SMART PARKING SYSTEM USING IOT

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Abstract *---- Parking is normally an easy task but thought as a time-consuming process due to mismanagement of parking. Current parking systems involves huge man power for management and requires user to search parking space floor by floor. Such conventional systems utilize more man power, along with users valuable time. This paper presents a smart parking and energy management solutions for a structured environments such as multi stored office parking area. The system proposes implementation of state-of-the-art internet of things(IoT) technology to mold with advanced Honeywell sensors and controllers to obtain a systematic parking system for users. Unoccupied parking slots are indicated using LEDS ,thus eliminates needs of searching for a slot. The occupied slots are virtually stored to the cloud to be accessed by central systems and direct the upcoming cars . Entire system is being fully automatic to reduce manpower and improves the parking illuminance This paper aims is improving time, value, and convenience in a parking area.*

Keywords ---- Parking, sensors, IoT, time saving , LEDs**.**

I INTRODUCTION

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time applications. It is usually embedded as part of a complete device including hardware and mechanical devices. In, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use in daily life.

Embedded system is usually used for a dedicated to specific tasks, engineers can optimize it, by reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced.

In general, embedded systems range from portable devices such as digital watches, to large stationary items like traffic lights, factory controllers, or the systems controlling power plants. Complexity varies from low, with a single
microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems. For example, Hand held computers share some information like elements with embedded systems, such as the operating systems and microprocessors which power them , but they are not truly embedded systems, because they allow different applications to be load and different peripherals to be connected.

An embedded system is some combination of computer hardware and software, and mixed with mechanical parts either fixed in capability or programmable, that is specifically designed for a particular application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, and toys are possible hosts of an embedded system. Embedded systems that are programmable to provide with a programming interface, and embedded systems programming is a specialized occupation. Certain operating systems or language platforms are decreased for the embedded market, such as Embedded Java and Windows XP Embedded and embedded c. Sometimes low-end consumer products uses very low-cost microprocessors and has a limited storage, with application and operating system both part of a single program. The program is written permanently into the system's memory in this case, rather than being loaded into RAM (random access memory), as programs on a personal computer are.

II. LITERATURE REVIEW

Variety of occasions are presented when we visit various public places like shopping malls, 5-star, multiplexes, etc. The difficulty we can see at these places is finding the availability of parking space. Sometimes times we need to traverse through multiple parking slots to find a free space for parking. The problem becomes more tedious if the parking are multi-storeyed. Thus, the problem is time-consuming. This situation calls for the need for an automated parking system that not only regulates parking in a given area but also keeps the manual intervention to a minimum.

Our proposed system presents an Autonomous car parking that regulates the number of cars that can be parked in a given space at any given time based on the parking space availability. When a car arrives at the entrance, it will be stopped at the main gate and the driver de-boards the car. Using the Android application on his Android device, the user commands the Parking Control Unit to check the Status of available Parking slots, through an SMS. On receiving this command, a search for free slot is carried out and corresponding information is provided to the user, by means of SMS. If the availability of Parking space is confirmed, the user commands the car to get parked to the designated slot. The car traces its path to the entrance of the parking area. Here, it waits and the details required for parking of car at the proper slot are communicated to the Car Control Unit.

On receiving the information, the car will further trace its path to free parking spot. On successful parking, the data on the LCD will be updated automatically. For retrieval purpose, the user commands “Unpark”, through the Android Application. On reception of this SMS, the car begins to trace back the path to the entrance, where the car driver is waiting. Thus, this system proves to be useful for the purpose of the car parking automation and thereby helps reduce the car driver’s time, as the searching of the free parking space is handled by the Parking control unit. By D. J. Bonde, R. S. Shende, K. S. Gaikwad, A. S. Kedari, and A. U. Bhokre, `Automated car parking system commanded by Android application," inProc. Int. Conf. Compute. Commun. Inform (ICCCI), 2014.

III. PROPOSED METHOD

This project explains about a simple and effective method to easily identify the parking slots for that we are proposing technology using Arduino and php server to detect empty parking slots . whether it is fill or empty we are using ultrasonic sensors. If the slot is empty green led will glow or if the slot is full then green led will glow at the same time the database about parking place will update in IoT platform using server.

