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Automatic Smart Parking using IOT

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ABSTRACT

In the past, there have been many works done on smart parking system approaching an even smarter system in where researches have been done and still being done to create a system which is not technologically savvy but also at ease. With the rapid increase in urban populations, the number of cars in developed and developing countries is also becoming higher. In the congested and densely populated urban areas, the unavailability of car parking spaces is becoming severe. To tackle this problem car parking plaszas and parking areas are being developed. However, the manual management of these car parking spaces is quite tedious and inefficient. Proper management and operation of a large car parking is quite a hectic and tedious job. In order to implement an effective and efficient car parking system, some degree of automation must be employed. In order to increase the operational efficiency of a car parking area, an IoT car parking system using the Arduino project is proposed. The project consists of 3 ultrasonic sensors. sensors are installed on the four car-parking slots. The project also includes an LCD screen that displays the status of parking slots. A remote server-based IOT platform is also integrated into the project for the purpose of remote monitoring and efficient control. The parking system is in development for a long time, until now most of the shopping malls have the parking slot status display through Ultrasonic for car presence and light for indication. It is not enough for smartness, For the smart parking system, everything should be turned into autonomous like auto-detection of money, slots availability

Keywords : IOT Platform, Internet of Things

I. INTRODUCTION

Today, a major issue any car driver faces is to find an available parking spot for the car and so to tackle this issue we have tried to introduce an efficient solution for parking system based on the nearest location and availability of parking lots. It is taken as an assumption that there is a reserved parking lot for us to operate. This system solves the problem of finding a parking spot for the driver, hence, saving both his time and fuel. Thus, the proposed system is beneficial on both personal as well as global level. The system

includes a smart phone application which displays the nearby parking places, allow the driver to book a parking -place and also navigate him to the selected parking space. The system also includes ultrasonic sensors deployed at each parking lot which help in keeping the count of available parking places at that particular parking lot.

Sensor Based Smart Parking System Abhishek Tatti Abstract:- The Internet of Things(IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. In urban areas, fuel wastage, carbon emission, traffic congestion and air pollution are mainly caused by illegally idling cars or by car drivers trying to find a parking spot. Therefore, finding available parking spots should be a task of utmost importance in daily life. This system proposes an easy but efficient solution of providing motorists with real time information about the availability of vacant spots in parking spaces with the help of a smart-phone application. Drivers can see the available parking spots in real time on a map, and also navigate to the nearest available parking spots using the mobile application. An app which allows drivers to book the parking lot will reduce the time and energy required to find one. This system provides a pathway for making an efficient, lowcost, smart, real-time system. This system also understands the importance of keeping the users data safe as well as protecting the system from any intrusions in a smart parking project and thus takes the required measures to ensure security, privacy, confidentiality and integrity of the users as well as the system.

With the rapid increase in urban populations, the number of cars in developed and developing countries is also becoming higher. In the congested and densely populated urban areas, the unavailability of car parking spaces is becoming severe. To tackle this problem car parking plazas and parking areas are being developed. However, the manual management of these car parking spaces is quite tedious and inefficient. In interconnection and automation of different physical gadgets, vehicles, home machines and different things, the internet of things (IoT) innovation plays a critical role. These objects associate and deal information with the assistance of software, different sensors, and actuators. A human's standard of life and living are improved with this automation of gadgets, which is a forthcoming need. In this paper we talked about a similar requirement for instance, a smart car parking system which empowers a driver to discover a parking area and a free slot in that parking area inside a city. This paper focus on decreasing the time squandered on discovering parking area. This in turn diminishes the fuel utilization and way of life. With the exponential increment in the quantity of vehicles and total population, vehicle accessibility, use out, about starting late, finding a space for parking the vehicle is turning out to be increasingly more troublesome with realizing the amount of conflicts, for example, automobile overloads.

The concept of Internet of Things (IoT) started with things with identity communication devices. The devices could be tracked, controlled or monitored using remote computers connected through Internet. IoT extends the use of Internet providing the communication, and thus inter-network of the devices and physical objects, or ‘Things’. The two prominent words in IoT are “internet” and “things”. Internet means a vast global network of connected servers, computers, tablets and mobiles using the internationally used protocols and connecting systems. Internet enables sending, receiving, or communicating of information. Thing in English has

number of uses and meanings. Dictionary meaning of 'Thing' is a term used to reference to a physical object, an action or idea, situation or activity, in case when we do not wish to be precise. IoT, in general consists of internetwork of the devices and physical objects, number of objects can gather the data at remote locations and communicate to units managing, acquiring, organizing and analyzing the data in the processes and services. It provides a vision where things (wearable, watch, alarm clock, home devices, surrounding objects with) become smart and behave alive through sensing, computing and communicating by embedded small devices which interact with remote objects or persons through connectivity. The scalable and robust nature of Cloud computing is allowing developers to create and host their applications on it. Cloud acts as a perfect partner for IoT as it acts as a platform where all the sensor data can be stored and accessed from remote locations. These factors gave rise to the amalgamation of both technologies thus leading to the formation of a new technology called Cloud of Things(CoT). In CoT the things(nodes) could be accessed, monitored and controlled from any remote location through the cloud. Due to high scalability in cloud any number of node could be added or removed from the IoT system on a real time basis. In simple terms IoT can be explained in form of an equation stating: Physical Object + Controller, Sensor and Actuators + Internet = Internet of Things The ideal of creating a Smart City is now becoming possible with the emergence of the Internet of Things. One of the key issues that smart cities relate to are car parking facilities and traffic management systems. In present day cities finding an available parking spot is always difficult for drivers, and it tends to become harder with ever increasing number of private car users. This situation can be seen as an opportunity for smart cities to undertake actions in order enhance the efficiency their parking resources thus leading to reduction in searching times, traffic congestion and road accidents. Problems pertaining to parking and traffic congestion can be solved if the drivers can be informed in advance about the availability of parking spaces at and around their intended destination. Recent advances in creating lowcost, low-power embedded systems are helping developers to build new applications for Internet of Things. Followed by the developments in sensor technology, many modern cities have opted for deploying various IoT based systems in and around the cities for the purpose of monitoring.

