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IOT Based Smart Parking System

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ABSTRACT: This paper introduces a novel algorithm that uses Internet-of-Things technology which increases the efficiency of the current cloud-based smart-parking system and develops network architecture. This paper proposed a system that helps users automatically find a free parking space by using the webpage that defines the availability of parking slots to the user. Hence the time requirement and fuel consumption is reduced. The simulation results help to reduce fuel consumption improve the probability of successful parking and minimizes the user waiting time. We can also successfully implement the proposed system in the real world.

KEYWORDS : Atmega328 Microcontroller, Internet of things (IOT), GPS module, GSM, Smart phone.

I. INTRODUCTION

In recent times the concept of smart city has achieved grate popularity. The productivity and reliability of urban areas is maximized due to huge efforts been made in the field of IOT. IOT noticed problems such as, traffic congestion, limited car parking areas and road safety. In this paper, we present an IOT based cloud integrated smart rotary parking system that reduces requirement of parking space. The proposed Smart Parking system consists of RFID for security purpose. RFID monitors and signalize the state of availability of each single parking space. A webpage allows an end user to check the availability of parking space in the given location. Such a system increases driver comfort and reduce efforts in parking space operation by allowing drivers to easily decide on where to park. The significant research that is made recently focuses on smart cities and how to use resources efficiently. Parking space is scarce in most Metropolitan areas and intelligent systems are required to coordinate and supervise parking. This paper presents a wireless system for locating parking spots remotely via a smartphone or computer or laptops. At long ranges the system is highly efficient and has high accuracy.

IOT is a global network of things i.e. physical and virtual devices having independent identity each one, which can be connected via a vast network to share information and process it into meaningful data. IOT refers to devices like Mobile phones, Bluetooth connected headsets, thermostats, and utility meters temperature readers, sensors, actuators which can sense some parameters.

The parking system goes through many problems in the parking environment. The smart parking system has been developed to solve those problems. An RFID device provides the service to find the vehicle parking location. Here, the drivers have to receive an RFID tagon the entrance of parking lot. The RFID tag is given at the entrance, the vehicle location is provided to the driver through RFID tag parking space. Along with security using RFID, the availability of the parking slot will be updated on the webpage. This webpage can be accessed on the server or mobile phones.

Hence, the problem faced for searching the parking slotis reduced and parking is used conveniently.

A webpage is accessible through the internet or other network using an internet browser, it is a document commonly written hypertext mark-up language (HTML). A webpage can be used by entering a URL address and may contain text, graphics and hyperlinks to other webpages and files.

Parking system implemented nowadays is automated multilevel car parking system which requires building large floors to park. Consumption of large area is the disadvantage of multilevel parking which is successfully eliminated by rotary car parking system. Maximum space utilization is a main advantage of rotary parking system. The rotary car parking system is totally automated with the user being given a RFID tag corresponding to the trolley being allocated to the user. System is easy to install and maintain as compared to existing system. Current parking issues have got a solution of rotary parking system.

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II. PROBLEM STATEMENT

With increase in the population no. of vehicles increased and due to unmanaged parking is leading to many problems. In centre cities, people faces difficulties as increasing no. of vehicles creates congestion, wastage of space, wastage of time, traffic problem, car napping, car vandalism and many other difficulties.

III. OBJECTIVE OF PROJECT

Our aim is to create a system that:

- Increase the security with simplifying parkingsystem.
- Smart system that parks no. of vehicles with theleast space possible.
- To design the garage energy efficient by usingefficient management.
- Providing simple web application for parking vehicles.
- High security.

IV. METHODOLOGY

Following is the methodology of the project:

- User will either book the parking slot through the webpage or he can direct access the slot by entering the parking area.
- The user receives the RFID tag at the entrance of the parking or at the parking gate.
- Then at the allotted slot the user parks the car.
- As it is the rotating parking system, the slot will move in rotary motion and the empty slot willcome at the base.
- During exit from the parking, the user has to read the RFID tag to the RFID reader. Then the respective vehicle will come at base position and user can remove the car from the parking.
- The entrance and exit time of the car is recorded inthe server.
- The same data is also updated on the webpage.
- The RFID tag is been submitted at the gate of parking space.

V. SYSTEM ARCHITECTURE

The block diagram of the proposed project is shownbelow. The block wise description is stated.

Fig1. Shows block diagram of smart parking system. The basic requirements of the controller (ATmega32) are 5V power supply and manual reset. It has internal RC oscillator with frequency of 8MHz. If higher speed of operation is required then external clock is to be connected. This combining forms 16MHz crystal oscillator that generates pulses, this is completely optional. system to improve efficiency of retrieval or processing power consumption versus processing speed.

