# A Design Thinking based Smart Parking System for Vehicle Parking Using IoT

## Gayathri U[1], Haran M[2], Charulatha D[3], Anupama A[4], Mrs.Nandhini[5*]

*[1]Gayathri U, UG Scholar, Department of Information Technology, SNS College of Technology, Coimbatore, Tamilnadu.*
*[2]Haran M, UG Scholar, Department of Information Technology, SNS College of Technology, Coimbatore, Tamilnadu.*
*[3]Charulatha D, UG Scholar, Department of Information Technology, SNS College of Technology, Coimbatore, Tamilnadu.*
*[4]Anupama A, UG Scholar, Department of Information Technology, SNS College of Technology, Coimbatore, Tamilnadu.*
*[5]Mrs.Nandhini, Professor, Department of Information Technology, SNS College of Technology, Coimbatore, Tamilnadu*

------------------------------------------------------------------***-------------------------------------------------------------------

**ABSTRACT**: *In the greater part of the advanced urban areas it is troublesome and costly to make additionally parking spots for vehicles since the quantities of vehicles that are running out and about are expanding step by step and the include of the free spaces in the urban communities are the equivalent. This issue prompts blockage for stopping searchers and drivers. To build up an IoT structure that objectives Parking Management which is greatest difficulties in current urban areas. Unavoidable presence of advanced cell urges clients to favor portable application-based arrangements. Development of IoT has cleared route for incorporation of cell phones, remote correspondence advances and portable Applications. This task is an IoT based Smart stopping framework for shrewd urban areas that coordinates with website page. It gives an extensive stopping arrangement both for the client and proprietor of the stopping space. The principle highlight of this venture is to distinguish the closest free parking spot and to exploring to the stopping opening. IR sensors are utilized to recognize if a parking space is free. Accessibility of a free space with its area data is sent utilizing GSM/GPRS module innovation, microcontroller and remote correspondence innovation to the worker and is recovered through a message application. A dynamic calculation is utilized to recognize whether the stopping space is unfilled or involved. The proprietor of the parking spot can likewise get the investigation of the quantity of filled and accessible openings energetic just by pinging our framework through short message. This framework helps in extemporizing the administration of stopping framework by adhering to rules of the legislature, for instance dealing with various parking spots in the city.*

**Keywords-** IR Sensors, Arduino Uno, GSM Voice Modem, Transformer

## 1. INTRODUCTION

At Present, the IoT applications in our day by day life are sprouting, and there is likewise a developing pattern in the utilizations of brilliant urban areas which can help in improving to lessen savvy urban communities' issues. In Smart City we face numerous challenges while creating, to explain shrewd city issues we need to grow such framework which is mix of the new innovation additionally of minimal effort and dependent on the diverse organization blend of the Internet, for example, a media communication, communicated, remote and sensor networks where Internet of Things (IoT) is base innovation. One of the significant issues in a keen city is the Parking.

A leaving opening ought to give clients enough spaces to leave their vehicle since vehicle assumes an enormous function in transportation, there is need of discovering leaving region to leave the vehicles. By making another framework, it can help oversee and diminishing the street traffic. Another framework causes clients to spare time in finding a parking space.

The Internet of Things is tied in with introducing various sensors like ul dynamic and detached IR and so on that associate with the web through various conventions for trading data and to convey, so as to accomplish checking, the executives. Utilizing IoT, Smart City can be set up by coordinating these highlights for IoT improvement. The Internet of Things (IoT) utilizes gadgets which are associated with one another and frameworks to gather the information by utilizing installing sensors, actuators and other physical items.

The online entrance utilized gives the data about the free parking spot accessible through a URL interface. The utilization of gateway disposes of human mistake as the accessibility can be checked without even a second's pause as opposed to utilizing an application which is inclined to glitch and human blunders. As there is no administrator impedance it sets up an immediate correspondence between the supplier and the client.

## 2. STATUS OF CURRENT AVAILABLE SYSTEMS

The current framework depicts the development of conventional stopping framework that it doesn't just give live data to clients so as to make it simple for them to search for empty parking area, it additionally offers power to administrators to screen and perform reenactments to represent the genuine stopping framework. The reason for this task is to apply the standards of line hypothesis into stopping framework demonstrating. The line framework model empowers the forecasts of appearance and administration time in the framework through investigation and counts. Aside of it, Graphical User Interface (GUI) is additionally planned and incorporated into the stopping framework so as to permit stopping zone administrators to screen the status of the parking garages and view the insights of appearance rate, administration time, etc. This task centers around the framework displaying and programming advancement and execution. It is normal that this task will have the option to help stopping zone administrators in planning their framework that will work effectively and create high salary. It will likewise give comfort to the administrators in dealing with the stopping zone distantly. Clients will likewise encounter an efficient and tranquil stopping zone.

### 2.1 LIMITATIONS OF THE EXISTING SYSTEM

The main limitations of the existing system are

- Availability of parking slot is not tracked by physical presence of vehicle in a parking slot.

- System gets failure when the user parks the vehicle mistakenly in another parking slot.

- Less reliability and there exists a unpredictability in parking slot availability.