II. LITERATURE SURVEY

Literature has revealed a significant number of smart parking solutions based on the Internet of Things (IoT) and context-awareness with the incorporation of routing strategies and vehicle detection techniques in a pervasive computing environment. With the rapid escalation of the smart and intelligent devices along with their applicability in a highly decentralized environment, real-time traffic monitoring, and finding parking spaces have become quite trivial. Smart parking sensors and technologies assist drivers in finding vacant parking slots while they are on the way to their destination. Considering the needs, wants, and demands of metropolitan cities, in this article, we have reviewed the recently published articles, mostly from the last 5 years, on smart parking systems augmented with sensors, embedded systems, context-awareness capability, and IoT which yields in saving time, fuel, energy, and reduces the stress of the drivers. To accomplish this, we have reviewed different models on smart parking solutions based on algorithmic formalisms, theoretical frameworks, formal models, smart device-based prototypes as well as real-time applications, and verifying the correctness properties of the system. The results shown may provide a base for the state-of-the-art future research directions.

SMART PARKING SYSTEM In today's world vehicles on the road are increasing by huge number. Sage(smart) parking system is an effective system which uses various components and technology to

manage the parking area. Many cities have started using the concept of smart parking projects. It helps drivers to find satisfied parking places through technology which is used in communication and through information especially for on street parking. It can also be defined as parking system that helps the drivers to find a vacant space using sensors that detect the presence of the vehicle and finally it will direct the drivers to available locations.

Many cities viewed that the drivers had real time problems to find a parking space easily especially during peak hours, festivals season, etc. Even if the parking space is known, many vehicles may lead to small number of parking space which in turn leads to traffic congestion. Many approaches had been made to overcome the difficulties of parking area and as a result many system and technologies are developed for parking. With the help of various designs of smart parking system, it would be helpful for the people.

Project Title : Smart Car Parking with Monitoring System M.Swatha1 , K. Pooja2 ©2018 IEEE

Abstract— Nowadays, the total amount of traffic is increased rapidly and parking space getting smaller. It's to design a drive less car by using RTOS (Real Time Operating System) and a Smartphone. It is motivated to configure the guidance system of a flexible (Automated Guided Vehicle) AGV. The driver finds very difficult to park their vehicle in a narrow garage, so it helps to park the vehicle using Smartphone via Bluetooth with the range of 100 m, ranges between the car and the Smartphone and GPS (Global Positioning System) is also used to know the location. This GPS system will help the user to easily identify the car location. "Car Assist" technology is used to monitor the car driving path and the things happening around the car can be viewed in the smart phone via GPS. It supports live time preview to monitor the car parking garage. The users need not to be present inside the car like some previous generation systems. The proposed work is compared with bench work results and yield very less time to monitor and park the vehicles against the existing system.

Project Title: Automatic Car Parking System with Visual Indicator along with IoT

SARTHAK MENDIRATTA DEBOPAM DEY DEEPIKA RANI SONA ©2017 IEEE

Abstract— this paper focuses on the concept of car parking detection mechanism using the ultrasonic sensor, in combination with the usage of Internet of Things i.e. sending the status of the parking slot to the Internet. Through which the user at any place in the world can see which parking slot is empty and where to park. This is done by sending the data of ultrasonic sensor through our Wi-Fi module that is ESP8266 to any open source easy to use IOT platform that uses HTTP to display our data (thingspeak.com in this case).

Project Title: Automatic Parking Space Detection System

Nazia Bibi 1 , Muhammad Nadeem Majid2 , Hassan Dawood3, and Ping guo4, © 2017 IEEE

Abstract—Searching a suitable parking space in populated metropolitan city is extremely difficult for drivers. Serious traffic congestion may occur due to unavailable parking space. Automatic smart parking system is emerging field and attracted computer vision researchers to contribute in this arena of technology. In this paper, we have presented a vision based smart parking framework to assist the drivers in efficiently finding suitable parking slot and reserve it. Initially, we have segmented the parking area into blocks using calibration. Then, classify each block to identify car and intimate the driver about the status of parking either reserved or free. Potentially, the performance accuracy of recommended system is higher than state of the art hardware solutions, validating the supremacy of the proposed framework.

