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Title: Development and desing for a vehicular care based on a embedded system to prevent car heist

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Presentation content

Introduction

A car alarm is a security system designed to prevent vehicle theft by using visual and auditory signals to alert about a potential vehicle theft worldwide.

According to data from the Mexican Association of Insurance Institutions (AMIS), an increase of 31% has been reported for this specific type of crime. The main states with these incidents are: Estado de México, Ciudad de México, Puebla, Guanajuato, Veracruz, Hidalgo, Michoacán, Guerrero, and Querétaro.

Year	2021	2020	2019	2018
México	115, 46	94, 52	98, 98	115, 80

Table 1. Stolen cars in México.

Introduction

Developing additional technology beyond what is integrated into vehicles is crucial for preventing and recovering stolen vehicles. Currently, low-cost technologies with high capabilities, such as RFID, GPS, GSM, and GPRS, among others, are being incorporated in vehicles.

Figure 1. Vehicle ubication.

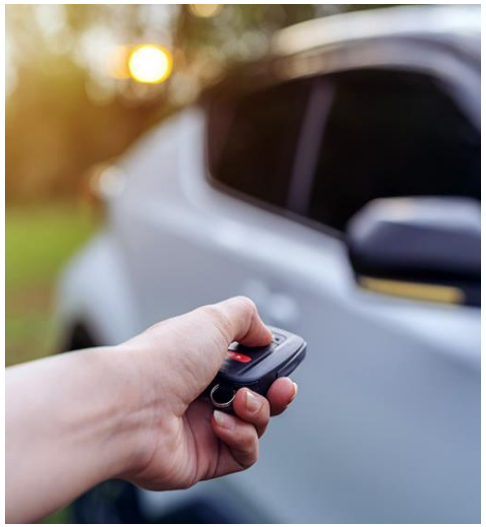


Figure 2. Security vehicle control.

Visual abstract

Development and Design for a Vehicular Care Based on a Embedded System to prevent Car Heist

Objective

Design and development an embedded system for security vehicle using GPS and GSM to prevent car heist.

Methodology

Design an embedded system with communication modules GSM and GPS and actuators.

Design a human-machine interface mobil Application with the embedded system.

Testing the operability between the embedded system and the offline human-machine interface.

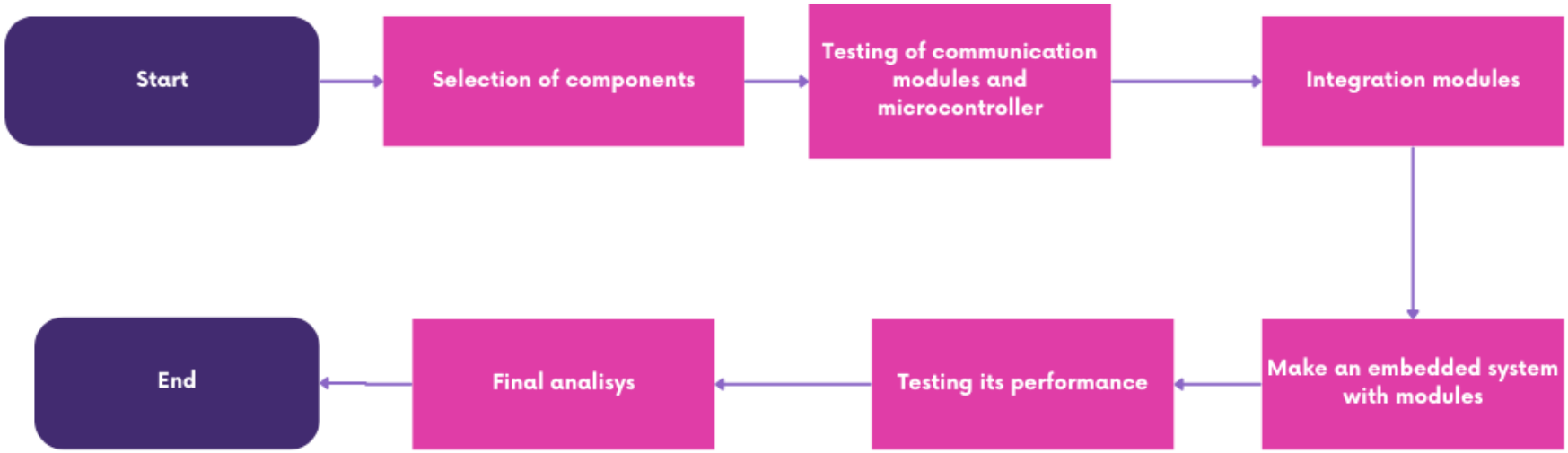
Installation of the embedded system into the car.
Final test.

