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TITLE: SMART PARKING SYSTEM USING IOT

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Abstract

Nowadays, finding a secure car parking zone in class and schools is incredibly laborious and long task. Throughout examination effort negative implications on tie up, air pollutions, climate changes, etc, are making troublesome things to search out the secure car parking zone on needed time. Thus, good Parking System (SPS) is that the choice to solve those problems and build a comprehensive good transit. Toward this finish, this paper we aims to style a secure and good parking observance, dominant and management solutions supported the mixing of Wireless detector Network (WSN), frequency Identification (RFID) and web of Things (IOT). The projected model provides period of time info for detective work parking tons, provides solutions to reduce tie up, parking management improvement and enhance user expertise whereas conserving user privacy and security.

Index Terms: Internet of things, RFID technology, Arduino mega 2560, Arduino IDE, etc.

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1. Introduction

In the development of traffic management systems, associate intelligent parking system was created to cut back the value of hiring folks and for optimum use of resources for car-park homeowners. Currently, the common methodology of finding a parking lot is manual wherever the motive force sometimes finds an area within the street through luck and skill. This method takes time and energy and should result in the worst case of failing to find any parking lot if the motive force is driving in a very town with high vehicle density. The choice is to find a predefined parking lot with high capability. However, this is often not associate optimum answer as a result of the parking lot may sometimes be isolated from the user destination. In recent years, analysis has used vehicle-to-vehicle and vehicle-to infrastructure interaction with the support of assorted wireless network technologies like frequency identification (RFID), wireless detector network, and therefore the web of Things.

IoT, WSN, and RFID open the trend to search out solutions of tons of difficult problems in secure SPS. It provides affordable operation value, sturdy responsibleness, convenience, efficiency, and prove that they're not hardly technically attainable however conjointly economically possible. Therefore, those small devices (sensors) area unit expected to play a vital and essential half to any instructed solutions. Toward this finish, exploiting recent technologies to create and

style parking tons is taken into account with applicable security problems. Here, detecting, observance and dominant area unit thought of because the key answer that gives period of time info concerning accessible parking tons.

Nowadays, IoT and RFID area unit incursive our daily live and activities that area unit reworking assets into good objects, permitting info exchange among them and build choices while not or with minimal human intervention. In spite, IoT incursive our life, wherever things area unit able to collect, exchange, analyze sensitive information between them. However, they're still additional liable to compromise unless a finest security answer has been enforced. New technology inventions inspire to form the SPS that provides necessary security and management facilities.

1.1 LITERATURE REVIEW

T. Pham, M. Tsai, D. Nguyen, C. Dow, proposed "A Cloud Based Smart Parking System Based on IOT", 2169-3536 IEEE, sep. 2015.[1]

In this paper, the author has increases the efficiency of this cloud-based sensible - parking system and develops a spec supported the Internet-of-Things technology. In this paper author proposed a system that helps users automatically find a free parking space at the least cost based on new performance

metrics to calculate the user parking cost by considering the gap and also the total variety of free places in every park. The value are going to be wont to provide an {answer} of finding an offered car parking zone upon missive of invitation by the user and an answer of suggesting a brand new automobile park if the current car park is full.

Yanfeng Geng and Christos G. Cassandras proposed the concept of "A new smart parking system based on optimal resource allocation and reservations", IEEE Trans. Intell. Transp. Syst., sep. 2013.[2]

Drivers access the system via cellular phone or internet. a new concept is a "smart parking system", This system explicitly allocates and reserves optimal parking spaces to drivers. Drivers WHO ar searching for parking spots send requests to the DPRC. Driver process Request Centre gathers driver parking requests, Cars location keeps track of driver allocation status and sends back the assignment result to drivers. A request is predicated on parking prices and walking distance between a parking spot and therefore the drivers actual destination. It also contains the driver's basic information such as license number, current location and car size. An allotted car parking zone is challenge to every driver via the DPRC. If the motive force is glad with the assignment author has the selection to order that spot.

Ivan Ganchev and Mairtin O' Droma proposed "A cloud based intelligent car parking services for smart cities", in Proc. 31st URSI General Assembly Sci. Symp. (URSI GASS), Aug. 2014.[5]

In this the author stated that IOT sub system includes sensor layer, communication layer and application layer. The primary goal of the intelligent car parking system is to find, allocate and reserve the best available car parking lot for a user who is driving a car in a particular area and to provide instructions for reaching this lot. Sensor layer detecting the car lot occupancy. A car parking lot detection method is proposed based on automatic threshold algorithm. An info station based multi-agent system facilitating a car parking locator service is proposed. An access control system for reducing the waiting time proposed. At the application layer, an information centre provides cloud based service. An IOT management centre administrates the smart city via an IOT.

