedure

The researchers will collect data from respondents via online survey questionnaires.

1. The evaluation procedures are as follows:
2. The researchers will gather all the respondents to demonstrate the system and experience.
3. Respondents will have a chance to use the system to test and evaluate its performance.

After the demonstration and testing of the system, the researcher will send the link to the survey questionnaire to the respondents to turn in their responses.

All the responses will be tabulated, use the Microsoft Excel to generate the statistical result, and interpret the data in narrative form.

Statistical Treatment of Data

The Weighted Arithmetic Mean of the responses is the statistical method used to determine the system's acceptability. Microsoft Excel was used to tabulate these responses. The average reply per criterion and the overall evaluation mean were computed. The weighted mean uses a Likert scale to determine how research participants rate the system.

The t-test is another formula that is utilized. A t-test is a type of inferential statistic that is used to assess if there is a significant difference between the means of two groups, which may be related to particular characteristics.

System Architecture

This diagram depicts the system's detailed flow.

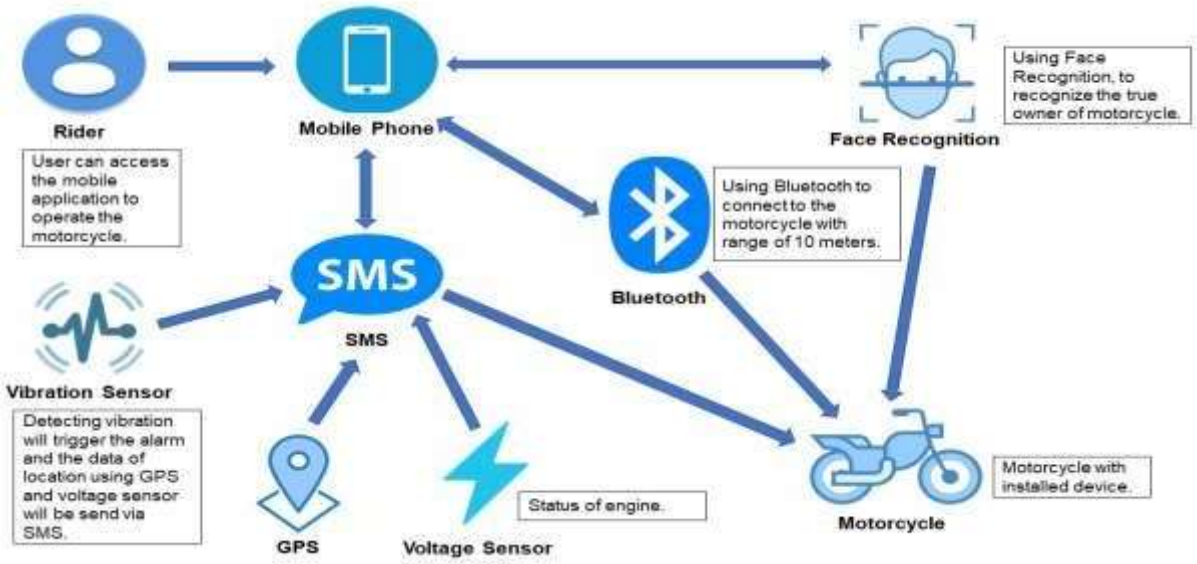

Figure 1. System's Architecture

IV. FINDING AND DISCUSSION

The researcher displays the contents of data to be analyzed and interpreted to know and determine the perception of the participants from two different groups namely, motorcycle rider and anti-carnapping task force. It also contains the stages involved in the development of the system and the summarized suggestions for future improvement of the system. The presentations of data are in sequence according to the objectives.

	Functional Suitability		**Motorcycle rider**		**Anti-carnapping Task Force**		**Summary**	
			Mean	VI	Mean	VI	Mean	VI
1	1.1	Functional completeness	4.47	HA	4.8	HA	4.63	HA
	1.2	Functional Correctness	4.4	VA	4.8	HA	4.6	HA
	1.3	Functional Appropriateness	4.5	VA	5	HA	4.8	HA
2	Compatibility		**Motorcycle rider**		**Anti-carnapping Task Force**		**Summary**	
			Mean	VI	Mean	VI	Mean	VI
	2.1	Co-existence	4.47	VA	4.2	VA	4.34	VA
	2.2	Interoperability	4.4	VA	4.4	VA	4.4	VA
3	**Usability**		**Motorcycle rider**		**Anti-carnapping Task Force**		**Summary**	
			Mean	VI	Mean	VI	Mean	VI
	3.1	Appropriateness recognizability	4.49	VA	4.8	HA	4.65	HA
	3.2	Learnability	4.36	VA	4.6	HA	4.48	HA
	3.3	Operability	4.42	VA	4.4	VA	4.41	VA
	3.4	Prevention against user error	3.22	A	4.6	HA	3.91	VA
	3.5	Appearance of the user interface	4.38	VA	4.6	HA	4.49	VA
	3.6	Accessibility	4.4	VA	4.8	HA	4.6	HA
4	Security		**Motorcycle rider**		**Anti-carnapping Task Force**		**Summary**	
			Mean	VI	Mean	VI	Mean	VI