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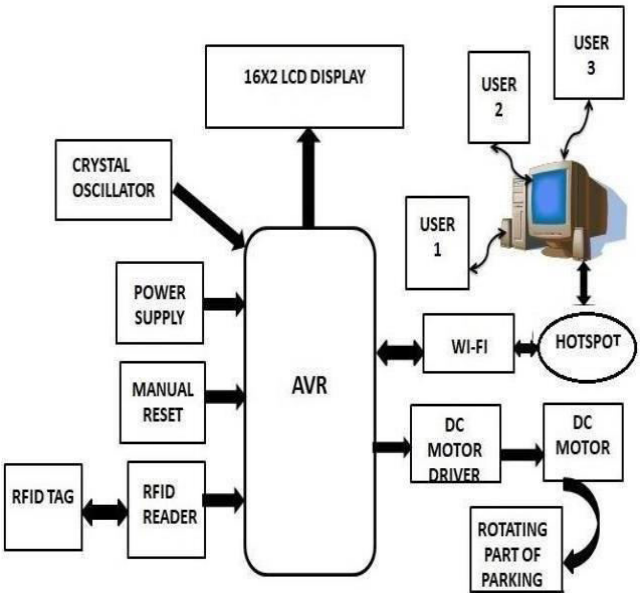

Figure 1 : BLOCK DIAGRAM

The input given to the controller is the signal throughRFID Reader (EM18). We shall have „n" number of RFID tags connected through the RF communication with the reader. The frequency in which RFID operates is of 125 KHz. We use the passive tag in this project. The operating range of passive tag is 6-10cms. To activate the stepper motor 12V/400mA is required. The controller provides (5v/25mA) which is not sufficient to drive the motor so we use DC Motor driver (L293D) which is connected to moving part of parking system. The Dc Motor Driver generates the current of 600mA which is sufficient to drive thestepper motor.

The empty trolley nos. in given slot of parking systemwill be displayed on 16X2 LCD. The same data will bestored on the server.
The ESP8266 with 1 MB of built-in flash allowing for single-chip devices capable of connecting to Wi-Fi.

- AVR(AT-mega 32):

It is a low power CMOS 8-bit microcontroller based on the AVR enhanced RISC (Reduced Instruction Set Computer) architecture. Along with running powerfulinstructions in a single clock cycle, the ATmega32achieves throughputs of 1 MIPS per MHz allowing the

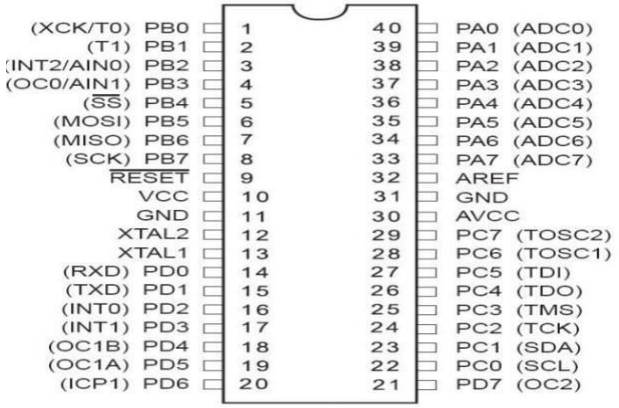

Figure 2: PIN DIAGRAM

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- RFID Tag:

RFID tagging is a system that uses small radio frequency identification devices for recognizing and tracking purposes. An RFID tagging system includes a host system application for data collection, processing, and transmission, the tag and a read/write device.

Figure 3: RFID TAG

- RFID Reader:

A radio frequency identification reader (RFID reader) gathers information from an RFID tag, which is used to identify individual objects. Through Radio waves data is transferred from the tag to a reader. RFID is a technology similar to bar codes. However, the RFID tag does not require to be scanned directly, nor itrequires line-of-sight with a reader. The RFID tagmust be within the range of an RFID reader ranges from 3 to 300 feet. RFID technology allows many items to be quickly scanned and permits fast identification of a particular product, even though it is surrounded by several other items.

Figure 4: RFID READER

- Wi-Fi Module:

The ESP8266 with 1 MB of built in flash allowing for single chip devices capable of connecting to Wi-Fi. ESP8266 module can operate in the low power connectivity models for instance it is operates in DTM10 it only consumes 1.2mW while maintaining a WI-FI connection. The ESP8266 Wi-Fi Module is a self-contained system on chip (SOC) with integrated Transmission control protocol and internet protocol (TCP/IP) stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is able of either hosting an application or offloading all Wi-Fi networking functions.

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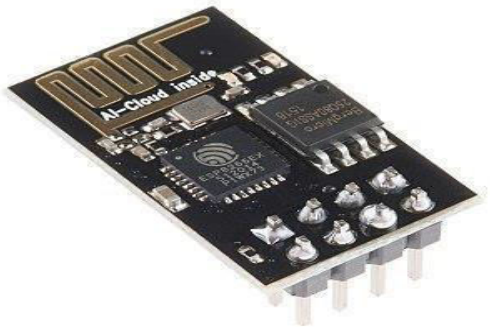

Figure 5 : WI –FI MODULE

- LCD:

LCD (liquid crystal display) is the technology used for display in electronic circuits. LCDs allow displays to be much thin than cathode ray tube (CRT) technologylike light-emitting diode (LED) and gas-plasma technologies. The pixels are controlled in completely different ways in LCD screens.