### 2.2 USERS OF THE SYSTEM

- Individuals owing private vehicle.

- System administrator.

### 2.3 REVIEW ANALYSIS OF EXISTING SYSTEMS

Recent updates in the application like giving the creation features like allotting the spaces reliant on the customer's region, still the applications are not exorbitantly successful to give the possible game plan. There are the applications made like ParkMe halting, Swiss Parking, etc were not prepared to offer the response for the issues to the degree.

| Present e-parking application | Defects in the present application | Ratings | Proposed e-parking application |
|---|---|---|---|
| Park E-Parking | 1. It gives inadequate data to the client.<br>2. It gives less stopping places. | Average | The application gives finished data to the client. |
| Parkitekt Bangalore | It doesn't give legitimate login and enrollment. | poor | It has the easy to use interface. |
| Get My Parking | Sometimes it does not provide you with proper parking places. | Good | Provides with the user required parking places. |

**Table 1.** Comparison of different parking applications with the proposed system.

### 2.4 PROPOSED SYSTEM

The graph below (Fig 1) shows the whole cycle of how the framework functions for finding the closest stopping opening closest to user. The venture proposes an IoT based Smart stopping framework that coordinates with website page. It gives an extensive stopping arrangement both for the client and proprietor of the parking spot. The principle highlight of this undertaking is to distinguishing closest free parking spot and to exploring to the stopping opening. The client will check for the

closest station and he/she will make an impression on the versatile number apportioned for a specific station. The client consequently will get a URL containing data about the free parking spot accessible. IR sensors are utilized to recognize if a parking space is free. Accessibility of a free space with its area data is sent utilizing GSM/GPRS module innovation, microcontroller and remote correspondence innovation to the worker and is recovered however a versatile application. A dynamic calculation is utilized to recognize whether the stopping space is vacant or involved. The proprietor of the parking spot can likewise get the investigation of the quantity of filled and accessible spaces exuberant just by pinging our framework through short message. It sets up the immediate correspondence among client and the specialist co-op with no inward/outer obstruction.
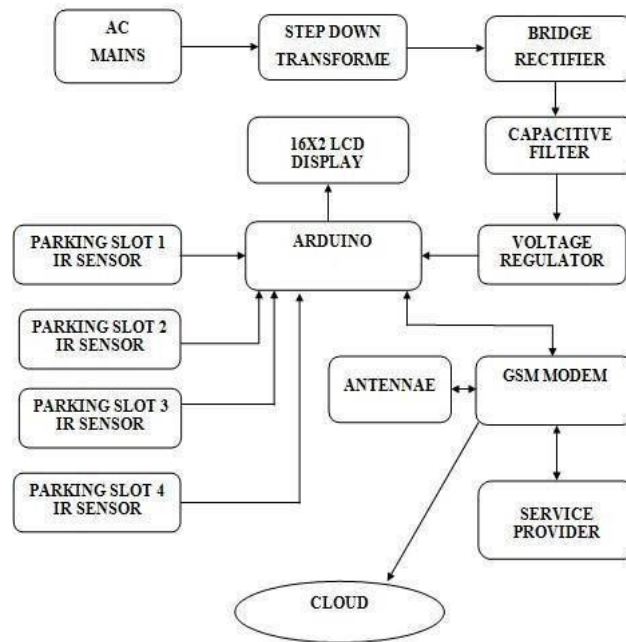


**Fig.1** Block diagram

## 3. TECHNOLOGY TO BE USED

### 3.1 16X2 LCD

This is an LCD Display designed for E-blocks. It is a 16 character, 2-line alphanumeric LCD display connected to a single 9-way D-type connector. This allows the device to be connected to most E-Block I/O ports. The LCD display requires data in a serial format, which is detailed in the user guide below. The display also requires a 5V power supply. Please take care not to exceed 5V, as this will cause damage to the device. The 5V is best generated from the E-blocks Multi programmer or a 5V fixed regulated power supply. The 16 x 2 intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. This booklet provides all the technical specifications for connecting the unit, which requires a single power supply (+5V).



**Fig.2** 16x2 LCD

### 3.2 ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.
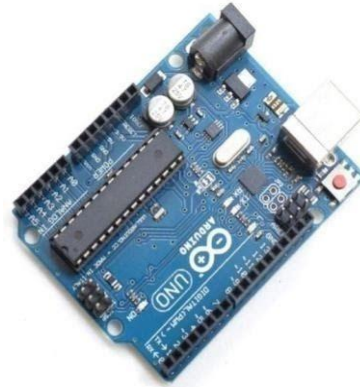


**Fig.3** Arduino Uno

### 3.3 IR SENSOR

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.



**Fig.4** IR Sensor

### 3.3 GSM VOICE MODEM

This GSM Modem can accept any GSM network act as SIM card and just like a mobile phone with its own unique phone number.

Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. The SIM800C is a complete Dual-band GSM/GPRS solution in a SMT module featuring an industry-standard interface, the SIM800CS is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, delivers performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.

