ADVANCED PARKING SLOT AVAILABILITY CHECKING SYSTEM USING RASPBERRY-Pi

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ABSTRACT

As significantly grown, in the current era, as a result of the ever-rising number of vehicles geared by the rapid population growth in urban areas. Wherefore finding a vacant parking space has become quite a challenging task, especially at peak hours. Car operators have to cycle back and forth a number of times before they finally find where to park. This leads to increased fuel consumption, air pollution, and wastage of time, is not just a major problem in India but also in all over the world. This system implemented us a cost effective, scalable and robust to indicate the number of free parking slots in a given parking area. This system implemented by using infrared sensors in every bay which are then connected to a Raspberry Pi. The raspberry Pi transfers all the data to a server, which is open to users using a mobile application.

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I. INTRODUCTION

More than half of the world population lives in the urban areas so the cities have reachedits full occupancy. As a result, number of vehicles in the cities is also increased.parking systemwould have more appreciated in placeless of higher demands such like Theatre, shopping mallsand in some crowded place. The devices could be tracked, controlled or monitored using remote computers connected through the Net. In IOT objects are connected to each other and exchange information from internet. Our cloud-based parking organized the parking lot. It helps user to find a vacant space in parking slot. It saves user's time as well as vehicle fuel.

An infrared (IR) sensor is used a teach slot parking; ittells the space availability which can be easily seen in mobile application through internet. It may be defined as connecting thingspresent in the physical world with sensors and then connecting them to a network through wired or wireless means. The solution proposed in this paper utilizes the architecture of the cloud server is in away that an unrestricted number of slots may be added without any change in the code. The associated mobile application can run on Windows, Android and iOS. Moreover, the code can berecycled for multiple boards making the proposed solution cost effective, adaptable and versatile.Followed by the developments in sensor technology, man modern cities have opted for deploying various IoT based systems in and around the cities for the purpose of monitoring.

1.1 INTRODUCTION OF EMBEDDEDSY STEM

An Embedded System is a combination of computer hardware and software, and perhapsadditional mechanical or other parts, designed to perform a specific function. A good example is the microwave oven. Almost every household has one, and tens of millions of the mare used everyday,

but very few people realize that a processor and software are involved in the preparation oftheirlunch ordinner.

This is in direct contrast to the personal computer in the family room. It too is comprisedof computer hardware and software and mechanical components (disk drives, for example). However, a personal computer is not designed to perform a specific function rather; it is able to do many different things. Many people use the term general-purpose computer to make this distinction clear. As shipped, a general-purpose computer is a blank slate; the manufacturer doesnot know what the customer will do wish it. One customer may use it for a network file server another may use it exclusively for playing games, and a third may use it to write the next greatAmericannovel.

II. LITERATURE SURVEY

1.Abhirup Khanna, Rishi Anand" IoT Based Smart Car Parking system

In the current era the number of vehicles is increasing day by day. Parking vehicle inmetropolitancitieshascreatedhavocindeedth athascreatedamajorproblemtoparktheirvehicl esin designated place which leads to traffic congestion during peak hours. Which leaves the user tosearch for their parking? This paper resolves the issue of parking system and has come up withIOT(InternetOfThings)enabledparkingspac eandallocationmechanism.Smartparkinginvolv esuse of ultrasonic sensor, Arduino Uno and cloud server. This system will be accessible through aandroid application to monitor the vacant slots available in parking area. This enables interactionbetweensmartparkingsystemandth euser.itproposestoimplementtheparkingsyste mbasedonreservation.Every user has auniqueOTP to occupy theirown reservedslot.

2.Rico,J.,Sancho,J.,Condon,B.&Camus,M."Parkin geasierbyusingcontextinformationofa smart city"

In the great majority of cities it is difficult and hardly expensive to create more parkingspaces for vehicles since they have almost reached its full occupancy. Combining this problem with an in efficient use of parking spaces leads to congestions due to aggregation of parking seekers and regular drivers. Recent advances in low-cost, low-power embedded systems bring the opportunity to develop new applications to solve these problems. In particular, Smart Cities greatly enrich their sustainability by introducing new resource management applications that rely in those constrained devices a significant part of the functionality of the system. The proposed SmartParking solution consists mainly in the on-site deployment of an IoT solution to monitor andsignalizethestateofavailabilityofeachsingle parkingspace,aswellasusingcontextinformatio ngeneratedbythecityanditscitizenstoprovideac curateresponsestodriver'sdemands.Furthermo re,thissystemimprovesthemanagementofparki ngresourcesbypublicauthorities,forinstance handling groups of parking spaces facilitating the whole city traffic management. Theintegrationofthisdeploymentintoanexisting livetest-bedimpliesaneasytaskrequiringjust thedata collection through the available means of the parking spaces availability. At the present timethereexistlivingtest-bedswhichcanbeusedtointegratethesenewfun ctionalitiesforexperimentation on IoT data level, to gain a better knowledge and understanding of the M2Mworld,reducingcosts, resources, pollution and time.