2. PROPOSED WORK

System Overview:

The system springs from the thought of IOT . The system uses the WSN consisting of RFID technology to observe automotive parks. associate RFID reader counts the share of free parking areas by suggests that of authentication in every parking lot. the utilization of RFID facilitates implementation of a large-scale system at low value. The system provides a mechanism to stop disputes within the parking lot and helps minimize wasted time in searching for a parking lot.Once work into the system, the user will select an acceptable parking lot. Information on the chosen parking location are going to be

confirmed to the user via notifications. Therefore, the standing of the overall parking system is usually updated in real time. The system can facilitate plot the parking time for every parking lot in real time and may support the business with hourly parking with minimum charges.
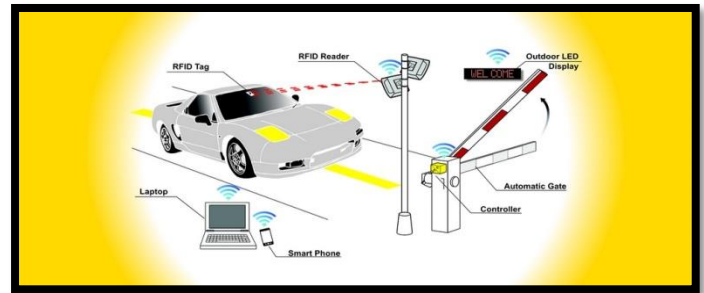

Fig-1: System summary

2.1 Hardware Requirements

2.1.1. Arduino Mega 2560 :

Arduino module that is connected exploitation associate RFID reader. The cardboard reader authenticates the user info and then displays this info on the screen. If the data of the RFID tag or card is correct, the Arduino module can management the gap of the door for the vehicle to enter. The Arduino Mega 2560 could be a microcontroller board supported the ATmega 2560 . It's fifty four digital input/output pins (of that fourteen will be used as PWM outputs), sixteen analog inputs, four UARTs (hardware serial ports), a sixteen Mc oscillator, a USB association, an influence jack, associate ICSP header, and a push. It contains everything required to support the microcontroller.

Fig-2: Arduino Mega

- Power : The Arduino Mega will be battery-powered via the USB association or with associate external power provide. the facility supply is chosen mechanically. External (non-USB) power will come back either from associate AC-to-DC adapter (wall-wart) or battery. The adapter will be connected by plugging a two.1mm center-positive plug into the board's power jack. Leads from A battery will be

inserted within the Gnd and Vin pin headers of the facility connexion. The board will operate associate external provide of six to twenty volts. If equipped but 7V, however, the 5V pin could provide but 5 volts and therefore the board is also unstable. If exploitation over 12V, the transformer might overheat and harm the board.

 The facility pins area unit as follows:

- VIN. - The input voltage to the Arduino board once it's exploitation associate external power supply (as hostile five volts from the USB association or alternative regulated power source). You 'll provide voltage through this pin, or, if activity voltage via the facility jack, access it through this pin.
- 5V. - The regulated power provide wont to power the microcontroller and alternative elements on the board. This will come back either from VIN via associate on-board regulator, or be equipped by USB or another regulated 5V provide.
- 3V3. - A 3.3 potential unit provide generated by the on-board regulator. most current draw is fifty mA.
- GND. - Ground pins.
- Memory: The ATmega2560 has 256 computer memory unit of non-volatile storage for storing code (of that eight computer memory unit is employed for the boot loader), eight computer memory unit of SRAM and four computer memory unit of EEPROM (which will be scan and written with the EEPROM library).
- Input & Output: Every of the fifty four digital pins on the Mega will be used as associate input or output, exploitation pinMode(), digitalWrite(), and digitalRead() functions. They operate at five volts. every pin will offer or receive a most of forty mA and has an indoor pull-up electrical device (disconnected by default) of 20-50 kOhms.

