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Parking Slot Availability Check and Booking System over IOT

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ABSTRACT

In our day today life, the main problem is parking of vehicles mainly the car parking at a particular destination. Also this problem leads to traffic congestion. This paper proposes the basic concept of using Wi-Fi based smart car parking services in modern cities as an important application of the Internet of Things (IOT).This system will be launched through Smartphone provided and it can be used to monitor or find the empty slots in that area. This system helps to improve the maximum utilization of parking area and reduces the user's waiting time.

Keywords: Internet of things (IOT) and Message queuing transport telemetry protocol (MQTT).

1. INTRODUCTION

Recent research in metropolitan cities along with increase in population there is large scale of vehicles on roads. Hence this leads to annoying issue for the drivers to park their vehicles as it is very difficult to find a parking slot quickly. The drivers usually waste time and effort for parking their vehicles and finally finding a space on streets through luck. In worst case, people fail to find any parking space especially during peak hours and festive seasons. The paper also introduces the usage of android application using Smartphone for the interaction between the smart parking system and the user. Moving towards smart city application, smart parking is a good example for a common citizen of how the Internet-of-Things (IoT) will be effectively and efficiently used in our daily living environments to provide different services to different users. Any citizen may use his Smartphone and a computer having Internet to access the smart city application from anywhere in the world to find a free parking spot in the city and get to know the which parking spot is still available.

It provide efficient car parking management through remote parking spot localization and fast car retrieval. Currently, Car parking system is based on reservation basis, but this system has a drawback in terms of time and space. This project management system can be grouped into multi-parking management which can be used to manage both outdoor and indoor parking area and single-parking management which usually targets indoor parking slots. The main objective of this project work lies on mono-parking management architectural system which works on real-time basis.

1.1 Some Important Concepts of IOT

1.1.1 End-Node

Starting from the front end, end-node is the first node of any IoT system, without this node the 'T' part of IoT i.e. Things is not achieved**,** these end nodes are sometimes also called as objects and they mostly work as sensing nodes. These nodes usually have dual nature. Examples of end-users are all types of sensors but normally these sensors are basic and it can be converted into active device by a designer. In our proposed system we have used IR sensors, Temp sensor, and LDR sensor as end node.

1.1.2 Basic IOT Architecture

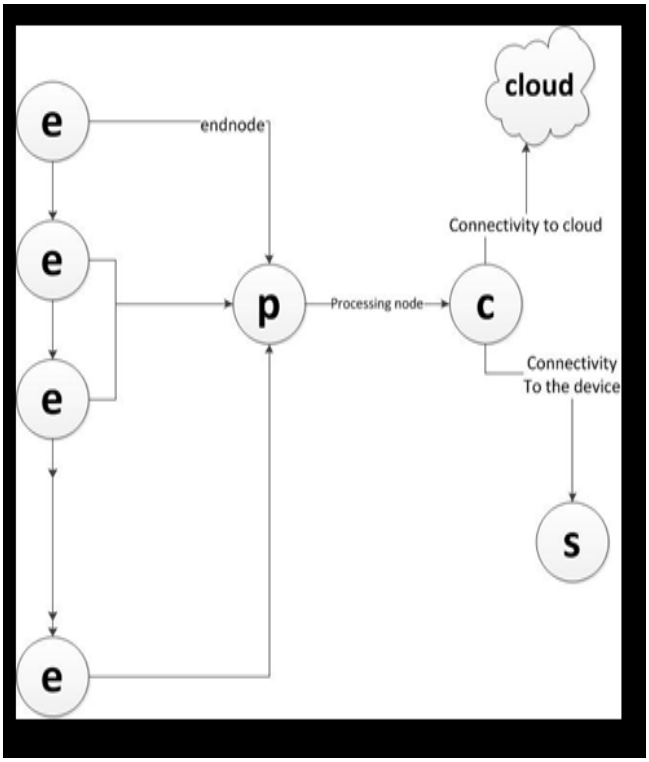

Fig.1. Basic block diagram of IoT

1.1.3 Processing Node

It's the central important block because it provides an artificial intelligence to the whole circuitry. It processes the data and information received from end-nodes and transfers it to further link for next action which may be software application or cloud based service and data received from application to the previous nodes i.e. End-nodes. Usually this

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node involves one or more microcontrollers, microprocessors, etc. and may be relatively bigger in size as compared to end-nodes. In our system we have used Pic microcontroller as the processing node.