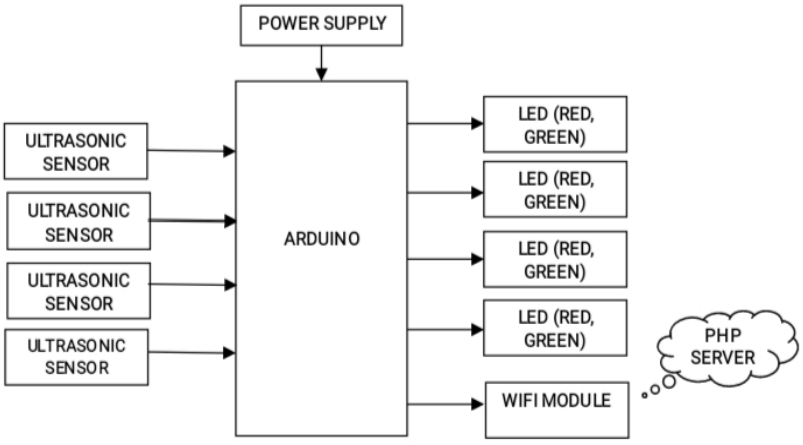

Fig. 1 – block diagram of proposed method

IV. NEED FOR IOT TECHNOLOGY

IoT is witnessed to large evolution. It can primarily exploits standard protocols and networking technologies. However, the major enable g technologies and protocols of IoT. These technologies

support the specific networking functionality needed in an IoT systems in contrast to a standard uniform network of common systems.

A. Low energy wireless :

This mostly used for reducing the power consumption through sensors and other elements can power down the long periods , communication links must remain in listening mode.

B. Radio protocols :

Zigbee , Z-wave are radio protocols for creating low-rate private area networks. It offers high throughput unlike many similar options. It increases the small local device power.

C. WIFI Direct :

It eliminated the need for an access point . it allows P2P(peer to peer) connections with the speed of WIFI, but with lower latency. WIFI direct eliminates an element of a network that often bogs it down, and it does not compromise on speed or throughput.

V. WORKING OF PROPOSED METHOD

The complete process of booking a parking slot with time and date and leaving a slot can be explained by a flow chart.

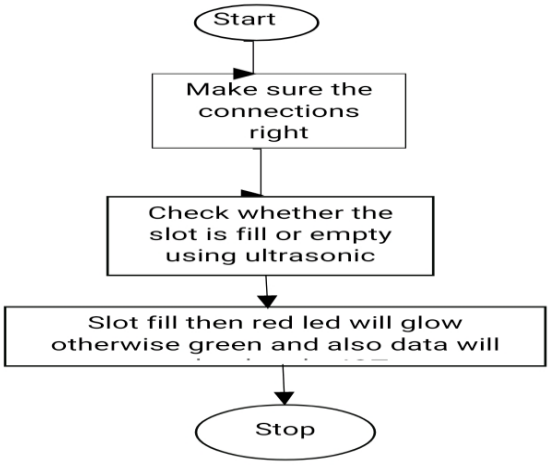

Fig.2 – flow chart

When the car enters into the parking area, in the entrance it shows that if the parking area is empty it displays slot is empty and also a green led will glow likewise if the slot is full it displays slot is filled and red led will glow.

The same database is updated into the IoT the user can check an availability, need a slot can book parking slot trough web server with time and date of a parking. It can updated by Php server (Wi-Fi module).