Project Title: Smart Parking System with Automatic Cashier Machine Utilize the IoT Technology

Agustina Ampuni, Sopater Fonataba, Adi Fitrianto, Information Systems M ©2019 IEEE

Abstract—The difficulty of finding car parking spot has become one of main consideration to create this paper and focusing on develop our proposed smart parking system. Other than that, the utilization of internet of things (IoT) technology has become one of great technology that match for complex system with a minimal use of hardware. With the implementation of IoT based on cloud computing, several smart devices, and also smart automatic machine, the concept of smart parking system are expected to be able to provide services for car parking spot searching and carparking spot allocation through the mobile application.

Savan K. Vachhani et.al [5] analyze the different algorithms that are used in smart car parking. First Come First Serve (FCFS) is used for the car allocation in queue. Priority (PR) is used for priority base queue assigning to the car. Study State Evolutionary Algorithm (SSEA) used for optimal allocation of parking lots. Dijkstra and Ant Colony (ACO) Algorithm are used for the finding nearest empty parking lot for car.In this, Dijkstra does a blind search there by consuming a lot of time waste of necessary resources. Wael Alsafery et.al[6] proposed system that collects the raw data locally and extracts features by applying data filtering and fusion techniques to reduce the transmitted data over the network. After that, the transformed data is sent to the cloud for processing and evaluating by using machine learning algorithms [6].

J. Cynthia et.al[7] proposed scheduling algorithm is used to identify the nearest free slot based on the size of a vehicle. The owner of the parking space can get the analytics of the number of free and available slots for a given period, the occupancy rate on week days and weekend and the amount collected for a given period and can use it for fixing variable parking fees. The mobile application is designed to provide rich customer experience. Prototype is built for single storage parking slot, but this model can be extended for multi storage parking space

[7]. Xuejian Zhao et.al[8] proposed an algorithm for this particular assignment problem and solve the parking planning problem. The method proposed can give timely and efficient guide information to vehicles for a real time smart parking system

[8]. Saidur Rahman et.al[9] proposed an automated system where the parking ground will only open if it has free slots for parking. The user can also check it before arriving there by a website. It will save the time as well as reduce the gathering in front of parking area

[9]. Roja T V proposed a method which allows us to register a free slot with user details and then the unique id is generated for that particular slot. When the vehicle enters the parking slot it asks for the ID which was generated while booking, if the ID is valid then only it allows the enter into the parking slot. If ID is not valid it does not allow [10].

OBJECTIVE

The objective of this paper is to propose a design of an Automated Car Parking System commanded by an Android application that regulates the number of cars to be parked on designated parking area by automating the Parking and Un-parking of the car with the help of Commands of an Android Application. The study of some existing systems shows that the level of automation in them is limited only to features like Number plate extraction, Comparison based on Snapshots of parking spaces, processing of images or Mechanical lifts in case of multilevel parking. Our system aims to reduce the human intervention to the minimal by automating the process of car parking. This in turn would prove to be useful in reducing the time required for search of free parking space by manually driving through multiple slots. The automation in the car is achieved by means of feature of Path Tracing using Sensors. We, hereby, also present a mathematical representation of our system. We also hereby present the results obtained and finally, focus on the future advancements for the project.

MOTIVATION

Locating a parking spot during peak hours in most populated areas like shopping malls, universities, exhibitions or convention centers is difficult for the drivers. The number of vehicles is also increasing daily adding to the parking vows at public places. Cities noticed that their drivers had real problems to find a parking space easily especially during peak hours, the difficulty roots from not knowing where the parking spaces are available at the given time. Even if this is known, many vehicles may pursue a small number of parking spaces which in turn leads to traffic congestion. The aim of this paper is to propose a design of Smart Parking System that regulates the number of cars to be parked on designated parking area and provide parking slots to park the vehicle.

1. Optimized parking – Users find the best spot available, saving time, resources and effort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporate entities.
2. Reduced traffic – Traffic flow increases as fewer cars are required to drive around in search of an open parking space.
3. Reduced pollution – Searching for parking burns around one million barrels of oil a day. An optimal parking solution will significantly decrease driving time, thus lowering the amount of daily vehicle emissions and ultimately reducing the global environmental footprint.
4. Enhanced User Experience – A smart parking solution will integrate the entire user experience into a unified action. Driver's payment, spot identification, location search and time notifications all seamlessly become part of the destination arrival process.

NEED FOR SMART PARKING SYSTEM

To find a parking spot is a time and a fuel consuming process. Studies have revealed that a car is parked for 95% of its life time and is only on the road for rest 5% of time. In a survey conducted by the British National Travel Survey in England, on an average a car was driven for more than 300 hours a year. Now where will a car be parked for these very long hours? It has been found that almost 35% of traffic is caused by drivers wandering around for parking spaces. In 2006, a study in France revealed an estimation that millions of hours were spent every year in France only in searching for parking which resulted in the loss of 700 million euros annually. In 2011, a global parking survey done by IBM states those 22 minutes is spent on average in searching for a parking lot. With these statistics, we can assume that a great portion of global pollution and fuel waste is related to parking issues. Also the convenience provided by the smart parking system will encourage people to start using parking slots on a more regular basis, thus the frequency of vehicles parked on the road shall reduce drastically which in turn shall help in minimizing traffic.

