

Department of Electronic Communication Engineering

Real Time Project

Smart Parking System

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ABSTRACT :

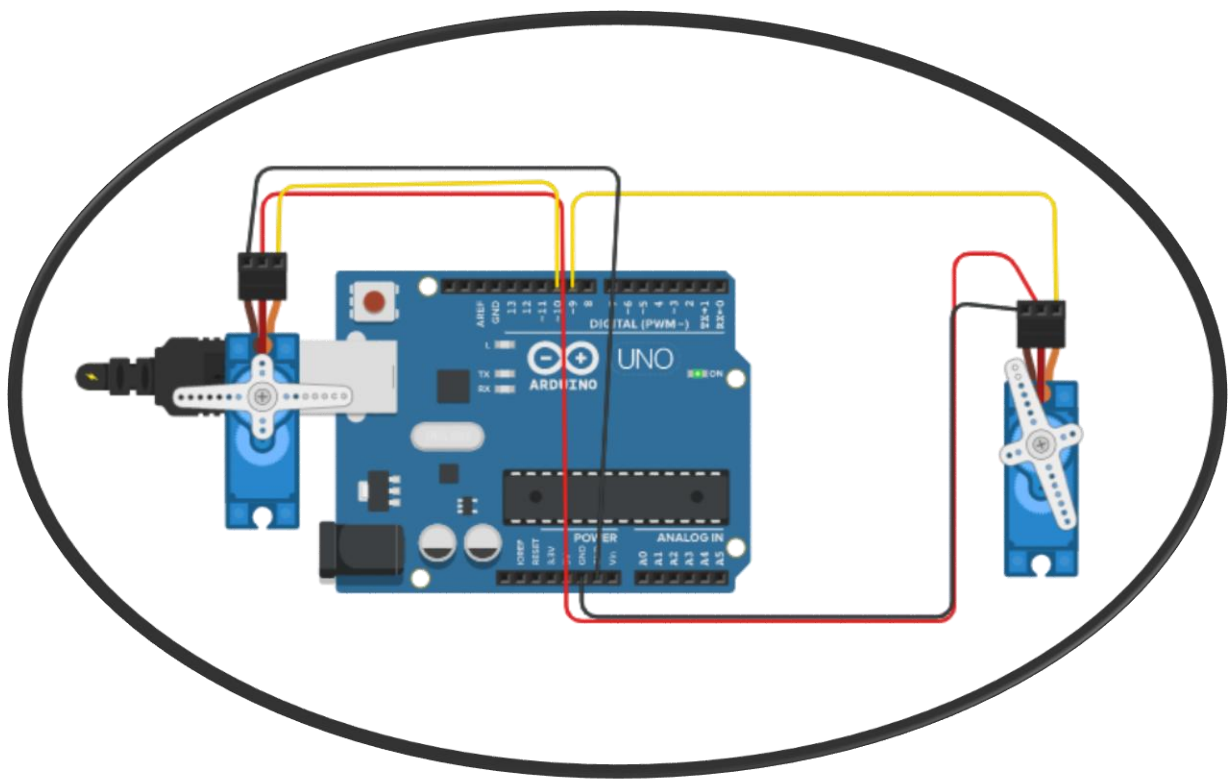
Moving towards the development of smart city, various smart applications like smart home, healthcare, street lighting, parking system, waste management system etc. are part of it. With the advent of IoT, these concepts can be readily achievable; it can increase the quality of services in cities and can improve productivity and reliability. IoT enables the connectivity between surrounding environmental things to the internet. Out of these applications smart parking system is an important part of so-called smart city. It solves the parking issue in urban areas. Smart parking system allows the user quick access which helps in reduction of time in searching the parking spot, reduction in traffic congestion. It can be used to monitor parking systems and exhibit the parking lot situation at any given moment.

INTRODUCTION

Building an advanced parking system is essential in a developing country like India where population and automobiles are increasing rapidly. Usage of the automobiles is increasing very rapidly, but the efficient parking slots are not available to park an automobile, which force the driver to park a vehicle on the roads, which is the reason for heavy congestion on the roads and slow movement of traffic. Although, lot of time is wasted in searching for parking slot. Also, while searching parking slots, movement of traffic becomes slow. To overcome all the problems mentioned above, we need an efficient parking system which would help to reduce traffic congestion at important locations where traffic rush is more. Arduino based car parking will provide automatic management of parking lots without any error. This problem cannot be solved by adding parking spaces or by making multi-storey parking spaces. Instead we need to enhance our available parking system to advanced monitoring parking system. This project will help to ensure the security of a vehicle, reduce corruption, man power and makes the whole parking as an automated system which will be error

HARDWARE REQUIREMENTS

A. Arduino uno The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller. The Arduino UNO board has six analog input pins A0 through A5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor. The Arduino UNO board has 14 digital I/O pins (15) (of which 6 provide PWM (Pulse Width Modulation) output. These pins can be configured to work as input digital pins to read logic values (0 or 1) or as digital output pins to drive different modules like LEDs, relays, etc. The pins labeled “~” can be used to generate PWM. The crystal oscillator helps Arduino in dealing with time issues. How does Arduino calculate time? The answer is, by using the crystal oscillator. The number printed on top of the Arduino crystal is 16.000H9H. It tells us that the frequency is 16,000,000 Hertz or 16 MHz’s



B. Servo motor The TowerPro SG90 9g Mini Servo is 180° rotation servo. It is a Digital Servo Motor which receives and processes PWM signal faster and better. In this system servo motor is used at the entrance and exit to open the gate. It is operated by the digital signals sent from arduino.

