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Vehicle To Vehicle Communication Using Arduino And Mobile Application

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Problem Statement

Inter-vehicle communication (IVC) technology enables vehicles to communicate with each other wirelessly. IVC can enhance road safety, traffic efficiency, and support advanced driver assistance systems and auonomous vehicle operations. The abstract explores the possibility of developing a cross-platform application with small hardware support for emergencies,alert systems, congestion control and management, navigation, and helplines.

Objective

This system will provide the user a android frontend and a unit with Arduino . Which will transmit and recieve the messages from nearby vehicles and enables to communicate with them.The android app enables the user to view nearby vehicles , points of interest , approaching of ambulance and provide SOS Messages. If a system is offline then the SOS Message can travel via radio waves to aurdino and then transmit via internet. The locations of all the vehicles are updated simultaneously and managed by a server.

Literature review

We found that existing systems are costly and available as proprietary units. We try to implement using low cost and with maximum efficiency. And the project will be intented to be as a Open Source Project . So other developers can contribute and refine it.

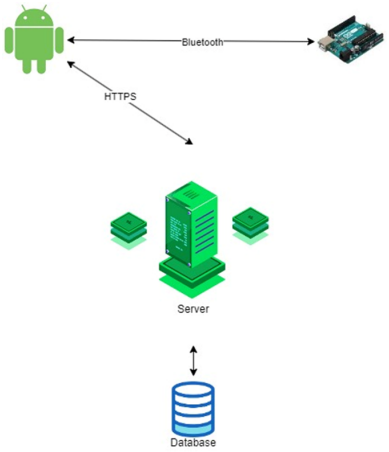
Tools Used

- ANDROID SDK
- KOTLIN
- MONGODB
- NODEJS
- ARDUINO
- Nrf24l01 + PA
- HC05
- GOOGLE MAPS API

METHODOLOGY

IThis system is a network of Arduino modules connected to the user's Android device using Bluetooth. We can set up an Arduino module with a nRF24L01+PA radio module and an HC05 Bluetooth module. Each of these is set up on a vehicle. This module can be connected to the user's Android device using the Bluetooth functionality. Users can thus receive and send messages with Arduino. All the Arduino are connected. Arduinos communicate with each other using radio waves transmitted from the nrF24L01+PA sender and receiver modules.\

The message from the android device is sent to the server which is hosted in a centralized way. This server communicates with the database and query the data and sends to the device. All traffic between android and server is done via HTTPS(HyperText Transfer Protocol)



Result and Analysis

One area of the project that could be improved is the issue with range. While we were able to achieve a range of 250 meters in our tests, this fell short of our initial goal of 500 meters. To address this, we could explore the use of more expensive hardware components that may offer a greater range. Additionally, we could explore alternative communication methods, such as cellular or satellite communication, to overcome the range limitations of the current system.

Furthermore, we envision new implementations that could further enhance the system's performance. For example, we could incorporate traffic signal detection and road condition detection to provide drivers with even more accurate and up-to-date information on the road. Additionally, we could add speed monitoring features to help drivers avoid accidents and traffic violations.

In summary, while the project outcomes met our initial expectations, we recognize that there is always room for improvement and innovation. We will continue to explore new ideas and technologies to enhance the system's performance and usability, and we are excited to see how the system evolves in the future.

Conclusion

In conclusion, we successfully developed a vehicle monitoring system that includes an Android application and specific hardware components that al low for the efficient transfer of data between the user interface and vehicles. The Android application enables users to monitor traffic conditions and access real time information regarding nearby vehicles, accidents, ambulance alerts, SOS alerts, and emergency services like police stations, health centers, and repair shops. By utilizing GPS in the user's mobile device to track nearby vehicles in real-time and feeding this information to a database that is accessible to all the nodes in the network, the application can provide up-to-date and accurate information to users

Overall, this project was a success, and the Android application and hard ware components proved to be effective tools for achieving our goals. The project demonstrates the potential for using technology to improve safety and efficiency on the road, and there is still much room for innovation and improve ment. With further development and implementation, this system could become a valuable tool for drivers in any location.

References

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