PROBLEM STATEMENT

Problem 1

Nowadays problems such as, traffic congestion, limited car parking facilities have increased at larger extent. One of the important considerations of being a smart city is the Smart Parking facility. Finding a particular space to park our vehicle becomes an annoying issue. Besides, number of vehicles in like manner rapidly grows once every day. It has been seen that the drivers struggle to find a halting extent without thinking about where parking space is open Problems such as, traffic congestion, limited car parking facilities.

Problem 2

Parking vehicles in densely populated areas are often challenging, stressful, and sometimes it becomes a monotonous job for the drivers in jam-packed areas. There are several reasons for the delay in finding parking spaces such as scarcity of parking slots, disordered or unmanaged parking of vehicles, lacking or unaware of parking information at the destination,

which further leads to the wastage of time, fuel, energy and increase in environmental pollution.

Problem 3

The parking planning is one of the most important parts of it. An effective parking planning strategy makes the better use of parking resources possible. This problem is not an individual problem but also a global challenge which includes air pollution, blockage of road, waste of natural resources such as fuel and mainly the time. It is most difficult to find the space to park their respective vehicle in crowded areas.

III. EXISTING SYSTEM

The time consumption in parking is the major problem that most of the people are facing. In the existing system, manpower is required to monitor the parking slot and allot the free slot to the vehicles in the shopping malls and other places. So there is a need for a system that replaces the man power and performs efficiently.

Locating a parking space in central city areas, especially during the peak hours, is cumbersome for drivers. The issue arises from not having the knowledge of where the available spaces may be at the time, even if known, many vehicles may seek very limited parking spaces to cause severe traffic congestion.

Finding a parking slot to park their vehicle has ended up being a disappointing issue to the drivers all the time. It has paved the way for traffic congestion which has turned out to be an alarming problem on a global scale .Searching for a parking space is a routine (and often frustrating) activity for many people in cities around the world.

DISADVANTAGES:

- ➢ Single purpose functions are performed and the system is costly.
- ➢ It may be a bit confusing for the unfamiliar users.

IV.PROPOSED SYSTEM

In our project, we present a Smart parking system. Our Smart Parking system consists of an on-site equipment of an IOT module that is used to monitor and inform the state of availability of each single parking slot with the help of an Ultrasonic sensor which will identify the state of parking slots and Raspberry Pi will be used to monitor and send data to cloud. A mobile application will also be provided that allows a user to check the availability of parking space and book a parking slots accordingly. Thus it reduces the time taken to manually search the empty parking slots in any parking area and also it eliminates unnecessary travelling of vehicles across the filled parking slots in a city. So it reduces time and it is cost effective also. In the recent years, there is many developments in communication technology. This technology can be used to develop a better parking management system. In the proposed system, advanced sensor networks are used to find the free slot. The system will automatically transmit real time parking space. availability data to the knowledge of the users via a LCD display. The display provides information like the status of each slot, whether it is in parked state or Free State, count of vehicles entering and exiting the parking area. The system also includes a web camera which is used to capture the license plate of vehicles entering the parking area. This image is stored as information that comprises of the entry and exit time of the vehicles, the driver's image and the vehicles number plate, in the webpage. These stored images can be used in times of theft or any security issues to find required information.A number of technologies provide the basis for smart parking solutions, including vehicle sensors, wireless communications, and data analytics. Smart parking is also made viable by innovation in areas such as smartphone apps for customer services, mobile payments, and in-car navigation systems. At the heart

of the smart parking concept is the ability to access, collect, analyze, disseminate, and act on information on parking usage. Increasingly, this information is provided in real-time from intelligent devices that enable both parking managers and drivers to optimize the use of parking capacity Real Objects + Internet + Sensors and Controllers = Internet of Things Internet of Things plays a vital role in the creation of Smart Cities. Ultrasonic sensor An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back [1].

Advantages

- The smart parking system that we propose is implemented using a mobile application that is connected to the cloud.
- The system helps a user know the availability of parking spaces on a real time basis.

Proposed working Implementation

The design flow of the system is first, the Raspberry Pi is interfaced with the required number of IR sensors to form a sensor network that monitors the slots to check the availability of slots. The number of slots required depends the slots required. For display purpose an LCD display is being interfaced with the Pi and is situated near the entry gate, so that it provides information like which slot is presently available to the user who is entering the parking area. The LCD display also displays the count of vehicles present in the parking area, each time when a vehicle enters or leaves the parking area.

