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IoT Standards & Protocols

Project Concept

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Project Concept

Project:

This is an idea originally submitted by Joe Rodrigues from CMU. The general gist of the project involves using a camera mounted to the front of a police car to scan license plates in the vicinity, checking them throughout the police database, and then checking for warrants/expired documents the associated driver has. In the event that the driver has a warrant/expired document, the officer will be notified with an app and they can take appropriate action.

This project can also be expanded very easily by storing more details about the drivers by extending the database.

Goals:

- Makes dangerous random stop-checks less necessary for police.
- Officers can focus more on driving as the system will automatically evaluate drivers accordingly.

Specifications:

- *Hardware required (tentative):*
 - Raspberry Pi 3 (€30) -> Base of the system.
 - Pi Camera (Approximately €25) -> Camera used.
- Other requirements:
 - Language (e.g. Python, Java, Processing) and library used to process the image data from the camera.
 - NoSQL Database for the police database to store information about license plates/associated driver's details for warrants/expired documents.
 - Type of application the officer can be notified with (e.g. Mobile app, website, notification in the camera etc.).

Literature Review:

In a typical police officers daily shift, they do many things. Respond to calls, enforce traffic laws, surveillance for people breaking other laws, etc. Among these tasks, most of their time, position dependent, is spent driving around in their police car. While driving it is common for them to manually search the license plate number of cars they see through a police database, retrieving information on the owner. This information depending on the state can include the registration, national crime information centre data, wanted status, driver information, bail conditions, felon indicators and prior in-house incidents with the owner. Traffic stops

conducted with this method are often referred to as “bingo” stops. This is already a tried and tested process but has room for optimization.

The proposed method of optimization is through the use of a camera placed on the front of a police car with software capability of reading multiple license plates and then checking the reports tied to the vehicle owner. Once the report is pulled by the software, the report is analysed automatically and if any flags appear such as a warrant or suspended license for example, the officer is given a notification through a sound prompt. Once the officer is notified, they will then manually check the license plate to assure no mistake was made by the software and if a match occurs, they can then intervene however deemed appropriate.

Using this system, the officer will no longer have to spend the time manually typing plate numbers into the computer and will have the ability to give full attention to driving or making sure other drivers are adhering to the laws. In combination with relieving the officer of distraction, this system would also optimize the capabilities of using the police database to check license plates. Rather than having to manually check each license plate one at a time, the software would be able to optimize this task, increasing the number of plates read in a given amount of time, as well as being able to read plates at times the officer wouldn't be able to. This system would also extend past the use as a device to pull drivers over. This system could also be used to collect and analyse data.

For our toy implementation of this system, our tentative plan is to use a Pi camera module connected to a Raspberry Pi. The Raspberry Pi was chosen as its hardware capabilities were capable for data and image processing, with a web search worth of previous computer vision-based projects already implemented. To simplify the process of connectivity with the Raspberry Pi, the Pi Camera Module V2 was also chosen to be used as the camera source. For the real system itself, other SoC (System on a Chip) and camera devices may be used, as the former hardware were chosen for its ease of accessibility.

References:

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- [2] E. D. Pauw, P. Ponsaers, K. van der Vijver, W. Bruggeman, and P. Deelman, *Technological-led policing*. Antwerp: Maklu, 2011
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- [4] L. Neumann and J. Matas, “Real-time scene text localization and recognition,” *2012 IEEE Conference on Computer Vision and Pattern Recognition*, 2012.
- [5] L. Gomez and D. Karatzas, “Multi-script Text Extraction from Natural Scenes,” *2013 12th International Conference on Document Analysis and Recognition*, 2013.