Review On Development of Smart Parking System

Prof. Bashir Shaikh[1], Rohit Hivaraj Masaram[2], Prajwal Arun Kewat[3], Sahil Lekharam Meshram[4],

Vaibhav Prabhakar Nagose[5]

[1]Project Guide, Department of Electrical Engineering, Priyadarshini College of Engineering, Nagpur

[2345]Students, Department of Electrical Engineering, Priyadarshini College of Engineering, Nagpur

ABSTRACT

Vehicle daily parking is a significant issue today, and its demand is growing everyday. India still uses a manual parking system, which leads to issues like having to waste time and fuel looking for open spaces when we need to park our cars, which calls for a lot of illumination. Because there is no designated parking area everywhere, chaos when parking is another issue that occasionally results in vehicle damage in the store or in the parking lot. There is a security issue as well. We're launching a brand-new parking system based on IOT technologies to address these issues. The system operates as follows: The driver pulls up in front of the garage door, and a screen displays the number of parking spaces that are available.

Keywords: Parking Slot , Arduino Uno , LCD display , IR sensor etc.

I. INTRODUCTION

Cities and large cities have always struggled with a lack of space, which is made much worse by cars parked on the street. Various car parking systems, including the multi-level automatic parking system, the automatic parking system, the Volkswagen Car Park, and many others, are utilised around the world to handle the problem of parking in moving locations. This project's goal is to create a scaled-down working model of a parking place in the parking system. There will undoubtedly be traffic issues on the highways as a result of the increase of automobiles.

This is due to the fact that the constructed parking lot and current traffic infrastructure cannot handle the amount of traffic on the road. The aforementioned issues have been resolved through the development of an intelligent parking system. Drivers can utilise the LCD screen to look for parking spaces in this parking lot-based application, which uses sensors and devices installed in parking lots to relay occupancy information in real time. This would cut down on energy use and air pollution because the motorist could quickly determine where there is a free parking place for his car.

The concept and execution of an automatic parking system are presented in this project. Automation, often known as automatic control, is the use of various techniques to operate machinery or other items with little or no human involvement. The main benefit of automation is labour savings, but it is also utilised to

improve quality, accuracy, and precision as well as energy and material savings.

- Comparison Of Manual And Automatic Parking

Figure 1: Automatic allotment Parking Figure 2: Manual Parking

• This demonstrates that automated parking saves space whereas manual parking is cluttered and takes up a lot of room.

• Over the years, our nation has experienced rapid growth, and today we are in a position where we have numerous excellent transportation options, commercial structures, and an increasing number of cars.

• We employ the manual parking technique when putting these automobiles in the parking lot, which is typically haphazard and chaotic since, due to discipline, people can put their cars anywhere they like, which causes confusion because most of the time people do not follow the specified signal. There will be a major traffic bottleneck at this place as a result.

• In our project, we essentially created a parking system that only requires you to drive up to a gate equipped with a sensor, open the gate, and then use the parking system displayed on the screen.

• The phrase "The parking lot is full!" arises when there are no more spaces available. As a result, one can save both time and energy.

II. OBJECTIVES

The effort is driven by the desire to digitally transform both our nation and our way of life. This automatic car technology is offered and well-liked in several nations. These are the goals:

1. Bringing in automatic vehicle parking in Bangladesh and reaping the rewards.

2. To evaluate this manual parking system's many features against those of the automated parking system.

3. To determine the financial advantages of implementing automated vehicle systems.

4. Using IOT capabilities to create a more sophisticated and long-lasting system.

III. LITERATURE REVIEW

• The necessity for parking spots and the lack of available land are the two considerations that motivate the idea of an autonomous parking system. APS was first employed in the Garage Rue de Ponthieu in Paris, France, in 1905. The APS was a ground-breaking, multi-story concrete building with an internal elevator for moving vehicles to the top levels, where they were parked by inspectors.

• In the 1920s, a car parking system (APS) that resembled a ferris wheel and could accommodate eight vehicles instead of the usual two became popular. This system was known as the paternoster system.

• Small footprint and simple mechanical design. The Paternoster was simple to utilise in a variety of settings, including indoor spaces. Kent Automatic Garages also put in place an APS that can contain more than 1,000 cars.

• Between the late 190s and the 1950s, the Bowser, Pigeon Hole, and Roto Park systems sparked interest in APS in the United States. Seven Bowser, Pigeon Hole systems were set up in 1957, and some of them are still in use today.

• In the 1990s, interest in APS was rekindled in the United States, and as of 2012, 25 significant APS projects (nearly 6,000 parking spaces) were under construction.

