SMART VEHICLE TRACKER

Name	Index Number
T. K. Wijesinghe	140684K
S. Arunan	140045E
G. P. P. D. Bandara	140062D
R. B. Mahanama	140381E

1. Introduction

Even though Google live traffic has enabled users save time which would have otherwise been wasted unproductively on the road, users are still struggling to find decent parking spots in many major cities at peak time. It is mainly due to the fact that people being unaware of the capacity and the occupied levels in the nearby car parks. On the other hand, people sometimes miss major car parks assuming that it will be full which leads to under utilization of the resources. A productivity application for both the users and the officials for such facilities hence play a vital role in this context.

Furthermore, the ticketing systems in car parks and expressways are still being handled by the human operators which also leads to a significant time delay for the users. Many of the entrances of these public facilities are monitored with CCTV surveillance systems, yet they are not being used for improving the productivity of the systems nor actively participating in tracking crime related vehicles.

2. The product
   1. Overview
   The product consist of an extension device for a CCTV surveillance systems which will be monitoring the incoming and outgoing traffic through a certain point and detecting the license numbers of the incoming and outgoing vehicles. The data recoded at each point is transmitted to the central server, where they will be stored.

   2. Key benefits and features
      1. Users can check parking slot availability through real time data streams.
      2. The device is an extension device, hence the existing systems will require least modifications.
      3. No need for human operators, the device will detect and recognize vehicle license numbers.
      4. Ticketing process at entrances of car parks and toll booths of highways can be automated saving time.
      5. In addition, the system is capable of tracking crime related vehicles, their location and their presence through the system.

3. Technical overview
   1. Hard-deadline and soft-deadline
      1. Hard-deadline – The license plate of the vehicle has to be detected before the vehicle reaches the entrance or exit point. If the device misses a vehicle (which will be a rare instance) the exit gate will not open until the CCTV camera gets a clear view.
      Soft-deadline – Updating the information to the central server. Since we are updating the details to the central server only for car park management there would not be any casualties.

2. Dead-lock and Live-lock
   1. Dead-lock – Synchronized methods to update occupied levels in the car parks
   2. Live-lock – When multiple devices are trying to contact and update central server the requests will be put into sort of a buffer and each request will be processed.

3. Client server model
   1. communication between the cameras and the local server
   2. Communication between the local servers with the central server
   3. Mobile application and the central server

4. Complex computational module/ subsystem for scalable operations
   This project has many applications such as expressway management, car park management, crime reduction and etc.

4. Technical description :

The CCTV cameras will be feeding video footage to the device we are building. This device will process the video footage using the computer vision and it will detect the vehicles number plate. The device will have gone through hundreds of sample data sets before actual deployment so that we can test various angles and develop the vision to a higher accuracy.

When the detecting number plates in a expressway system, the device will send the detected plate number to the expressway controller's application. Expressway controller's system consists of the database of Motor Vehicular Registrations. Expressway Controller is beyond the scope of this project.

In the case of car park management the device will send the detected number plate to the central server and it will update it in the database in real time. It enables the mobile application user to check the availability of a car park slot in a particular car park or in a nearby car park.

In preventing crime operation the stolen car plate number will be stored in the central server. The device will be sending the detected car plate number to the system continuously. When a car plate number matches the one in a database it will send an alert to the necessary parties.

CCTV Camera

Embedded device ————— Expressway controller
(Beyond the scope of this project)

Alert System ————— Central Server

Mobile Application
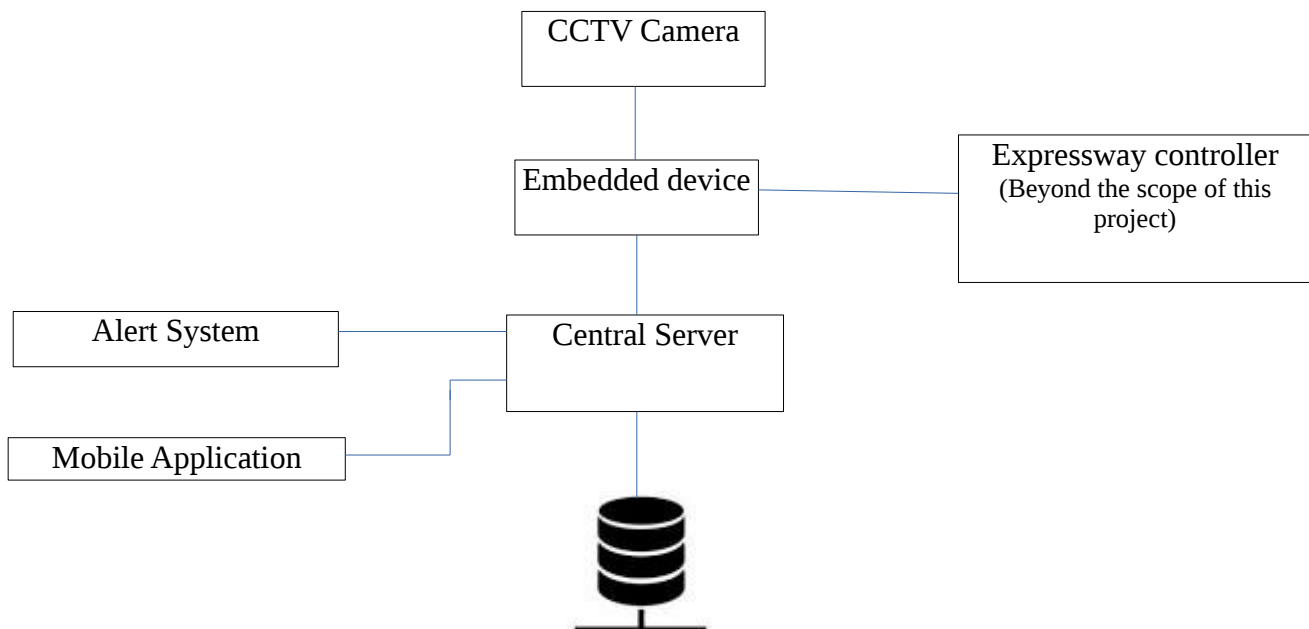
4. Work assignment
   1. Embedded device – Prasanna
   2. Mobile application – Arunan
   3. Local servers – Thejan
   4. Central server – Bhanuka