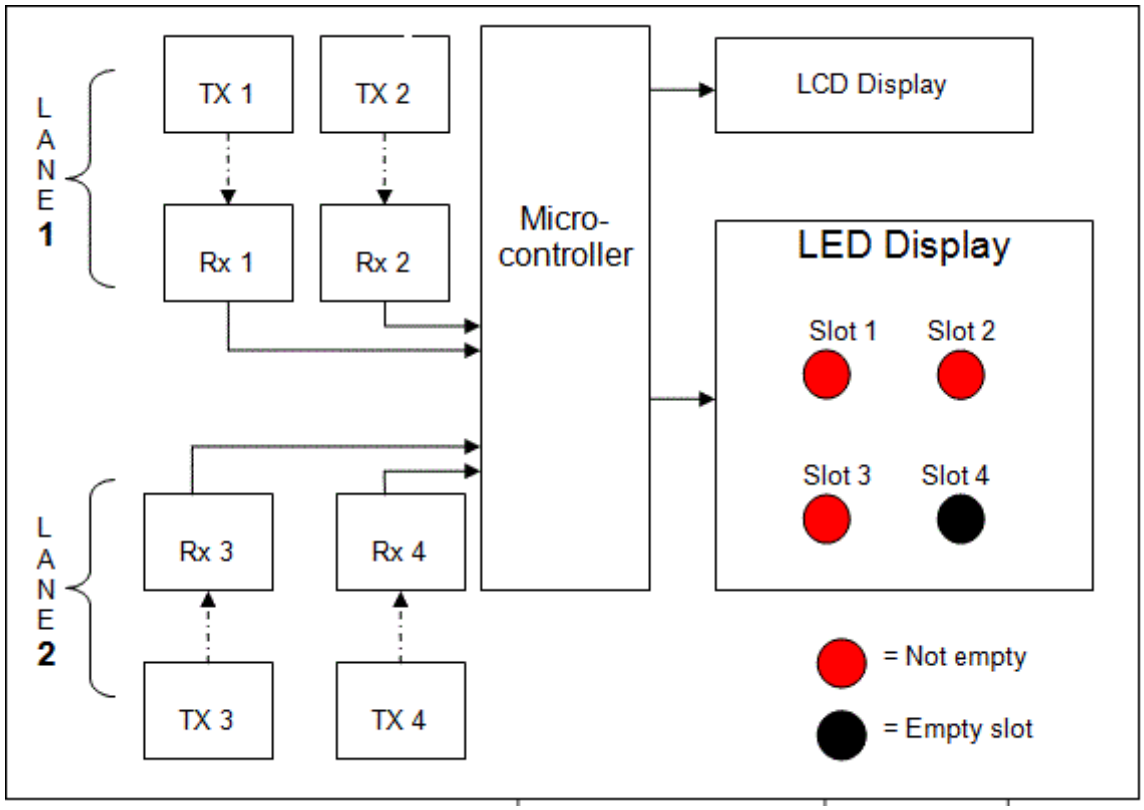
We created a prototype of a novel smart parking framework for an urban domain in light of reservation utilizing Internet of Things (IOT) by using Raspberry-pi. Proposed system provides optimize usage of parking space and get considerable revenue generation. .IOT is enabled by Raspberry Pi world's first open source hardware project capable of connecting with computing devices, digital & analogue machines using GPIO-General Purpose Input / Output Pins. Since Raspberry Pi comes with inbuilt ARM processor which runs Debi an Linux as OS, it could host high level programming languages such as Wiring Pi for processing data transformed through GPIO Pins. INTEGRATING RASPBERRI PI WITH ULTRASONIC SENSOR HSC-SR04 is the commonly used ultrasonic distance sensor which operates to find the distance between 2 to 400 cm distances. This ultrasonic distance sensor module contains four pins such as • VCC – Input Power of 5V • TRIG – Trigger Input • ECHO – Echo Output • GND – Ground Upon triggering the TRIG pin with minimum required High signal of at least 10 S duration, it will transmit eight 40 KHz ultrasonic burst through the sender. The ECHO pin will get high voltage for the duration of time taken for sending and receiving ultrasonic sound signals. Based on the distance of obstacle the pulse width will vary Entire operation of ultrasonic control such as to initiate the sender to trigger sound waves, listening the receiver to calculate the distance will be controlled through Raspberry Pi and Python scripts as below will handle these operations through Wiring Module[3].

The system demonstrates a fully automated car parking system. For this purpose, IR sensors along with motors, LCD display and Raspberry pi are used for controlling the system's working. IR sensors are to detect the vehicle's motion at the entry, exit and also at the slots. The LCD displays the available slot to the driver for parking in the slot. If parking space is not available, barrier gate is not activated and indicated in the display as "PARKING FULL".If slot is free, then allows the vehicle to enter the slot and displays "FREE" where user can park the vehicle. The raspberry pi is used to facilitate the working of the entire system. And, also it takes the count of number of cars entered and exited. At the entry point, camera is fixed so that it will take a picture of vehicle's license plate and the image will be stored in database

by converting the image to data using digital image processing. In case of any theft occurs in parking area, to identify the vehicle or to obtain the details of the like time at which car entered and exited, the data is retrieved from the database. In short, the smart parking management system helps in parking without any human intervention, by knowing the availability of the slots. So the convenience for the people in parking is optimized . As a result of quantitative evaluation using practical databases, the proposed system achieves 97.8% recall and 95.8% precision for parking slot marking detection, 98.1% classification rate for parking slot occupancy. Furthermore, it is revealed that the proposed system can operate in real time, i.e., 47.1 ms for parking slot marking detection and occupancy and 32.0 ms for parking slot marking tracking. In future works, this system can be improved by adding other applications such as online booking by using GSM. The driver or user can book their parking lot at home or on the way to the shopping mall. This can reduce the time of the user to searching the vacant parking lot. As a further study, different sensor systems can be added to improve this system to detect the object and guide the driver or users efficiently.