 Additionally, some pins have specialised functions:

- Serial: zero (RX) and one (TX); Serial 1: nineteen (RX) and eighteen (TX); Serial 2: seventeen (RX) and sixteen (TX); Serial 3: fifteen (RX) and fourteen (TX). Won't to receive (RX) and transmit (TX) TTL serial information. Pins zero and one are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: two (interrupt 0), three (interrupt 1), eighteen (interrupt 5), nineteen (interrupt 4), twenty (interrupt 3), and twenty one (interrupt 2). These pins will be organized to trigger associate interrupt on an occasional price, a rising or falling edge, or a amendment in price.
- PWM: Zero to thirteen offer 8-bit PWM output with the analog Write() operate.
- LED: 13. There's a inherent diode connected to digital pin thirteen. once the pin is HIGH.

The Mega2560 has sixteen analog inputs, every of which offer ten bits of resolution (i.e. 1024 totally different values). By default they live from ground to five volts, although is it attainable to vary the higher finish of their vary exploitation the AREF pin and analog Reference() operate.

There area unit some of alternative pins on the board:

● AREF. Reference voltage for the analog inputs. Used with analogReference().

● Reset. Bring this line LOW to reset the microcontroller.

- Communication:The Arduino Mega2560 encompasses a range of facilities for act with a laptop, another Arduino, or alternative microcontrollers. The ATmega2560 provides four hardware UARTs for TTL (5V) serial communication. Associate ATmega8U2 on the board channels one amongst these over USB and provides a virtual com port to software package on the pc (Windows machines can would like a .inf file, however OSX and UNIX operating system machines can acknowledge the board as a COM port mechanically. The Arduino software package includes a serial monitor that permits easy matter information to be sent to and from the board. The RX and Lone-Star State LEDs on the board can flash once information is being transmitted via the ATmega8U2 chip and USB association to the pc (but not for serial communication on pins zero and 1).
- USB Overcurrent Protection: The Arduino Mega2560 encompasses a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Though most computers offer their own internal protection, the fuse provides an additional layer of protection. If over five hundred mA is applied to the USB port, the fuse can mechanically break the association till the short or overload is removed.

2.1.2 RFID Tag & Reader :

RFID systems incorporates 3 elements in 2 combinations: A transceiver (transmitter/receiver) associated antenna area unit sometimes combined as an RFID reader. A electrical device (transmitter/responder) associated antenna area unit combined to form an RFID tag. associate RFID tag is scan once the reader emits a radio emission that activates the electrical device, that sends information back to the transceiver.

A basic RFID system consists of 3 components:

- • Associate antenna or coil
- • A transceiver (with decoder)
- • A electrical device (RF tag) electronically programmed with distinctive info

There area unit 2 forms of transponders, that correlate to the 2 major forms of RFID tags.

• Passive transponders and RFID tags don't have any energy supply of their own, hoping on the energy given off by the reader for the facility to reply. Cheaper, passive RFID tags area unit the foremost doubtless to be used for commodity.

• A full of life electrical device or tag has an indoor power supply, that it uses to come up with a symbol in response to a reader. Active transponders area unit costlier than passive ones. they'll communicate over miles like normal radio communications. they're unremarkably employed in navigation systems for business and personal craft. There area unit several North American nationes of this technology around us these days, though they're typically invisible to users. you'll realize that you just area unit already carrying and employing a RFID tag, or maybe many. At its most elementary level, RFID could be a wireless link to unambiguously determine objects or folks. it's generally known as dedicated short vary communication (DSRC). RFID systems embrace electronic devices known as transponders or tags, and reader physical science to speak with the tags. These systems communicate via radio signals that carry information either unidirectional or bifacial. once a electrical device enters a scan zone, its information is captured by the reader and may then be transferred through commonplace interfaces to a bunch laptop, printer, or programmable logic controller for storage or action.