IV. BLOCK DIAGRAM

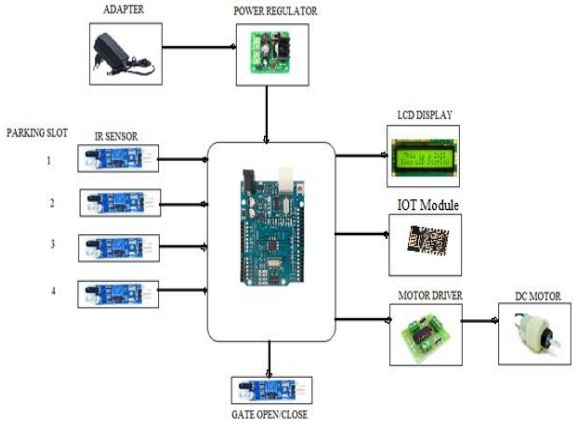

Fig.3. Block Diagram of system

V. WORKING

The automatic parking of the car should be successful if there are clear instructions and instructions on how a driver can engage with the system to discover a free space. For a parking lot to operate properly, administrators and competent administration must be present. A wide range of elements are necessary for the project's successful operation and completion with the least amount of human interference.

- To start, attach a 12 volt adaptor to the control board and turn on the project.
- Here, a power supply unit receives 12 volts. All components receive power from the power supply unit. For power regulation from 12 volts to 5 volts DC, we used a 7805 IC module. This 5 volts is sent to the LCD screen, buzzer, and IR sensor. A motor driver board, an IOT module, and an Arduino Uno Controller (328P) receive 12 volts DC, respectively.
- Case 1, Parking Slot 1 is Full when Sensor 1 is Active.
- Case 2: Other sensors 2, 3, and 4 are operational. Parking space 2,3,4 is occupied
- Case 3: Any sensor that is inactive indicates that a slot is empty. When it happens, the front gate is open for vehicles.
- Case 4: The front portion of the gate is closed to vehicles when all sensors are operational, indicating that the slot is full. And Buzzer begins to buzz.The LCD display will reveal all information.

S2: Full / Empty, S1: Full / Empty Close / Open the gate

S4: Full / Empty, S3: Full / Empty

The price and number of available slots will be shown on the LCD display, and the same information will also be sent via an IOT module. The operator will direct the Arduino to open the gate when a car approaches. When the DC motor receives the signal from the Arduino, it assists the gate in opening. The Arduino will only send the signal to the DC motor. And using an IOT module and LCD display, the availability of parking spaces would be displayed on smartphones. Car will park according to available space.

VI. HARDWARE COMPONENTS

- Arduino Uno
- L293D
- Adapter
- LCD Display
- DC Motor
- IR sensor
- Buzzer
- Resistors
- Capacitors
- Diodes
- Others

Software Specifications :

- Arduino Compiler
- MC Programming Language: C
-

- ***Arduino Uno***

A computer, other Arduino/Genuino boards, or other microcontrollers can all be communicated with via the many offices on the Arduino/Genuino Uno. On PC pins 0 (RX) and 1 (TX), the ATmega328 UART provides TTL (5V) serial connection. The device's

ATmega16U2 broadcasts this serial connection over USB and manifests as a virtual com port on the computer during programming.

- ***IR Sensor***

An electrical device known as an IR (infrared) sensor is capable of sensing specific environmental characteristics through the emission or detection of radiation. Along with detecting movement, it can monitor an object's temperature. It maps or estimates the distance of objects in front of them using infrared light.

- ***Liquid crystal display***

This device can be used for debugging as well as to display any messages or status information. Liquid Crystal Display is referred to as LCD. LEDs (seven-segment LEDs or other multi-segment LEDs) have largely been replaced by LCD.

- ***DC motor***

A DC motor is an electrical device that generates mechanical power from electricity. The motor's output typically consists of the shaft rotating. A DC or AC source may be used as the input. However, a DC motor utilises direct current.

- ***L293D Motor Driver Board***

For low current motors, L293 is the simplest and least expensive. It is less expensive to create your own H-bridge from scratch for high current motors.

Two tiny motors can be controlled concurrently in both directions by the L293 integrated circuit motor controller. Small is truly small. The L293 is only capable of handling extremely modest currents, even though its maximum current limit is 600mA, unless you have done some considerable cooling to keep the case temperature low.

- ***IOT Module***

The most important element of an IoT system is its IoT modules, which are tiny computing components implanted in devices to enable wireless communication between the device and the network..