V. PROPOSED ARCHITECTURE

The architecture of the proposed system consists of a single central server to which the various ultrasonic sensors interfaced with a raspberry pi are connected. These ultrasonic sensors are responsible for detection of a car entering and exiting from a parking lot. So, it can be said that the sensor keeps the count at the parking lot where it is deployed. This information is passed on to the central server by the raspberry pi in real time. The sensor used in this system is HC-SR04 which consists of a transmitter and receiver. Its major application is to measure distance. The transmitter sends a sound wave. It reflects from an obstacle and is captured by the receiver. The time required for this process is calculated by multiplying 0.5 of the time with the speed of sound i.e. 330 m/s to get the distance between sensor and the obstacle. In this case, the obstacle is a car. The system assumes that the car waits in front of the sensors for a few seconds so that the sensors are able to detect it. Now, to make sure that only a car is detected, not anything other, there are two sensors deployed at each entrance and exit. The distance between the two sensors is kept so that it is less than the length of the smallest car but large enough not to accommodate anything else. When these both sensors give approximately the same reading of the distance at the same instance, it is considered as a car. This triggers the raspberry pi to signal the central database to change the available count.The central server collects data from all the parking lots and maintains a master availability chart for the user application. Also, the central database is responsible to keep the records of all the users using the application. This data is collected when a user registers to use the application. So, the next time the user logs in, the database should be efficient enough to authorize it almost instantly. The final part of the system is the user application. It is an Android application for the user to book a parking slot of his/her choice. The application obtains all the data from the central database. The user can select a parking lot by navigating through the application. The locations of the parking lots are displayed using Google Maps API. Each time a user books a parking lot, it is treated as a transaction. At the end of a successful transaction, a QR code is generated which needs to be shown at the entrance so as to verify the user identity.



Proposed Architecture

VI. About Technology

Internet of Things

The Internet of Things, or IoT, refers to the billions of physical devices around the world that are now connected to the internet, all collecting and sharing data. Thanks to the arrival of super-cheap computer chips and the ubiquity of wireless networks, it's possible to turn anything, from something as small as a pill to something as big as an aero plane, into a part of the IoT.

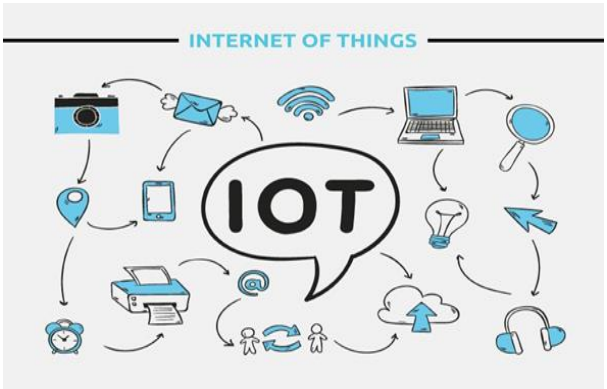


Fig No 2.1: Internet of things

Connecting up all these different objects and adding sensors to them adds a level of digital intelligence to devices that would be otherwise dumb, enabling them to communicate real-time data without involving a human being. The Internet of Things is making the fabric of the world around us smarter and more responsive, merging the digital and physical universes. IoT wants to connect all potential objects to interact each other on the internet to provide secure, comfort life for human. Internet of Things (IoT) makes our world as possible as connected together. Nowadays we almost have internet inf11rastructure wherever and we can use it whenever.

Raspberry PI The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It also now supports hot plugging using USB ports. It has 14 more GP IO pins. It has EEPROM read out support for the new HAT expansion boards. No more back powering problems, due to the USB current limiters which also in hibit back flow,

together with the ideal power diode.Raspbian is a Debian-based computer operating system (OS)for RaspberryPi[12].There are several versions of Raspbian including Raspbian Stretch and Raspbian Jessie [12]. Raspbian is highly optimized for the Raspberry Pi based microprocessors low-performance ARM CPUs. Raspbian uses PIXEL,Pi improved light weight X-Window environment as its main desktop. It is composed of a modified LXDE desktop environment and the Open box stacking window manager with a new the mean few other changes.Raspbian is an open operating system based on Debian optimized for the Raspberry Pi hardware with over 35,000 packages, pre-compiled software bundled format for easy installation on your RaspberryPi.The minimum size of 2GB SD card is required top reinstall the Raspbian OS, but a 4GB SD card or above is highly recommended for future addition of packages recommended. Figure2.3 describes the project code in the Raspbian OS. The code for the sensor data reading is burned in the ADS1115A2D converter and it is interfaced with the Raspberry Pi3 with I2C bus interface. The code for further stages is written in Python in the python (idle) editor of Raspbian OS. The following piece of code is written to read a sensor value in the text editor. First, a new file is created using the python(idle) editor prject.py in the terminal window of Raspbian OS. Then following code is written in the file project.py

Python is the right choice, for data analysis in IoT systems. The language is simple and can be easily deployed. Its large community helps in providing help and libraries as and when required. It is the ideal language for data-intensive applications. Now python is coming into the field, with the following features of python most of developers prefer python programming language.