C. IR sensor An IR 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. In this system IR sensor is used to detect the vehicle at the entrance, exit and at the parking lot.

D. LCD display LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.in this system LCD display is used to provide the information about the number of

parking space occupied or free. E. GSM module The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. In this system gsm module is used for vehicle authentication by sending and receiving SMS at the entrance and exit respectively.

METHODOLOGY

The proposed system performs three fundamental operations: 1) Incoming vehicle detection and parking spot navigation. 2) Spot allocation and vehicle monitoring. 3) Authentication for the genuine user to avoid vehicle thefts. In the proposed system, Arduino microcontrollers are used to develop the control system. When vehicles enter the parking lot, the sensors at the entrance detects the vehicle and sends the signal to the control system in order to collect the user information for the purpose of authentication. The vehicle number through user mobile number (by sending SMS) will be collect by GSM module interfaced to the microcontroller. After storing the data, microcontroller gives the signal to servo motor in order to open the gate and allows the vehicle to enter into the parking area. The available parking slot will be indicated in LCD display, which guides the user to the free space. After user parks the vehicle in the slot, the sensors detects the presence of the vehicle and sends the signal to the system. System records time from when the vehicle is parked to its exit time and sends the parking slot number to the user mobile number through SMS. When user wants to exit, once again the vehicle number through user mobile number will be collected and compared with the data which is pre-stored during entrance. If there exist a mismatch, information will be sent to the authorized user and the exit gate will be kept closed till the authorization. The time duration will be calculated and appropriate bill will be generated at the exit gate. After the payment, the exit gate will be opened by the system and car exits.

WORKING MECHANISM

Data Collection: IoT sensors installed in parking spots detect the presence of vehicles and transmit this information to the central management system via the communication network. The sensors can utilize technologies such as ultrasonic, magnetic, or infrared to detect vehicle occupancy accurately.

Real-time Data Processing: The central management system processes the received data to determine the availability status of parking spaces. It analyzes the occupancy patterns, calculates the number of available spots, and generates real-time reports and visualizations.

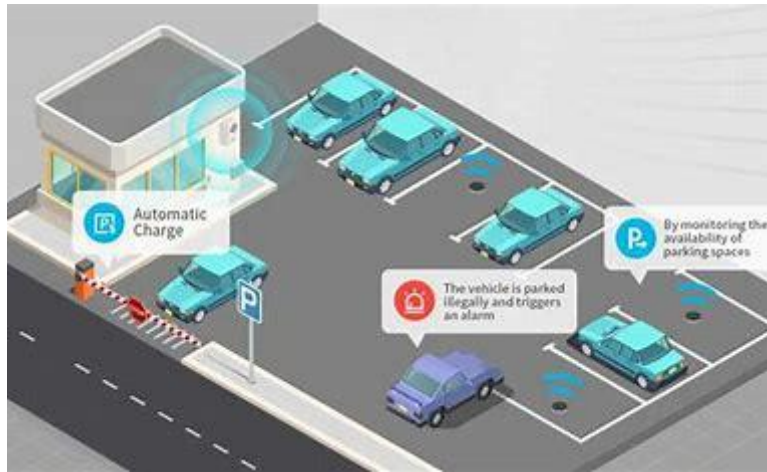
Driver Information: The mobile application, connected to the central management system, displays the realtime parking availability information to drivers. Users can view the nearest available parking spots, navigate to them, and even reserve a spot in advance.

Optimization: The system can collect historical parking data, which can be analyzed to identify patterns and trends. This information can help parking operators optimize parking lot design, implement dynamic pricing strategies, and efficiently manage space utilization.



APPLICATION

* **Raliway Sation**



* Apartment



* Multi- complies



Advantages of Smart Parking

Smart parking systems can be a great opportunity to improve current traffic processes in cities. There are numerous advantages to these technologies, such as the following.

- **Reduces Traffic**
By always directly showing a user where there is a free spot, smart parking can reduce the time searching for it. Cars wouldn't drive around blocks and slow down if there might be a spot.
- **Reduces Emissions**
In addition to the point mentioned previously, by reducing traffic, it also reduces the emissions of cars.
- **Security**
In addition to the improved efficiency, smart parking systems also provide security for the designated area. The software can understand which user tries to reserve a parking spot and can allow or deny access. Especially for offices or restricted areas, this can be a good solution to control who can enter the area.
- **Real Time Traffic Data**
With the data collected of the parking spots, cities can better analyse their traffic and thus improve its efficiency and detect errors.
- **Manage Retail or Office Parking**
Not only cities will see benefits in using smart parking technology, also large office or retail parking lots can. For companies with a high number of employees that come by car, the technology can reduce time, emissions and costs of running the car.
- **Help Cities to Become Smart**
Smart parking is a step into the direction of smart cities. By connecting buildings, cars, transportation and other public services, our future cities can become more efficient and sustainable.

CONCLUSION

Looking at our time's globe, Internet technology has played a major role in marketing, trade, banking, and so on. Internet technology is helping people to create web applications. A good example is the smart parking application. The project's first move was to build a prototype that was connected to the Internet to make the system easier for users to use. The second step in the project was to create a website that allowed the prototype of the parking to interact with the website of the process. The aim of this research is to highlight some of the ways in which smart parking applications will help improve the lifestyle of many car owners and save time when parking in an area around the mall, school or any other way around. Despite having met all the goals and requirements, there are still some goals to be implemented in the future to make the project more effect..

