Hardware Solution

The proposed hardware solution is divided according to the module. The Reservation Free Parking module’s hardware solution consists of an Ultrasonic sensor to detect if there is a car, Arduino board to collect information from the sensors and NodeMCU board to allow the Arduino to send and receive data to the Firebase. The Reservation Free Parking module needs a sensor implemented on each parking spot and so in total a huge number of sensors are needed depending on the number of parking spots. The Ultrasonic sensor has a high accuracy and a low cost. Hence, it was chosen among the other sensors in Table 4-2. Also, the Arduino was chosen over the Raspberry Pi because it is suitable for interfacing sensors with it and has a low cost which makes it more scalable.

In addition, the hardware solution for the Reserved Parking module consists of an RFID reader to read the RFID tag on the car, Arduino board to collect information from the RFID reader, Servo motor to be the gates of the parking area and NodeMCU to allow the Arduino to send and receive data to the Firebase. The RFID was chosen because it provides an important functionality over the other sensors in Table 4-2. Unlike the other methods, RFID is able to identify exactly the users entering and leaving the parking area. Hence, the RFID sensor can be implemented at the gates of the parking area and the system only allows those who have registered and reserved a parking spot to enter. The Arduino was also chosen in this module because it is more suitable for the RFID and the Servo motor to be interfaced with. To power the system in our testing prototype, a 9V battery will be used. However, a power grid should be used in real life implementation