The aim of associate RFID system is to alter information to be transmitted by a conveyable device, known as a tag, that is scan by associate RFID reader and processed per the wants of a selected application. {the data|the info|the info} transmitted by the tag might offer identification or location information, or specifics concerning the merchandise labelled, like worth, color, date of purchase, etc. RFID technology has been employed by thousands of firms for a decade or additional. RFID quickly gained attention thanks to its ability to trace moving objects. Because the technology is refined, additional pervasive - and invasive - uses for RFID tags area unit within the works. A typical RFID tag consists of a chip hooked up to a radio aerial mounted on a substrate. The chip will store the maximum amount as two kilobytes of information. To retrieve the information hold on on associate RFID tag, you would like a reader. A typical reader could be a device that has one or additional antennas that emit radio waves and receive signals back from the tag. The reader then passes the data in digital type to a system. Once a link is established with a novel ID on associate item, then automation of associate assortment of processes ensures.
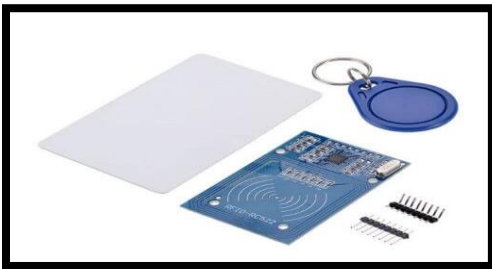

Fig-3: RFID Tag & Reader

2.1.3 The Servo Motor:

The servo engine could be a motor that comes with a Gear shell and a Shaft transmission that provides motion larger torsion and larger exactitude. This engine will rotate one hundred eighty degrees and in some sorts 360 degrees. The servomotor is internally created from a "mostly microcontroller" negative feedback circuit. once the engine provides pulses at an explicit time constant, the engine rotates to the angle per that point constant. In every kind, the time constant varies from one engine to a different per the manufacturer and therefore the technical bullet therein comes with the servo engine. Within the Arduino, programming surroundings there's a library known as Servo Library put in within the program. This library provides North American nation the flexibility to regulate most of the one hundred eighty degree Servo drives. At the top of this post, you may have the flexibility to use the library's commands through sensible examples.

Fig-4: Servo Motor

2.1.4 Crystal rectifier (LED) :

A diode could be a semiconductor light that emits light-weight once current flow through it. Early LEDs were typically used as indicator lamps, substitution tiny incandescent bulbs, and in seven section displays.

Fig-5: LED

2.1.5 Liquid- crystal show 16x2 (LCD) :

A 16x2 {lcd| liquid crystal show| LCD| digital display| alphanumeric display} display is incredibly basic module and is incredibly unremarkably employed in varied devices and circuits. These modules area unit most well-liked over seven sections and alternative multi segment LEDs. A sixteenx2 {lcd|

liquid crystal show |LCD| digital display| alphanumeric display} suggests that it will display 16 characters per line and there area unit two such lines. during this alphanumeric display every character is displayed in 5x7 element matrix.
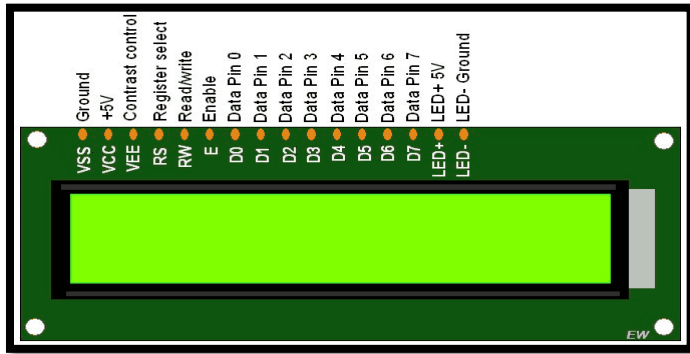

Fig-6: LCD 16x2

Pin Description:

Pin No.	Function	Name
1	Ground(0 V)	Ground
2	Supply voltage 5V(4.7-5.3)	V_{CC}
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Select command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	Data pin	DB0
8	Data pin	DB1
9	Data pin	DB2
10	Data pin	DB3
11	Data pin	DB4

12	Data pin	DB5
13	Data pin	DB6
14	Data pin	DB7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

Table 1: Data pins

2.1.6 220 Ω Resistors:

A electrical device could be a passive two-terminal electrical element that implements electrical resistance as a circuit component. In electronic circuits, electrical device area unit wont to scale back current flow, regulate signal levels, to divide voltages, bias active parts, and terminate transmissionlines.