3.Kafle, V. P., Fukushima, Y., &Harai, H. "ID-based communication for realizing IoT andM2Minfutureheterogeneous mobile networks

Internet of Things (IoT) and Machine to Machine (M2M) communication are expected tobe the major paradigm of communications in the future Internet, where trillion of devices will beconnected through heterogeneous mobile networks that will vary in both networking and linktechnologies.TheIoT/M2Mdevicesneedtore mainconnecteddespitetheychangetheirpoints ofattachment frequently to the network either due to mobility or simply switching links in theoverlapped wireless coverage for better connectivity. To meet the needs of IoT/M2M

devicesregardingsecuredconnectivityandseamlessmobilityinheterogeneousnetworks,wehave proposed an ID-based communication network architecture, called HIMALIS, which includesseveralnetworkfunctionssuitableforIoT/M2Msuchassecureinitialconfigurationofdevicesfornetwork access, device discovery, remote monitoring, and control. It provides a set of simpleprogramminginterfacestousers,thusenablingthedevelopmentofvariousIoT/M2Mapplicationsindependently of underlying networking protocols. We also introduce our recent implementationofHIMALISsensordevicestodemonstratetheproofofconcept.Thesesensordeviceshavebeenincluded in the JOSE testbed network, which is available to use in the Japanese domestic andinternationaljoint projects.

III. BLOCK DIAGRAM

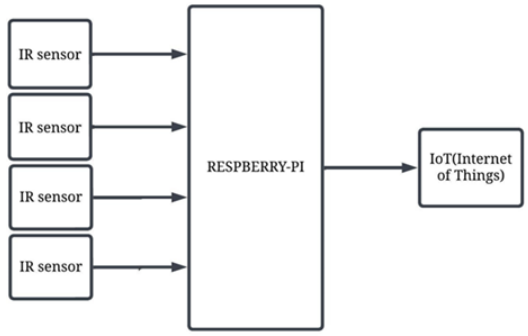

Fig.1Blockdiagramof advanced parking slot availability checking system using raspberry-pi

COMPONENTSINBLOCKDIAGRAM

1. IRsensor
2. Raspberry-Pi
3. IoT(InternetofThings)

IR sensor: - It presents a novel parking system with IoT over Wi-Fi. The authors suggest anIOT based solution to the issue using a mobile app, IR sensors. Two IR sensors are used at theentry and exitgates to detect vehicle entry and exit in the parking area. And other four IR sensorsare used to detect the parking slot availability. With the solution's help, users can easily look fornearby parking lots alongside Realtime availability in each parking lot. They can also block the desired parking slot through the app. Up on exit, the amount to be paid is determined using the time the service was used, which is determined using IR sensor data, and payment is processed usingthelinkedin-appwallet.Thistechnologyimprovestheoverallefficiency,reliability,andconvenienceandreducesthepreciousresourcesinsearchingfor parking spaces and pollution.

Raspberry-Pi: - It first detects the vehicle parked in slots and shows the status of each slotthrough the webserver. Visitors can know the status of the parking slot through the webpage,afterthattheyhavetoshowtheirRFIDtothereadertogetauthenticatedandnotedownthetimeof that specific vehicle.It has Raspberry Pi is used as a core, as a prototype 4 parking slots arepresent.FordetectionofvehicleIRSensorisusedandtohavespecialidentityRFIDisusedforeverynewcar.Thedatabase ismaintainedforeveryvisitor.Alertofdetectingthemoneybasedonthestaytimeoftheslotwillbeintimatedthroughmail.

IoT(Internet of Things): - An IoT based smart parking system, also known as a connectedparkingsystem,isacentralizedmanagementsystemthatallowsdriverstouseasmartphoneapptosearch for and reserve a parking spot.The drivers use this application to direct themselves to theavailableparking spacesinstead ofwastingtheirtime and fuel in search of one.

POWER SUPPLY

Theinputtothecircuitisappliedfromtheregulatedpowersupply.Thea.c.inputi.e.,230Vfrom the mains supply is step down by the transformer to 12V and is fed to a rectifier. The outputobtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, theoutput voltage from the rectifier is fed to a filter to remove any a.c components present even afterrectification.Now,thisvoltageisgiventoavoltageregulatortoobtainapureconstantdcvoltage.

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BLOCKDIAGRAM OF POWER SUPPLY

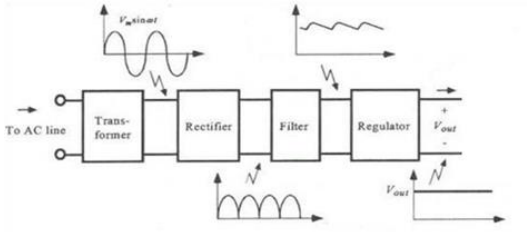

Fig.2Block Diagram of Power supply

These sensors normally used to check volumetric water content, and another group of sensors calculates a new property of moisture within soils named water potential. Generally, these sensors are named as soil water potential sensors which include gypsum blocks and tension meter.

