

The Smart Car Parking System Based on Iot Commanded by Android Application

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Abstract— Parking the car is one of the difficult task that we are facing in our day to day life. The main issue is providing the sufficient parking system. Now a days it is very hard to find the availability of parking slots. The various places(public) that is shopping mall, cinema hall etc finds it difficult to search the available parking area. This calls for the situations of an Smart car parking system which is based on IoT and commanded by Android application which are equipped with IR sensors and microcontroller (arduino-uno).In this paper a small prototype of smart car parking system which is based on IoT is implemented. The paper proposed a system that the user will automatically find the parking space through an android application via server. In addition to this we can say that the its a new way of communication between humans and the things with the help of new technology based on IoT.

Key words: Internet of Things (IOT), Sensors, Microcontroller, Web Application , Smart Car Parking

I. INTRODUCTION

In this paper we are going to implement the smart car parking system based on iot and commanded by android application in order to reduce the traffic congestion that occurs in and around various urban areas which is caused by vehicles during parking. The various public places like malls, cinema hall & 3-star hotels during the festival time it creates more and more complexity in parking area. Our proposed system is that we aim to make our system very less human dependent. IoT is a network of object's and the sensors that are connected to each other in order to share and to collect the information and the data between the devices. IoT networking makes parking facilities more easy to upload the data to the server with minimum cost. In our system, we are going to design and implement a prototype of Smart Car Parking System that allows drivers to find the vacant parking spaces through an mobile application via server periodically.

The infrared sensor is a combination of transmitter and receiver.Message Queue Telemetry Transport is the new version of protocol used in our system.MQTT is a publisher/subscriber protocol and the broker(mqtt) plays a important role in publish/subscribe .In MQTT every client is publisher as well as subscriber and the clients doesn't have any information about one another.

II. LITERATURE SURVEY

A. Hilal Al-Kharusi Ibrahim Al-Bahadly (Oct 2013)"A Survey On "Smart Parking"System"

- In this paper we have studied a system that works on RFID tags that help individual cars at the entrance .The author of this paper presents an idea to use wide angle camera as a sensor.

B. Shihong Qin, Xiangling Yao (Feb 2012) "Intelligent Parking System Based On GSM Module"

- This paper proposes the intelligent car parking system based on the GSM module. This system has successfully been applied to GSM network in the parking management technology

C. J.S.John, Prof.V.S.Rao(April 2011)"A Web Based Centralized Vehicle Parking System Using GSM Security."

- In this paper we study the parking lot monitoring tools, parking lot reservation module, and security module.
- This system holds good for smart parking system, as it provides higher level of security for the vehicles parked in the respective parking spots. This system also reduces the traffic and congestion in finding the available parking spots.

III. PROBLEM STATEMENT

In order to propose and implement an smart-parking system based on Internet of things and commanded by Android application using IR Sensors that helps automatically find free parking space based on the parameters of performance that makes the system cost and time efficient. The parking slots which are available should be sensed and can be updated on Server and so that every user connected with the Server can identify free parking slots in a specific location.

IV. SYSTEM ARCHITECTURE

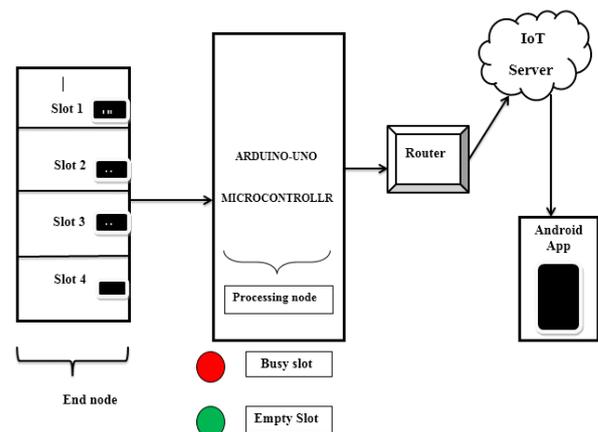


Fig. 1: System Architecture

The basic architecture is shown in the Figure 1. In our architecture infrared sensors are used which is used to detect the object. Ardiuno-uno is a microcontroller which is known as the processing node, Ethernet shield is connected to the arduino so as to connect with the server through cat5 cabel etc.

The client is connected with the server through mobile application. The mobile application links with the devices and the sensors. These sensors are connected through the Ethernet shield which is connected to the server in order to send the data.