Figure 6: LCD

- Stepper Motor and Motor Driver:

Stepper motors enable accurate positioning with ease. They are used in many types of apparatus for accurate rotation angle and stepwise speed control using pulse signals. Stepper motors are ideal for quick acceleration and response also generate high torque with a compact body. Due to their mechanical design, stepper motors also hold their position at stop. Steppermotor solutions consist of a driver (takes pulse signals in and converts them to stepwise motor motion) and a stepper motor.

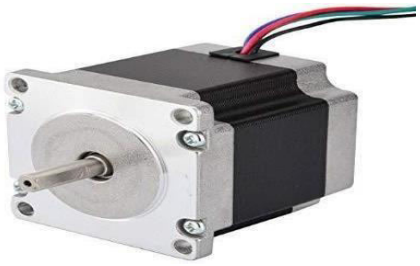

Figure 7: STEPPER MOTOR

The ULN2003 is known for its high-voltage, high-current capacity. The drivers can be used in parallel for even high current output. Electrically and physically stacking one chip on top of another hasbeen done. The motor requires high ratings whichcannot be provided by other interfacing devices so it can also be used for interfacing with a stepper motor.

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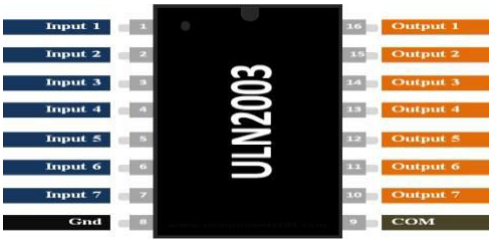

Figure 8: ULN

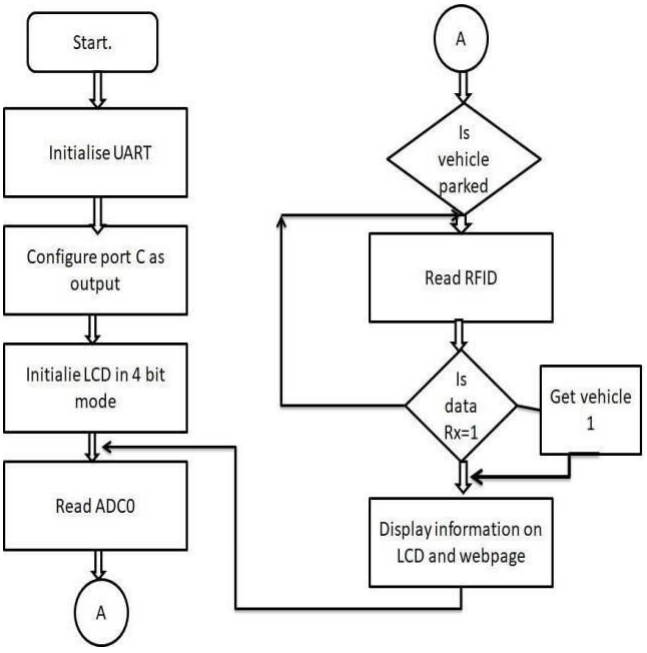

Figure 9 : FLOW CHART

- As the communication takes place through UART with the RFID so the initialization of UART is done.
  - Here Port C is used as the output port so as todrive the motor.
  - The data updated will be displayed on the LCD, as the parking is been used or vacant.
  - The vacant slots of parking are been checkedlater.
  - RFID is read so as to allocate the slot to therespective user.
  - The updated data is displayed on the LCD aswell as the webpage.
  - The same process repeats for the next vehicle.

VI. PROPOSED SYSTEM ADVANTAGES

- Highly secured system.
- Reduces the requirement of man power.
- Traffic flow decreases as fewer cars are required to drive around in search of an open parking space.
- An optimal parking solution will remarkably decrease driving time, hence lowering the amount of daily vehicle emissions andultimately reducing the global environmental pollution.
- System reduces the area required for the parking.
- Real-Time Data is generated and processed.
- Optimized parking: – Users find the best parking spot available, reduces time, resources and effort. The parking slot fills up efficiently and space can be utilized properly by corporate and commercial entities.

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VII. APPLICATIONS

The methodology can be adopted by various governments and private organization's so as to reducethe parking space such as:

- Shopping malls.
- Theaters.
- Auditoriums.
- Colleges.
- Companies.
- Society.

VIII. CONCLUSION

The system benefits of smart paring go well beyond avoiding the needless circling of city blocks. It also allows cities to develop fully integrated multimodal and intelligent transportation systems. Developing smart parking solutions within a city requires mobile phone integration, hardware and software innovation and data standardization and management,. Due tosmart parking systems within a city solves the vandalism and pollution problem.

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