	4.1	Confidentiality	4.6	HA	4.8	HA	4.7	HA
	4.2	Integrity	4.3	VA	5	HA	4.65	HA
	4.3	Non-repudiation	4.38	VA	5	HA	4.69	HA
	4.4	Accountability	4.4	VA	5	HA	4.7	HA
	4.5	Authenticity	4.5	VA	4.8	HA	4.65	HA
5	Maintainability		**Motorcycle rider**		**Anti-carnapping Task Force**		**Summary**	
			Mean	VI	Mean	VI	Mean	VI
	5.1	Modularity	4.49	VA	4.8	HA	4.65	HA
	5.2	Reusability	4.1	VA	4.8	HA	4.45	VA
	5.3	Analyzability	4.31	VA	4.8	HA	4.56	HA
	5.4	Modifiability	4.42	VA	4.4	VA	4.41	VA
6	**Portability**		**Motorcycle rider**		**Anti-carnapping Task Force**		**Summary**	
			Mean	VI	Mean	VI	Mean	VI
	6.1	Adaptability	4.51	HA	4.8	HA	4.66	HA
	6.2	Installability	4.4	VA	4.8	HA	4.6	HA
	6.3	Replicability	4.29	VA	4.8	HA	4.55	HA

Table 1: Shows the result of the evaluation of conducted among Motorcycle Rider and Anti-carnapping Task Force in Barangay Maharlika Village, Taguig City.

Findings

Table 2

General Average of the Assessment Using ISO 25010 Criteria as Perceived by the Respondents

No	Categories	Group	Anti-Carnapping
		Motorcycle Rider	Task Force
1	Function Suitability	4.46	4.87
2	Compatibility	4.44	4.3
3	Usability	4.21	4.63
4	Security	4.44	4.92
5	Maintainability	4.33	4.7
6	Portability	4.4	4.8

The table was used for determining the difference of the group perception by the means of evaluating them using the statistical treatment T-TEST for the analysis of the variable based on the assessment of the group.

V. CONCLUSION AND FURTHER RESEARCH

Conclusions

Based on the findings, the researchers have the following conclusions.

1. This study concludes, based on the data and results gathered, that a Motorcycle contra robos device with a mobile-based application is a valuable and effective measure for preventing motorcycle theft.
2. The two participants were delighted with the system's utility in terms of the user-friendliness of its user interface.
3. The two groups of participants determined the document's validity, secrecy, and integrity of information, as well as the capacity to know that it was graded and reviewed by the admin and the prevention of illegal access to information.

4. For a first-time user of the system, the user manuals are beneficial.

5. The application may be installed and uninstalled in a specific environment and modified to new hardware as it becomes available.

Recommendations

The following recommendations are based on this study:

1. Create a web app to support the mobile app, synchronize alerts and location logs, and backup all the data in the mobile app.
2. When the rider's blood alcohol content exceeds the safety level indicated by the alcohol sensor, an automated kill switch for the motorcycle engine is activated.
3. To serve as a reference/guide for future researchers interested in investigating a motorcycle contra-robos device with a mobile-based application to increase vehicle security.

VI. REFERENCES

1. Astuti, Nuraeni., Ritzkal Ritzkal., Ade Hendri Hendrawan., Bayu Adhi Prakosa. (2020). Vehicle Security System using Short Message Service (SMS) as a Danger Warning in Motorcycle Vehicles. Journal of Robotics and Control (JRC) [Online], 1.6: 224-228.
2. Austria, Y. D., Lacatan, L. L., Funtera, J.G. D., Garcia, S. C., Montenegro, J. H., Santilleces, L. T. (2017). Face Recognition for Motorcycle Engine Ignition with Messaging System, Computers and Society (cs.CY) arXiv: 1907.10385.
3. Ibrahim, Mr S. Jafar Ali, K. Singaraj, P. Jebaroopan, and S. A. Sheikfareed. "Android Based Robot for Industrial Application." International Journal of Engineering Research & Technology 3, no. 3 (2014).

4. Elayaraja, D, Ibrahim, S. Jafar Ali. "Design Parametric Optimization Of Wall Following Robot." Turkish Journal of Computer and Mathematics Education (TURCOMAT) 12, no. 8 (2021): 2072-2080.
5. Malik, K. Alhaf, D. Elayaraja, S. Jafar Ali Ibrahim, and NS Kalyan Chakravarthy. "INVESTIGATING THE POTENTIAL CONSEQUENCES OF THE MEMBERSHIP FUNCTIONS IN A FUZZY LOGIC CONTROLLER-BASED OBSTACLE CLIMBING ROBOT." INFORMATION TECHNOLOGY IN INDUSTRY 9, no. 1 (2021): 1294-1299.
6. Dimyati, A., Rasjid, D. H. (2021). Design and Build a Motorcycle Security Controller Using the IoT-Based GPS Tracking Method, PELS, vol. 1, no. 1.
7. Mahalakshmi H, Nikhitha J, Varsha B. (2018). Implementing Anti-theft Systems for ATM and Vehicles, pices, vol. 1, no. 12, pp. 196-201.
8. Richey, Rita C. (1994). Developmental Research: The Definition and Scope.