Application based Smart Parking System using CAN bus

CONCEPT:

We have witnessed a rapid growth in the Internet of Things and its contribution to the growth of smart cities in recent years.The increase in population and vehicular densities have led to the congested roads,inadequate parking facilities and poor infrastructure has called for a technology-driven solution known commonly as a Smart Parking System.This is a client-based parking slot reservation system that is implemented using micro/controllers interfaced with the sensors for parking vacancy detection.They are also connected to cloud services in order to produce complete IoT solution,with each microcontroller acting as a node in a network.Additionally,the CAN protocol is deployed for communication between nodes of this network in case of failure of the nodes in the wireless network.This is a solution developed that caters to users mainly residing in smart cities.

Sensor based approach using ultrasonic sensors are used to detect parking slot occupancy

For communication between microcontrollers and external devices that represent users,bluetooth has been utilised.

An Android application has been developed to connect users to the parking slots by aiding in the process of receiving parking slos remotely.The application uses the Google Maps API to display the map and the current user location.

System Level design

1. **Arduino Uno** - gather sensor data and communicate with external devices

2.Each Arduino interfaced with an **HC-05 Bluetooth**

3.Each of the nodes are interfaced with **HC-SR04 ultrasonic sensors -**to detect parking slots.

4.Each parking slot is equipped with **RGB LEDS-**to detect parking slot is empty

5.Resarvation or status of parking slot is communicated by **bluetooth module** by users **Android App**

CAN controller

High speed transceiver

PGS software

Hardware design:

HC-05

RGB LEDS Arduino Uno CAN Transceiver

HC-SR04

Software architecture:

Android app

Bluetooth module

Firebase SDK

FCM

APPENDIX:

CAN-bus:

It is mainly used for data communication between the measurement and control centres in the automotive interior.

The characteristics of CAN-bus:

1.It is the international standard industrial field bus.Its transmission performance is reliable,and it has a high real time performance.

2.Its transmission distance is long(10km farthest without relay).Its transmission rate is fast(1 Mbps highest)

3.Upto 110 nodes can be connected to a single bus,and nodes can be expanded easily.

3.Each node on the bus have an equal status,regardless of master-slave and the burst data can be transmitted in real time.

4.The wrong node will turn off automatically and cut off communication with CAN bus .

5.It uses a short frame packet and it uses hardware CRC checksum,so the data error ratio is extremely low.