VII. FLOWCHART

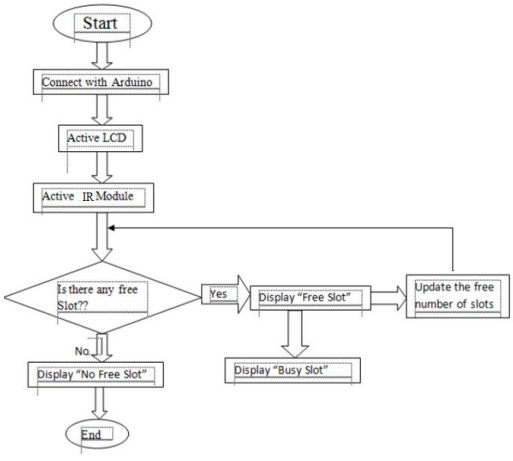

Fig.4. Flow Diagram

VIII. ADVANTAGES

• Independent parking, indoor and outdoor installation flexibility.

• Space utilisation that works. Custom module volumes can be offered, and the puzzle mechanism is fully adjustable.

• Installation that is simple and inexpensive.

• Minimal running expenses.

• Convenient driving in and out.

• It takes less than 180 seconds to park and retrieve the automobile after several entries and exits.

• Low noise, PLC-controlled operation, and safety.

• Reduction in destruction and waiting while parking.

• A godsend for older drivers and inexperienced drivers who typically struggle to park their cars.

IX. DISADVANTAGES OF AUTOMATED PARKING SYSTEMS (APS)

• If the sensors malfunction, it can be exceedingly challenging to move automobiles out of the parking lot and can potentially result in accidents in the parking lot.

• It can be expensive owing to extensive automation technology.

X. APPLICATIONS

• Since APS has a more manageable volume and automated parking systems, it is frequently employed in places where a multi-story parking garage would be either too big, too expensive, or unworkable. Examples of such uses include spaces that are irregularly shaped, underneath, inside, or between existing or new structures.

• Similar to multi-story parking garages, APS can also be used in circumstances where there are separate above-ground, upper-level buildings and lower-level buildings.

XI. CONCLUSION

There are several sophisticated parking methods presented. According to the numerous application examples of the intelligent parking system that is being provided, its effectiveness reduces traffic issues, particularly in urban areas where parking spaces and traffic congestion are both undeniable problems. By directing clients and making the best use of parking spaces, it does this. To determine the benefits and drawbacks of each sensor technology, a study of all those utilised for vehicle detection—one of the most crucial components of an intelligent parking system—is necessary. Although the optical vehicle identification system has significant drawbacks, as previously mentioned, the benefits greatly exceed the drawbacks.

REFERENCES

[1]D.J. Bonde, Rohit Sunil Shende, Akash Sambhaji Kedari, Ketan Suresh Gaikwad and Amol Uday Bokre, “Automated Car parking system commanded by androidapplication”

[2]Mohammed Y Aalsalem, Wazir Zada Khan and Khailid Mohammed Dhabba, “An automated vehicle parking management and monitoring system using ANPR cameras”

[3]M. M. Rashid , A. Musa, M. Ataur Rahman and N. Farhana, A. Farhana, “automatic parking management system and parking fee collection based on number plate recognition”

[4]Vanessa W.S. Tang, Yuan Zheng and Jiannong Cao, “An intelligent car management system based on wireless sensor networks”

[5]Mala Aggarwal, Simmi Aggarwal and R.S. Uppal, “Comparative implementation of automatic car parking system with least distance parking space in wireless sensor networks

[6]Steven Barret, “ Arduino microcontroller: processing for everyone”

[7]Afif Mghawish, Akram A. Abdel Qader and Mahmoud A. Al-Jezawi, "Multi-function control system using GSM modem based SM5100B Module"

[8]Anita L. Shelke, N.R. Kolhare, R.V. Sarvadnya and Vishal A. Kangne, "wireless RF communication based on DSP"

[9]Y.S.E. Ali, S.B. Bashi and M.K. Hassan, "Microcontroller performance for DC motor speed control system"

[10]I.G.A.P Raka Agung, S.Huda and I.W.Arta .Wijaya "Speed control for DC motor with pulse width modulation (PWM) method using infrared remote control based on ATmega16 microcontroller"

[11]Li Min "The Design of SMS Alarm System on CORTEX M3 + SIM900A"

[12]Maria Rodriguez Ferandez, Eduardo Zalama Casanova and Ignacio Gonzalez Alonso "Review of Display Technologies Focusing on Power Consumption"