When the system starts working the InfraRed sensor's sense the presence of vehicles continuously. If any vehicle is detected at that time the IR sensors senses the output is shown which is red and when there is no vehicle at that time its output is shown as green. The data of IR sensors is given to the arduino-uno(microcontroller) then this data is published by microcontroller to the server where the mqtt broker is available. In order to view this data the mobile phone consist of android application. This application is subscribed to the server and the data is observed on the mobile application.

V. SYSTEM REQUIREMENT AND SPECIFICATION

For designing such systems some requirements such as hardware and software are required for some safety precautions which is mentioned below:

A. Hardware Requirement

1) Infrared Sensors

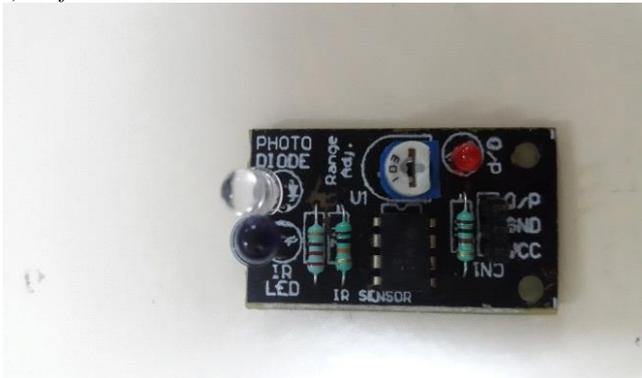


Fig. 2: Infrared Sensor

The IR sensors are used to detect the obstacle's. The IR sensors are very cheap and easily available in market. It uses a voltage of about 0.5 volts-0.25 volts. Reduces program complexity. If any vehicle is detected at that time the IR sensors senses the output which is red and when there is no vehicle at that time its output is shown as green.

2) Arduino UNO



Fig. 3: ArduinoUNO

The Arduino uno is the microcontroller which is considered as the heart of the system. The main job of this node is to process the data which is received from IR sensors and transport it to the further link for action which can be monitored on mobile application. It also sends the information received from application to the IR sensors. Arduino uno is In-Expensive (Less than Rs. 1000/-) and has simple and easy to learn programming.

3) Ethernet Shield



Fig. 4: Ethernet Shield

In order to connect to the internet through arduino board, Ethernet shield is required. It is based on the W5100 ethernet chip. The pin layout intact allows another shield to be stacked on top.

5.1.4 Router:

The router is used to forwards data packets along networks from the IR sensors to the mobile phone (android application). The data and the information from the sensors is send to the server through router. The connectify is a software which is installed in the laptop in order to connect with the Ethernet shield through Cat5 cabel

4) Android Application

Android is an mobile operating system developed by google based on Linux kernel and primarily designed for touch screen. Android operating system is a stack of components which is roghly divided into 5 sections that is Linux kernel libraries, Android Runtime, application framework and component

VI. SYSTEM IMPLEMENTATION

A. Hardware Implementation

1) Step 1

In this step the arduino-uno(microcontroller) is connected with the ethernet shield. The ethernet shield is used to connect the arduino-uno to the mobile and web application.

2) Step 2

The hardware architecture is shown in the figure which consist of the IR sensors that are used to sense the data through ethernet shield which is connected to the server. When the system starts working the sensors continuously sense the presence of vehicles. Whenever any vehicle is detected, the IR sensors senses the output which is shown red and when there is no vehicle at that time its output is shown green.