Fig-7: Resistors

2.1.7 Bread board :

A breadboard could be a solderless device for temporary paradigm with physical science and take a look at circuit styles. Most electronic elements in electronic circuits will be interconnected by inserting their leads or terminals into the holes so creating connections through wires wherever applicable.
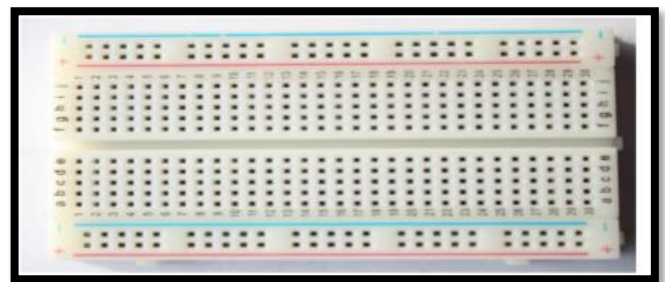

Fig-8: Breadboard

2.1.8.Connecting Wire :

A jump wire is an electrical wire, or cluster of them in a cable, with a connexion or pin at each Male ends have a pin projecting and may plug into things, while female ends don't

and area unit wont to plug things into. Male-to-male jumper wires are the foremost common and what you doubtless can use most frequently. once connecting 2 ports on a bread board, a male-to-male wire is what you will need.

Fig-9: jumper wires

2.1.9Bluetooth :

Bluetooth HC-05 module is a straightforward to use Bluetooth SPP (Serial Port Protocol) module, designed for clear wireless serial association setup. port Bluetooth module is totally qualified Bluetooth V2.0+EDR (Enhanced information Rate) 3Mbps Modulation with complete two.4GHz radio transceiver and baseband. vary of bluetooth .
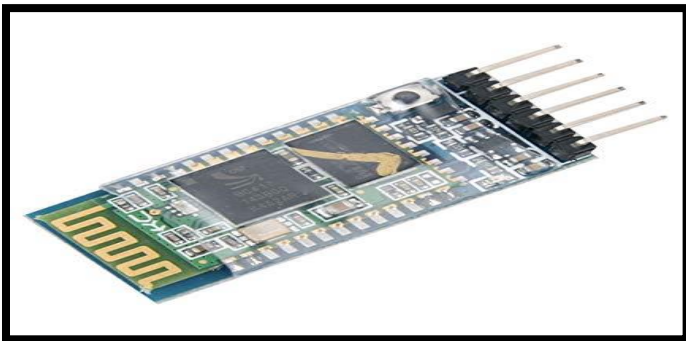

Fig-10:Bluetooth HC-05 module

2.1.10 IR Sensor :

An infrared detector is associate instrument that's wont to sense sure characteristics of its surroundings. It will this by either emitting or detective work actinic ray. Infrared sensors are capable of activity the warmth being emitted by associate object and detective work motion.

Fig-11: IR Sensor

2.2 Software package necessities :

2.2.1 Arduino IDE:

The Arduino integrated development surroundings could be a cross-platform application that's written within the programing language Java. It's wont to write and transfer programs to Arduino board. The ASCII text file for the IDE is discharged underneath the antelope General Public License, version 2.

License: LGPL or GPL license

Operating system: Windows, macOS, Linux

Stable release: one.8.8 / seven Gregorian calendar month 2018

Written in: C, C++
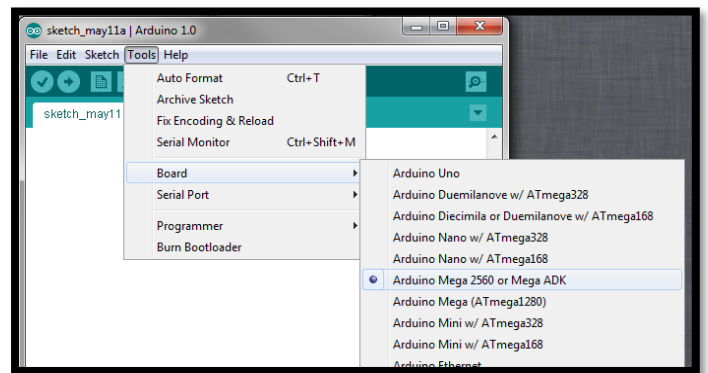
Platforms: x86-32 (32 bit Intel x86), x86-64, ARM design

Fig-2: Arduino Platform

3. CONCLUSION

A novel good parking observance, dominant and management answer supported the mixing of RFID, WSN, and IoT has been introduced. This parking system improves performance by reducing the amount of users that fail for find a {parking space|parking lot|parking zone|automobile parking lot|car parking zone} and minimizes the prices of moving to the parking space.In this paper design and system has been shown with success simulated and enforced in a very real scenario. The results show that our formula significantly reduces the typical waiting time of users for parking.

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