Installation Steps

SetUp And Installation Of Raspberry PI:

Setup of SD card:

1. Download and launch the Raspberry Pi Imager
2. Insert your SD card into the computer or laptop's SD cards lot.
3. In the Raspberry Pi Imager, select the OS that you want to install and the SD card you would like to install it on.
4. Then simply click the write button.
5. Wait for the Raspberry Pi Imager to finsh writing.
6. you can eject your SD card.

Setup of Raspberry Pi:

1. Insert SD card into SD cards lot.
2. Connect HDMI cable to HDMI port with monitor also.
3. Connect power supply
4. connect keyboard and mouse
5. Start power supply

Following figures how components of raspberry pi.

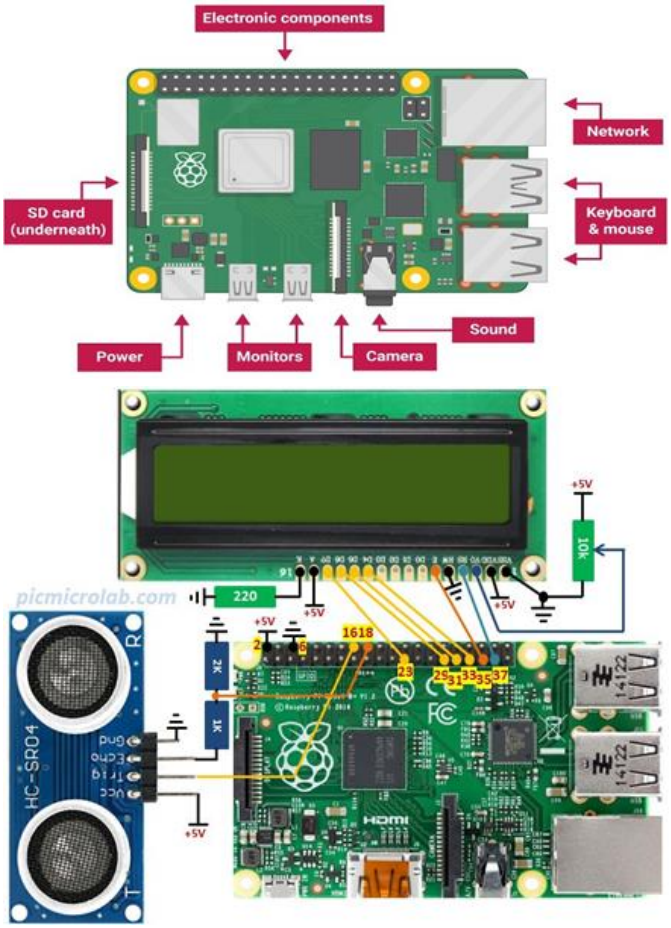


Fig Raspberry Pi

Raspberry PI is a small computer that has a great capability like a personal computer. Numerous things

can be done with Raspberry PI like, controlling hardware robots using computer programming languages, using it as a media center, creating video games from scratch. Moreover, it has powerful graphical capabilities. It also has many inputs and outputs such as USB & HDMI slots, SD card reader, and most importantly the easy access to the general purpose input/output (GPIO). Raspberry PI can work with several operating systems. The official operating system is called "Raspbian" and it can be downloaded freely from their website. The OS can be easily installed by the following setup steps: download the OS and store it inside the SD card. Connect a keyboard and a mouse through USB ports, and a monitor. Plug the power and it will be booted automatically. Choose the needed OS (Raspbian) then install it. Use the keyboard to set date and location and any other needed info. Enter this code in the command line "pi@raspberrypi~$", then type startx, and wait until it is installed. In fact, Raspberry PI has many models and price ranges. Getting the right model that fits our needs is necessary.

Ultrasonic Sensors

A sensor is a device that can detect inputs from the environment such as sound, heat, motion and pressure signals and convert it to data that can be readable by people via a display screen. There are many types of sensors, such as Ultrasonic sensors, IR sensors, temperature sensors, level sensors and infrared sensors. An ultrasonic sensor, which is the one that is used in this project, is sensitive to all types of motion. HC-SR04 is a type of Ultrasonic sensor which has a stable performance and a high accurate range. Moreover, it has a low cost, it is available in the markets, and it is able to measure distances from 0.02 meters to 4 meters with accuracy of about 0.003 meters in every 0.0004 second. The ultrasonic sensor has four pins which are VCC, TRIG, ECHO, and GND. The VCC is an input which connected to a 0 to 5 voltage power source, the TRIG is a trigger that sends sound signals to the car nearest outside objects, and the ECHO receives the returned signals which the TRIG has already sent, and GND is connected to the ground [10]. The ultrasonic sensors in the system need a formula that changes the time it takes for the ultrasonic sound to move from the trigger to the object and back to the eco and transfer it to a distance measurement between the ultrasonic sensor and the object. The trigger sends the signal in a very small time about (0.4 milliseconds) and receives the reflected signal from echo. This process is needed to calculate the distance between the sensors and the object.