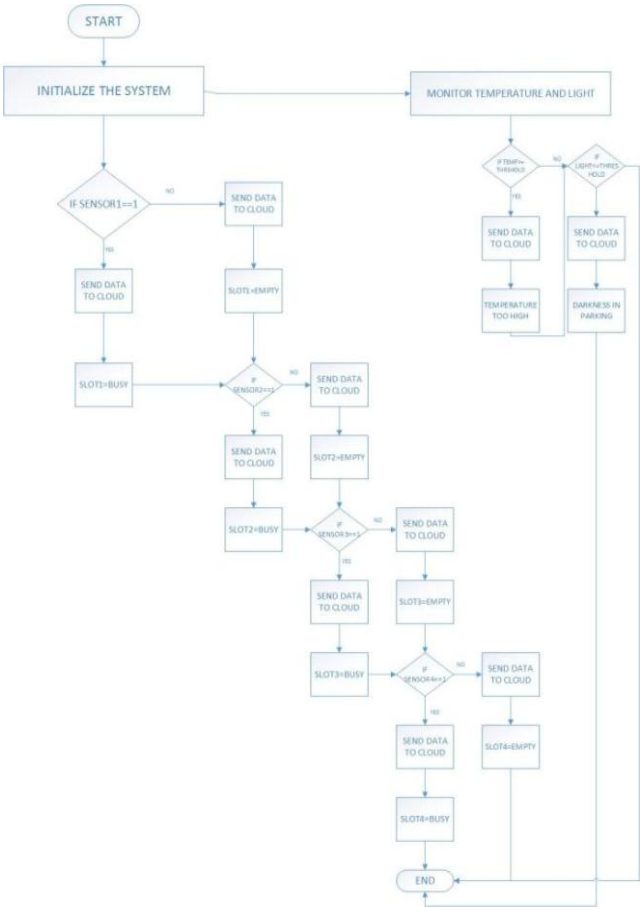

Fig.2. Flow chart

1.1.4 Connectivity

Connectivity is must in any system to establish a connection, which may be wired or wireless. The main task of this node/link is to transfer the data gathered after processing of data sent by the end node to the application software or to cloud. Connectivity allows data transfer in duplex form. In this desired system we have used Ethernet shield to send data over the cloud. Here in this part we deal with many layers of the network to establish a connection between hardware and software. Protocols used in each layer have a specific task. Physical layer deals with the electrical and mechanical support to the system. Every system has a MAC address which is unique. This system needs to dynamically assign IP address to each node and users so a connection which is DHCP enabled is used. For a secure and fast connection MQTT protocol is used along with TCP (wired connection).

As HTTP is often too effusive and works on point to point communication method but what actually needed is quality of service delivery, bandwidth efficient, data agnostic and continuous session awareness, which is totally satisfied by MQTT. This protocol works on pub/sub (publish and subscribe) basis, which allows one to many communication and in this the clients are unknown to each other and every client can be a publisher or a subscriber. It guarantees delivery of service and buffering as well as retaining of messages. This protocol needs a broker to deal between the clients or between the publisher and subscriber.

2. PROPOSED SYSTEM

The proposed system is the combination of both hardware and software to form the module. Smartphone's are used to exchange the information or data between mobile and sensor circuitry. The algorithm is to defined the parking slot allotment in an initially selection & checking for car parking is made from Smartphone or computer using Wi-Fi. Checks for availability for parking slots S1, S2, S3, S4.If parking slot is free, the particular slot on web page will be Green. If all parking is full, all the slots on web page will be RED and a pop up will be generated 'Parking full'. For sensing the temperature of parking area, if it is greater than threshold, then pop will be "Temperature to high". For Light of parking area, if it is less than threshold, then pop up message will be "Turn on Light".

3. RELATED WORK

3.1 Smart Routing: A Novel application of collaborative path finding to smart parking systems

To avoid increasing parking issue, the smart parking system helps to find the available parking spaces to the guidance. In many metropolitan cities, the up-to-date information are provided by parking guidance and information system .Driver can know the information through internet. The location of available car park spaces provided by the system based on the driver's current location or his destination. After the parking space is reserved, the driver's route to the destination is traced by the global positioning system. These results in traffic congestion, because of multiple users are directed towards the same parking area at the same time.

3.2 A New Smart Car Parking System Based On Optimal Resource Allocation and Reservations

In this system, a new smart car parking system is implemented. Based on the user's distance from the parking area the system assigns and reserves a parking space for users. This paper solves a Mixed Integer Linear Program (MILP) Problem at each point. MILP supports random events such as new user request and parking space availability. It gives a solution in an optimal allocation based on user current state information. When the allocation is updated in next decision point which ensure that there is no parking slot reservation and no user is allocate a parking slot with higher cost .This paper ensures that a better response from the system along with reservations. The main advantages are guaranteed reservations and can receive a quick response from the system. The disadvantage is efficient for urban environment only.