**Fig.5** GSM Voice Modem

## 3.4 TRANSFORMER

A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. Electromagnetic induction produces an electromotive force within a conductor which is exposed to time varying magnetic fields. Transformers are used to increase or decrease the alternating voltages in electric power applications. It is a step down transformer in which the secondary winding is more than primary winding. Due to this windings it can able to step down the voltage. A Transformer changes electricity from high to low voltage or low to high voltage using two properties of electricity.
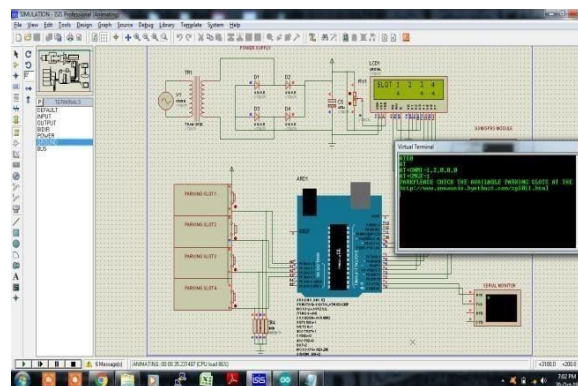


**Fig.6** Transformer

## 3.5 IMPLEMENTATION



**Fig.7** Stimulation Output

**Fig.8** Final Output

## 4. CONCLUSION

In the smart cities, mainly people face problems like parking issue, traffic congestion, time delays etc. which is nullified by this system which helps in improvising the management of parking system by following rules of the government, for example handling different parking spaces in the city. Using internet of things in a smart parking system it helps in reduction in consumption of fuel, it reduces traffic congestion in cities and cloud used for storing the information which is collected from the sensors. The system benefits of smart parking go well beyond avoiding time wasting and Developing a smart parking solutions with in a city solves the pollution problem. It also establishes the direct mode of connection between the service provider and the receiver. This also minimizes the chances of human errors and provides better efficiency.

## REFERENCES

[1]. NoorHazrinHanyMohamadHanif,Mohd Hafiz Badiozaman,Hanita Daud: Smart parking reservation system using short message services (SMS). Published on internation conference on 2010.

[2]. Chumkamon.S, Tuvaphanthaphiphat.p, Keeratiwintakorn,p. "The vertical handoff between GSM and ZIGBEE networks for vehicular communication.©2010 IEEE conferences.

[3]. Smart Parking Service based on Wireless Sensor Networks. JihoonYang, JorgePortilla, Teresa Riesgo" IEEE Intelligent Transportation Systems Magazine, vol. 3(1), pp. 18 - 30, 2011.

[4] Caicedo, F. and Vargas, J. (2012) Access Control Systems and Reductions of Driver's Wait Time at the Entrance of a Car Park. IEEE 7th International Conference on Industrial Electronics and Applications, Singapore, 18-20 July 2012, 1639-1644

[5]. Prasad, A.S.G., Sharath, U., Amith, B. and Supritha, B.R. (2012) Fiber Bragg Grating Sensor Instrumentation for Parking Space Occupancy Management. International Conference on Optical Engineering (ICOE), Belgaum, 26-28 July 2012, 1-4.

[6]. P. Dharma Reddy, A. Rajeshwar Rao, Dr. Syed Musthak Ahmed, "An Intelligent Parking Guidance and Information System by using image processing technique", IJARCCE, Vol. 2, Issue 10, October 2013.

[7]. Samaras, A., Evangeliou, N., Arvanitopoulos, A., Gialelis, J.; Koubias, S., Tzes, A., "KATHODIGOS–A Novel Smart Parking System based on Wireless Sensor Networks", in Proceedings of the 1st International Virtual Conference on Intelligent Transportation Systems, Slovakia, 26–30 August 2013; pp. 140–145.

[8]. D.J.Bonde, R.S.Shende, K.S.Gaikwad, A.S.Kedari, yA.U.Bhokre, 'automated vehicle parking controlled by the Android application' 'in Proc. In t. Comput Pack. Comun. Report. (ICCCI), 2014

[9]. ThanhNamPham1, Ming-FongTsai1, Bing Nguyen1 Duc, Chyi-Ren Dow1 and Der-Jiunn Deng2. "An intelligent parking system based on cloud technologies based on the Internet of things". IEEE access, volume 3, pp. 1581 1591, September 2015 5

[10].Ahmed YaseenMjhool, Ali Abbas Al-Sabbagh, Ruaa A. SaeedAlsabah. "Intelligent parking techniques based on the Internet of Things". Official of telecommunication networks and systems, Vol.1 (1), 1-10 August 2015.

[11].T. Dinh, Y. Kim, "A novel location-centric IoT-cloud based on-street car parking violation management system in smart cities", Sensors (Switzerland) , vol. 16, no. 6, 2016.

[12].Pampa Sadhukhan, "An IoT-based E-parking system for smart cities", Published in: 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI):IEEE Xplore : 04 December 2017.

[13].S.R. Rajeswari, Rohit Kumar Guha, Shubham Gautam, Adwitiya Rahman, T.V.R. Pavani "IOT based Car Parking Mechanism and Control System",:International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-1S4, June 2019.