VI. ARCHITECTURE OF PROPOSED METHOD

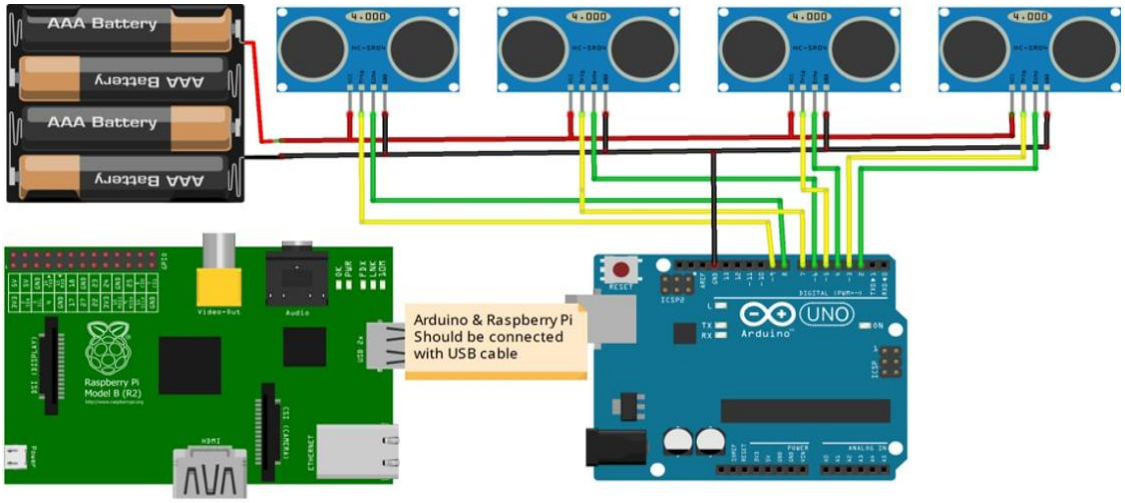

Fig-3.circuit diagram

VII. SOFTWARE MODEL

The software module is divided into 4 types i.e.,

A . Sensing layer :

In the sensing layer, the devices can generate or detect the energy information of the connected energy network. The energy edge server is responsible for managing connection among devices, that is, setting up reliable communication links for devices. Questioning the date is primary feature of proposed model by intelligent edge computing services. Considering the heterogeneity of the energy data in smart cities, the edge server will queue and classify the collected energy data for hierarchical processing.

B.Network Layer :

In the proposed IoT-based energy management system, data transmission is a crucial function for data transferring between energy devices and the energy edge server, and task offloading between the edge server and the cloud server. Different kinds of communication technologies, such as power line communications (PLC), 5G, LTE, and Wi-Fi, can be used for data transmission. The data storage capacity in the energy cloud server, energy edge, and energy devices can be integrated as one source of network storage. The virtual data pool can help energy managers in developing control policies by historical data analysis. The registry is used to record the dynamic entering/leaving of devices in the proposed IoT-based energy network. Since the devices may enter/leave the network frequently, the registry plays a significant role in supporting related network configuration.

C. Cognition Layer :

In the proposed system structure, the cognition layer is a core layer that creates intelligent awareness of the energy environment. This layer contains 3(three) main functional modules i.e., DRL processing, Optimization, and Configuration. DRL processing modules are observed at the cloud server and edge server. The module records the demands and current states of associated users. Then, according to the results of the last executed action, the reward can be calculated by the DRL module. The DRL module can make decisions under the guidance of a powerful DNN that provides accurate estimation and prediction. Since the frequently usage of edge servers might cause unacceptable energy consumption. The optimization also can be explore by an optimal schedule of using edge servers for cost minimization. The configurations can be realized in the energy cloud server into the operations of edge servers or systems. Meanwhile, the configuration also can be operated in the edge server for nearby devices. Note that the configuration can be processed at the cloud server in a centralized manner or at each device/ edge server in a decentralized manner.

D. Application Layer :

The application layer provides a set of functions and tools to post-process data coming from the underlying layers and figure out the network settings of the proposed IoT-based infrastructure. In general, energy management is of the core function to help the entities like control and schedule the energy from every angle of the system without knowing the layer conditions. Topology control is used to make the decision for devices leaving/entering the network. Web based application (e.g., online dashboard for visual management) and mobility application (e.g., mobile applications on smartphones for facility managers) benefiting the interoperability among different devices and technologies is enabled in the proposed IoT-based energy management system.

VIII. HARDWARE PARTS DESCRIPTION

Here we are mainly used hardware components are Arduino uno, NodeMCU, and ultrasonic sensors.

A . Arduino Uno :

Arduino uno is a microcontroller board and it is based on the ATmega328. It has 14 digital input / output pins in which 6 pins can be used as PWM outputs. Has a 16 analog inputs, a 16MHz ceramic resonator, and an inbuilt USB connection, power jack, an ICSP header, and a reset button. It contains a everything needs to support microcontroller, simply connect it to a computer with a USB cable or power it with an AC to DC adapter or battery to get started.