3.3 The Research and Implementation of the Intelligent Parking Reservation Management System Based On Zigbee Technology

Development of economy and city modernization level, traffic congestion and parking has become the major issue. In order to overcome this issue a smart parking system using zigbee system has been proposed in this paper. It sends requested information from user to PC and updates the database. The parking information is provided to the

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application layer by using the internet to make it convenient for the people. The system consists of mobile client and server side parking slot. Through the web-service interface, the client requests the server for parking information. Then the server searches in the available database for the requested information and send to the client by the web-service interface. The real time update status is available to the client. The advantages are simple and based on android. The drawbacks in this paper are more expensive.

4. EVALUATION

The hardware unit of the system is represented by the block diagram. It contains PIC microcontroller as the main processing unit.IR sensor gives the input to the microcontroller which guide the user to know the empty parking space. LDR is used to send pop-up when the darkness increases. Temperature sensor is used to monitor the parking area's temperature. The data obtained from the sensor is fed to the PIC. If any one of the sensors sense the vehicle then the corresponding output is send through OSI model which we can access the data on our mobile through app or html page and view the empty parking slot in the locality.

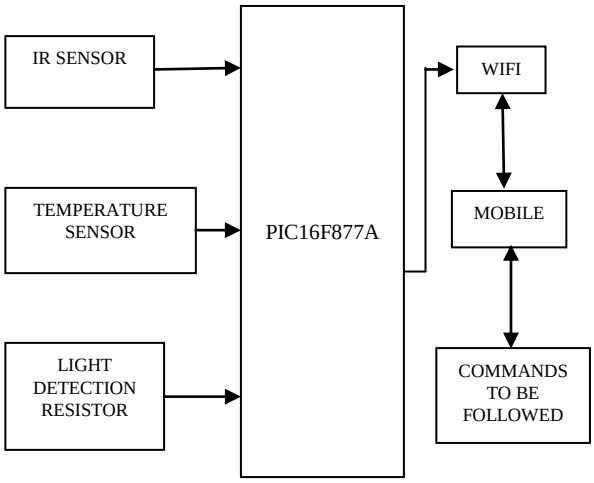

Fig.3. Block Diagram

5. RESULT AND DISCUSSIONS

Parking slot allotment implementation using IOT concept for smart car parking areas follows:

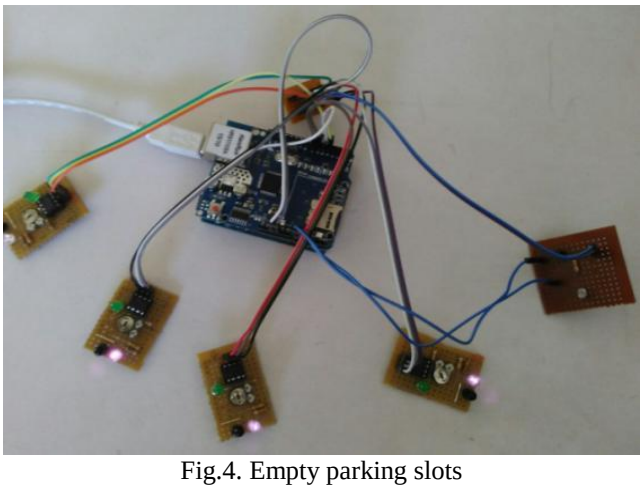

Fig.4. Empty parking slots

This figure shows empty parking slot as the green LED is not glowing.

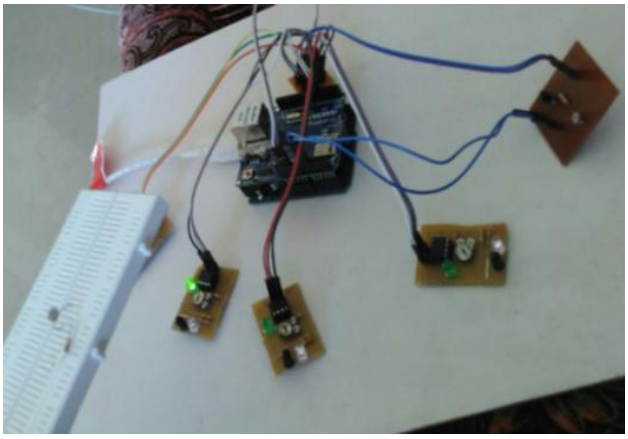

Fig.5. Slot 2 is full

This figure shows that the slot 2 is full, because green LED is glowing.

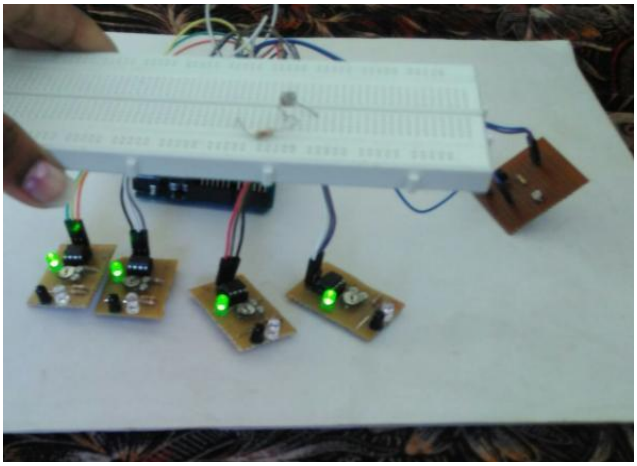

Fig.6. All the slots are full

This figure shows all the LEDs are glowing which means the parking slot is full.