Conclusion

Testing the system. It has an average response of 2 minutes from request the action to the actuator has finished, otherwise, the ubication request has an average response of 5 minutes to recived the SMS with the coordinates.

Methodology

For the successful development of the project, it is essential to follow each step methodically and carefully. The process begins with selecting the appropriate components to reach the project's objectives. The tests are conducted with communication and integration modules. Afterward, the integration from the previous step is performed to ensure proper functionality. Afterwards an embedded system is implemented to save space and reduce connection errors. Finally, the embedded system undergoes final testing to verify its performance.



Methodology

Gear selection

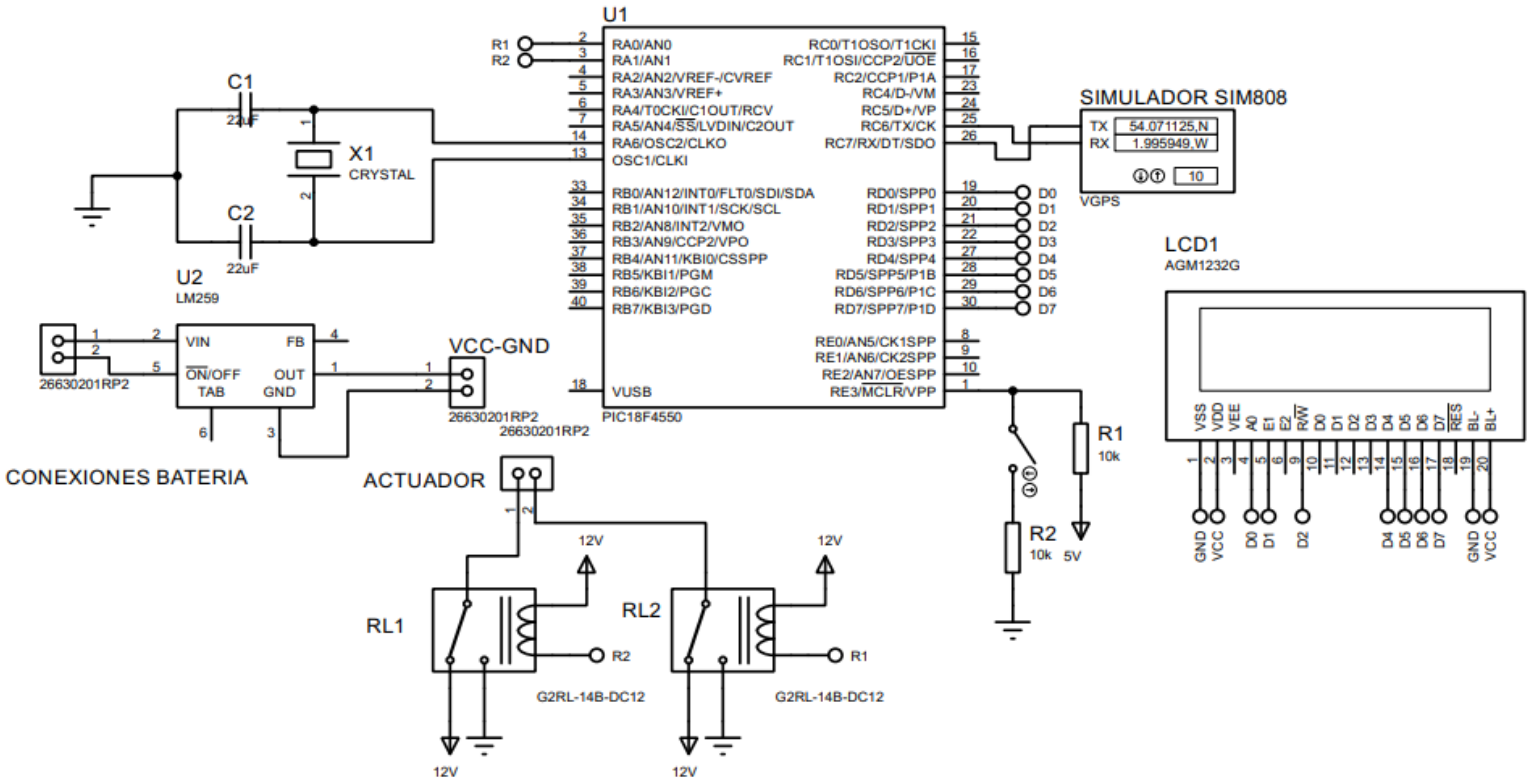


Figure 3. Electronic diagram.

Methodology

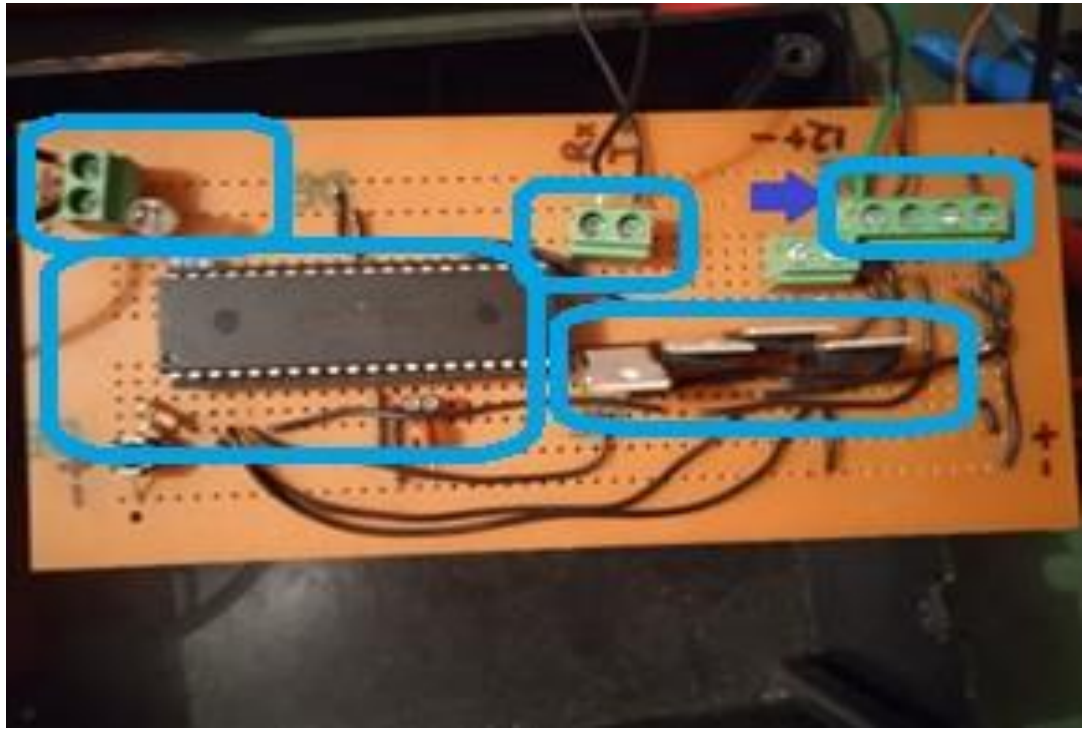


Figure 4. Embedded system.

Methodology

Creation of an mobile app.