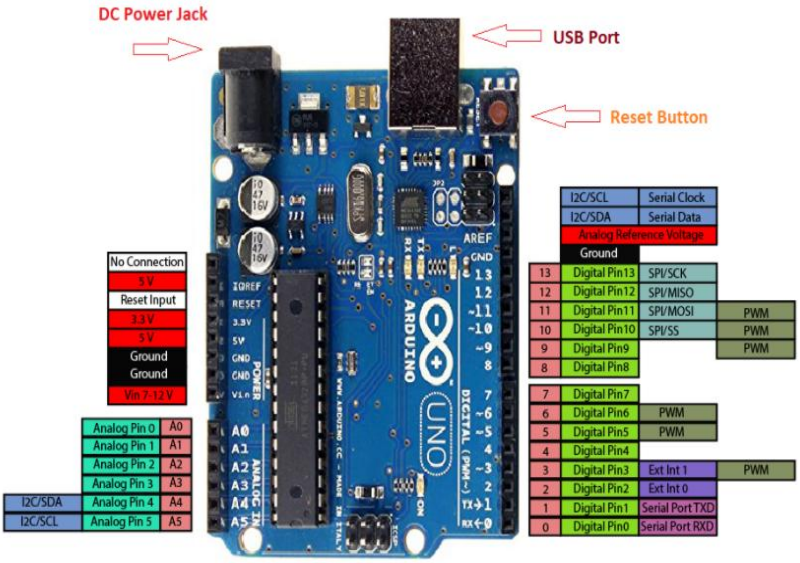

Fig-4 : Arduino Uno

B . Ultrasonic sensor :

An ultrasonic is an electronic device that measures the distance of an object by emitting ultrasonic sound waves and converts reflected sound into an electrical signal. Ultrasonic waves travel faster than speed of the audible sound.

Speed of the sound :

V= 340 m/s , V= 0.034 cm/us

Time = distance / speed.

Fig -5: Ultrasonic sensor

C . NodeMCU ESP8266 :

There are lots of devices that are used with the embedded systems and the internet of things with various features, NodeMCU is a low-cost open source IoT platform of the microcontrollers with built in a WIFI 802.11. It has an inbuilt micro-USB cable; it can use to publish or respond in the database.

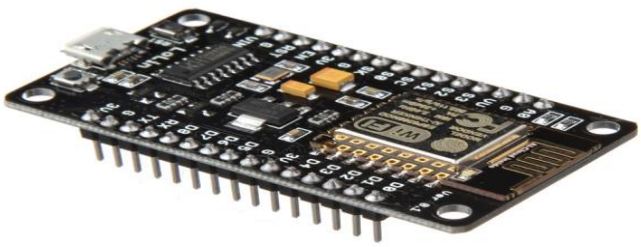

Fig -6 : NodeMCU ESO8266

IX SIMULATIONS AND SLOT BOOKING

Here we are creating a web application and the process of how to book a slot of parking area.