Fig.7. Web page displaying the project

This figure represents the web page from where we can avail two facilities.

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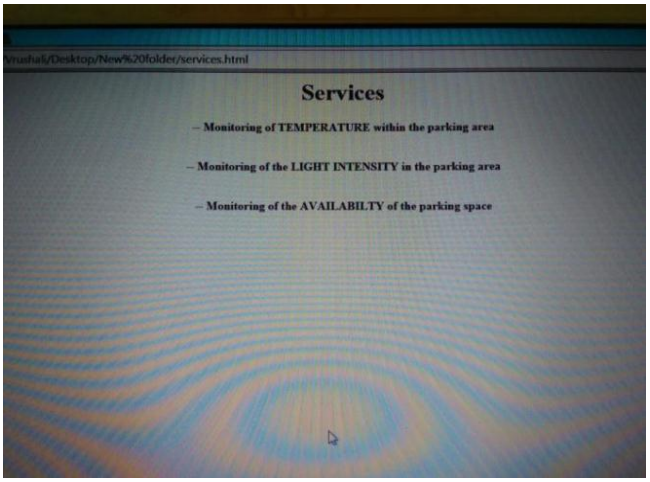

Fig.8. Services tab

This figure shows the facilities availed by this parking system.

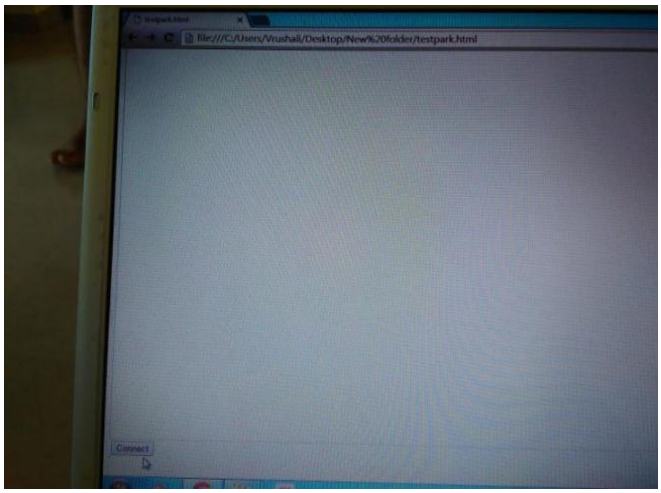

Fig.9. Start tab

This figure indicates the actual window from where we can monitor the parking area

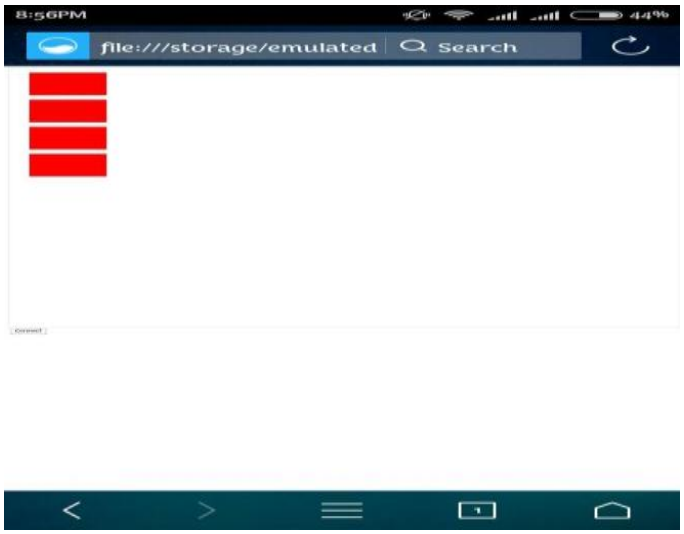

Fig.10. HTML page

This figure shows all red boxes which indicate the parking are full**.**

Fig.11. Pop up message

This figure shows the pop-up message generated when the user tries to access the parking area which is full.

6. CONCLUSION

In this paper, the implementation of cloud based smart parking system using Internet of Things (IOT) is discussed. The average waiting of users for parking their vehicles is effectively reduced in this system. This study has proposed a parking system that performance for minimizes the costs of moving to the parking space and reducing the number of users that fail to a parking space. The average waiting time of each car service becomes minimal, and the total time of each vehicle in each car park is reduced. This smart parking system provides better performance and reduced traffic congestion. Security measure to ensure that the user's do not misuse the parking system can be implemented.

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