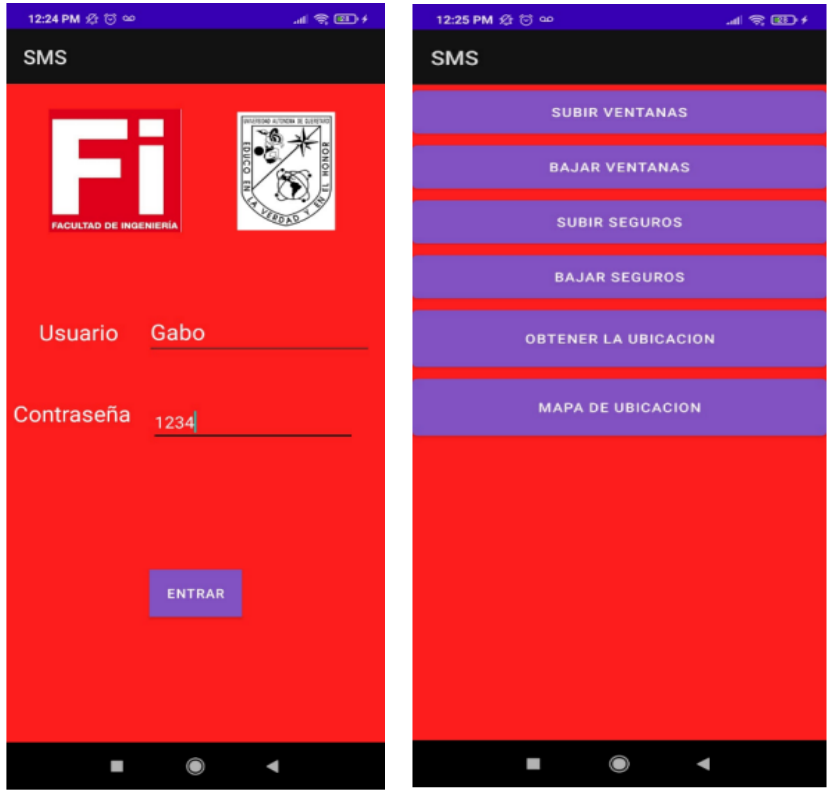


Figure 5. App mobile.

Results

The embedded system functioned correctly, allowing it to be installed in the selected vehicle using the same power source. Additionally, the necessary connections were made with the system's corresponding actuators. As a result, the vehicle is equipped with a functional alarm system capable of tracking its location in real-time. With the support of a mobile application linked to the embedded system, users can control the door locks, window operation, and obtain the vehicle's real-time location. Multiple tests were conducted on the embedded system's actions, yielding an average response time of 2 minutes for window and lock operations and 5 minutes for location retrieval.

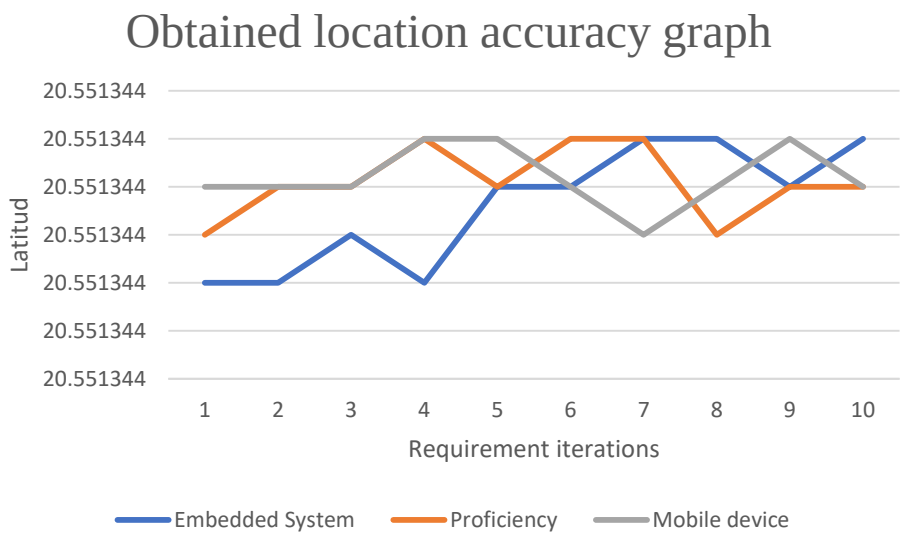


Figure 6. Location accuracy comparison.

Conclusions

Integrating new low-cost technologies is essential to cover current demands. In this specific challenge, careful consideration was given to the characteristics of all materials used. As a result, promising outcomes were achieved. However, the system can be further improved by refining the programming logic and enhancing the integration of the embedded system.

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