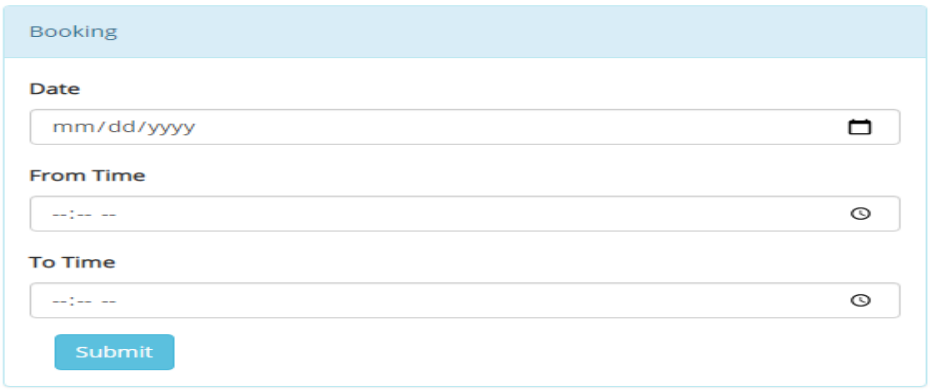

Fig.7 : Registration details

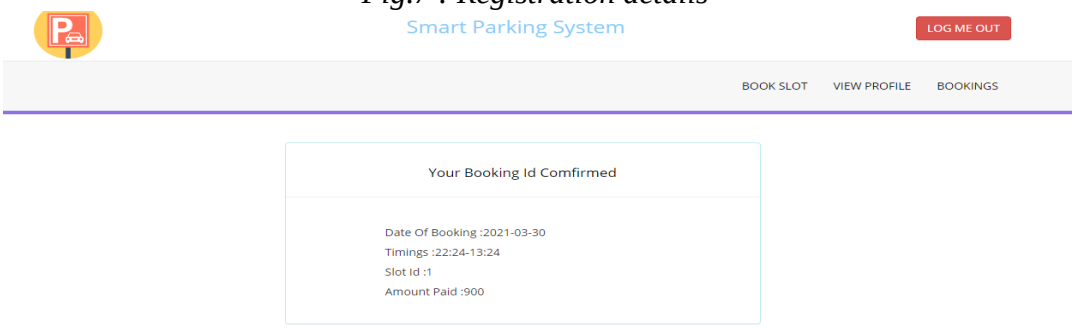

Fig.7.4.Confirmation details

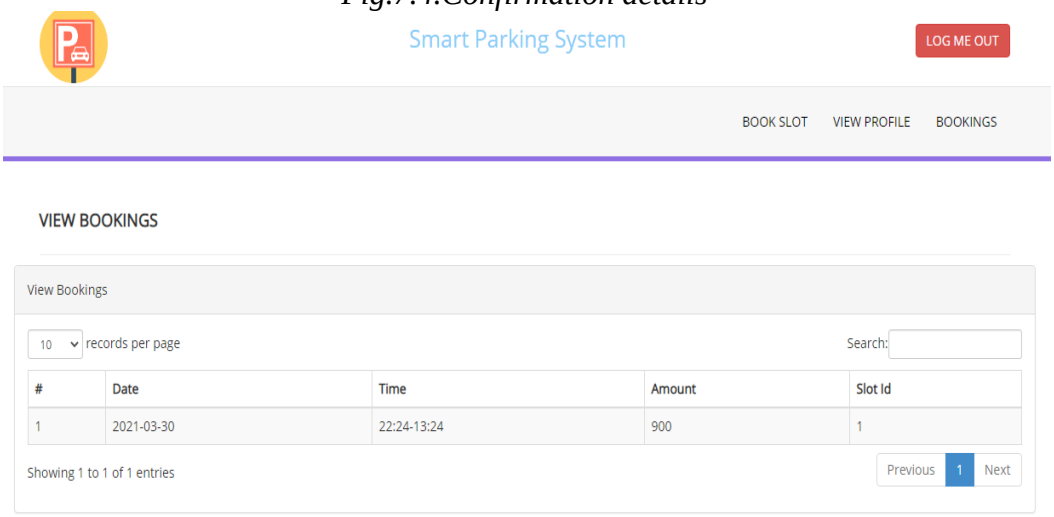

Fig.8.Slot booking details

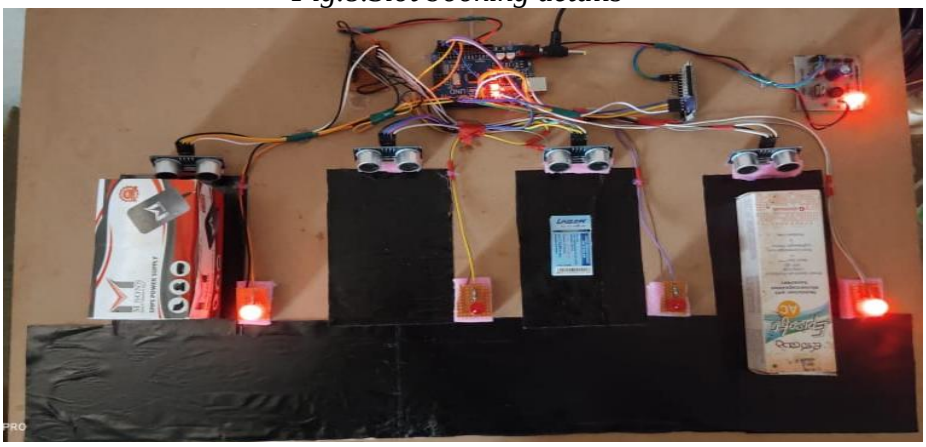

Fig:9. Parking areas after vehicle parking

X. CONCLUSION

The concept of smart cities has always been a dream for humanity. Since the past couple of years large advancement have ben made in making smart cities a reality. The growth of internet of things have give a rise to new possibilities in terms of smart cities. In this paper we address the issue of parking and present an IoT based smart parking system. The system that provides real time information regarding availability of parking spot in parking area. User from their location can book a parking slot though web application provided by us. So, it enhances the quality of life of people.

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