(1) Using IO trigger for at least 10us high level signal,

(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

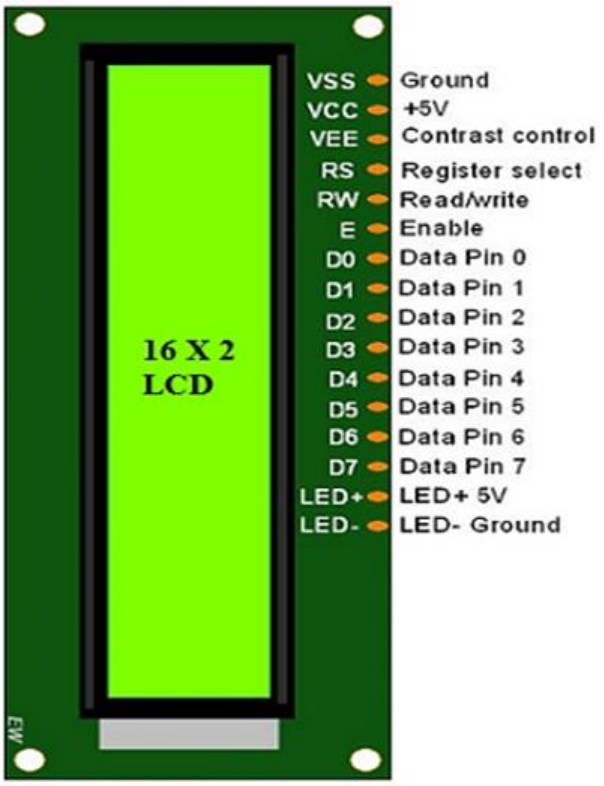
(3) IF the signal back, through high level, time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time× velocity of sound (340M/S) / 2

Ultrasonic Sensors

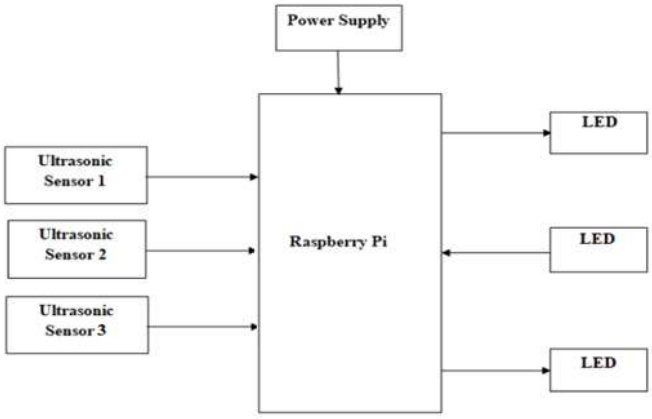
LCD Display An electronic visual display made up of liquid crystals. In this project, a 16X2 display is used. This kind of displays can be found in a wide range of applications in the industries.

• 5 x 8 dots with cursor • Built-in controller (KS 0066 or Equivalent) • + 5V power supply (Also available for + 3V) • 1/16 duty cycle • B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED) • N.V. optional for + 3V power supply



Pin of Diagram of Display Unit

Proposed Block Diagram



Block Diagram

Figure 1 shows the system block diagram of proposed work it major constituent of it are:

Ultrasonic sensor and Pi Camera: Act as an input to collect the data from it reading and viewing sensor.Raspberry Pi: The input from parking lot sensor is given to microcontroller system. To develop the Smart Parking System architecture several pieces of equipment are required: ultrasonic sensors, LCD indicators, microcontrollers, and management software. The ultrasonic detector transmits its status message through a cable to the PIC micro controller , which collects and forwards the information to the central control unit (CCU) through cables. The CCU processes the data and sends commands to the vendors wed application and LED panel. The CCU is the middle layer of SPS and is responsible for controlling the ultrasonic detectors. The CCU is responsible for the collection of parking space information and for processing data for the whole parking lot. The CCU transmits commands to the LED display board to update the parking space information. Simultaneously, collected data can be saved in the parking lot server's database which will allow a supervisor to monitor, manage and control parking lot information.

VII. CONCLUSION

In large cities with heavy traffic, looking for parking with available slots is not only a waste of time and energy; the worst is, causes more traffic.This designed automatic smart parking system which is simple, economic and provides effective solution to reduce carbon footprints in the atmosphere .Smart parking technology is used for enhancing the productivity levels and the service levels in the operations .It also benefits in terms of lowering operating cost and increases revenues and facility value. The growth of IOT and cloud technologies have given rise to new possibilities in terms of smart cities .The efforts made in this review paper are intended to improve the parking facilities of a city and thereby able to enhance the quality of life of the people .To be a smart city, smart parking facility is an essential service. Previous technologies were exploited which proved to be either not efficient or too expensive. Here we have employed raspberry- pi which seem to be cost efficient with easy installation and maintenance .The components used for the implementation of the

system provide efficient output at various stages of implementation. Thus the system functioning is efficient and is recommended for commercial implementation.

VIII. FUTURE ENHANCEMENT

This Project can be extended by using Pi Camera, Raspberry Pi Processor; it has an inbuilt Wi-Fi So We can check the Parking slots without connecting the external Wi-Fi module to the controller. The LCD can also be added to monitor the slots. This project can be extended by adding an application of booking the parking slots before reaching the destination. This can be achieved by using GSM and RFID communication. In future works, this system can be improved by adding other applications such as online booking by using GSM. This can diminish the season of the client seeking the empty parking area. As a further review, distinctive sensor frameworks can be added to enhance this framework to distinguish the question and guide the driver or client's speediest.

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