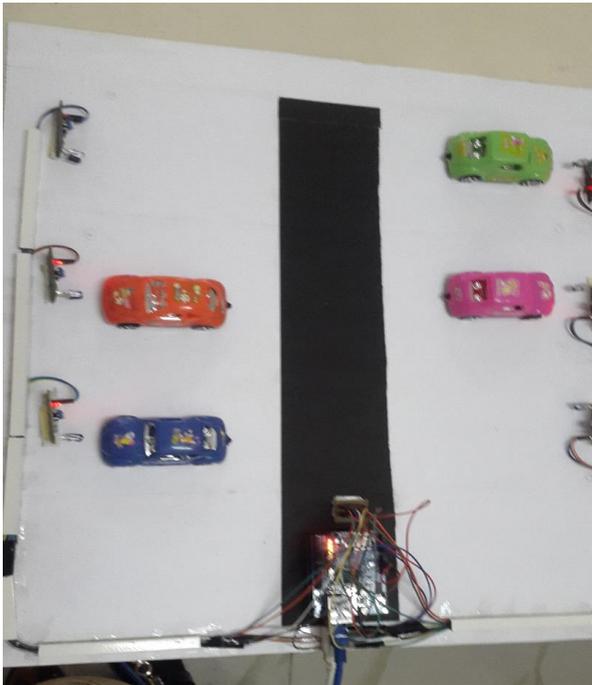


Fig. 5: Hardware Module

B. Software Implementation

1) Android Application

Step 1: Create an android application using ionic tool

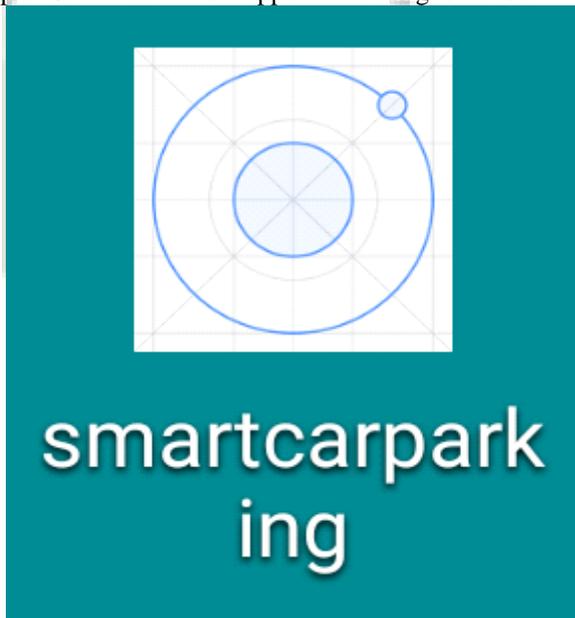


Fig. 6:

Step 2: Click on smart car parking application. The Dashboard window open before the client.

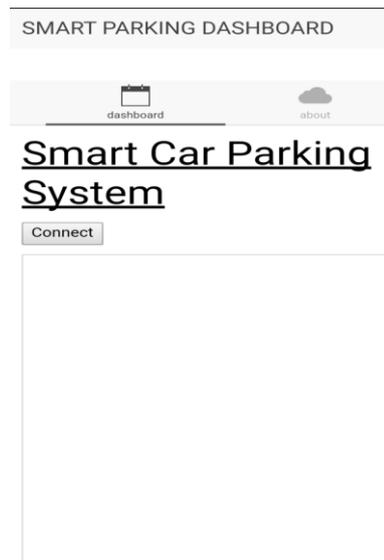


Fig. 7:

Smart Car Parking System

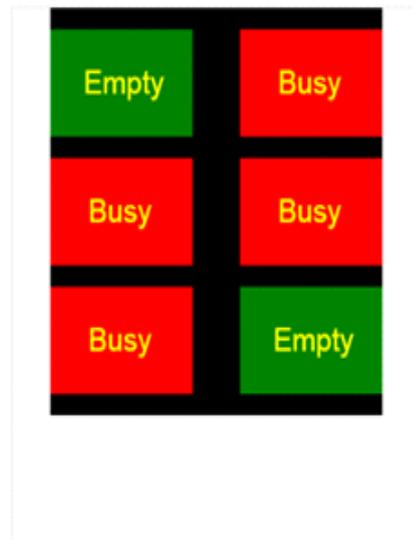


Fig. 8:

The output of the smart car parking system commanded by web application is shown in the figure which shows whether the parking slot is empty or busy.

VII. CONCLUSION

Thus we have proposed a parking system that improves performance in order to find a parking slot and reduces the cost of moving to the parking space. The system makes use of Android application. in order to facilitate the parking for the user. We hereby aim to reduce the human efforts which is required for the parking of vehicle at public places. Thus, the proposed system provide an efficient car parking system based on internet of things method. A favourable IoT solution must make the parking facility easy to upload the field data to the Internet. Using an Internet of Things (IoT) gateway to connect with the microcontroller, however, sensors and other edge devices, field data can be retrieved, stored and analyzed to the Internet.

VIII. FUTURE SCOPE

In future, the context and regards to the implementation of the IoT we will makes two way communication like any user from the application itself in order to book parking slot depending on the availability of slot and all data that will be stored in MongoDB database for further analysis of particular parking area that is converted valuable data into the good business. We will also implement Hybrid or Generic App for Andriod, Windows and IOS platform.

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