IV. CIRCUIT DIAGRAM OF POWER SUPPLY

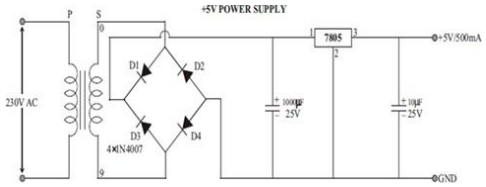

Fig.3Circuit diagram of power supply

Theinputtothecircuitisappliedfromtheregulatedpowersupply.TheAcinputi.e.,230Vfrommthemains supplyisstep downby thetransformerto 12Vandisfedtoarectifier.Theoutputobtainedfrom therectifier isapulsating dcvoltageand it resultsas 5v dcsupply.

In this we have used stepdown transformer whose input is 230V Ac supply and then it isconverted to 12V Ac which is the output of stepdown transformer. And then we have used someother components like rectifier and filter and voltage regulator to convert from 12V Ac to 5v Dc.Here,therectifier bis used to convert from Acto Dc.

V RESULT WITHOUT POWER SUPPLY

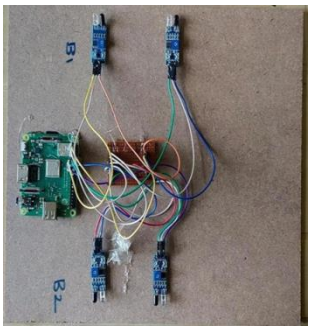

Fig4: Without power supply

WITH POWER SUPPLY

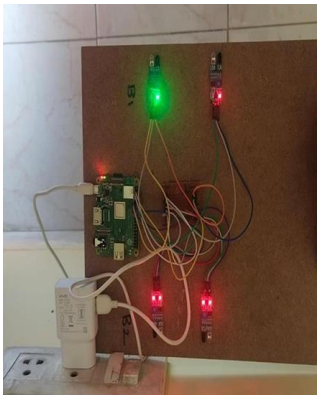

Fig5:With power supply

An IoT-based parking system is a centralized management that enables drivers to search for and reserve a parking spot remotely through their smartphones. Hence, this is the output of our project where it shows parking slots are available based on IoT by using raspberry-Pi.

VI. ADVANTAGES DISADVANTAGES & APPLICATIONS

ADVANTAGES

1. Reducecongestionandimprovetrafficflowbyusingsensorstomonitorparkingspaceavailabilityand directdriverstoavailablespaces.
2. IoTgatewayprotocolhelpconnectIoTdevicesandsensorsinsizableparkingslots.
3. Increasedefficiency
4. Enhancedsecurity
5. Reduced costs
6. Fasterprocesses

DISADVANTAGES

7. Expensiveconstructionandinstallation

VII. CONCLUSION &FUTURE SCOPE

CONCLUSION

Workproposedinthissystemaddressesanissueofparkinginsmartparking.Thesystemisimplementedusingow-costIRsensors,Raspberrypiforrealtimedataprocessing,E-parkingmobileapplicationmotor.Thedevelopedsystemcontributesrealtimeinformationofavailabilityof parking slots in parking area and allows users to book parking slot from remote locations byusing mobile application and also provides user authentication. The developed system is testedfor different cases such as single user

booking, multiple users booking, user trying to bookreservedslotand userauthentication.

FUTURESCOPE

This system can also be converted into Arduino based. Parking assistance, automatedparking lots, and the Internet of Things (IoT) are some of the most promising technologies forthe future of parking. An increase in parking concerns across the globe, growth in demand forInternet of Things (IoT) based technology, and high adoption rate in several vehicles drive theneed for the global smart parking market. However, high employment cost & configurationcomplexity,and lowrateofinternetpenetrationindevelopingregionsrestrainthemarketgrowth

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4. https://www.geeksforgeeks.org/advantages-and-disadvantages-of-iot/

APPENDIX

```
#include <stdio.h> #include <wiringPi.h>
#define SENSOR_PIN 2 // GPIO pin used for sensor input #define LED_PIN 3 // GPIO pin used for LED outputintmain() {if (wiringPiSetup() == -1) {
printf("Failed to initialize wiringPi.\n"); return 1;}
pinMode(SENSOR_PIN, INPUT); // Set sensor pin as input pinMode(LED_PIN, OUTPUT); // Set LED pin as output
while (1) {intsensorValue = digitalRead(SENSOR_PIN);
if (sensorValue == HIGH) { printf("Parking slot is occupied.\n");
digitalWrite(LED_PIN, HIGH); // Turn on the LED}
else {printf("Parking slot is available.\n");
digitalWrite(LED_PIN, LOW); // Turn off the LED}
delay(1000); // Wait for 1 second before checking again}return 0;}
```