



International Journal for Innovative Engineering and Management Research

A Peer Reviewed Open Access International Journal

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IJIEMR Transactions, online available on 11th Jan 2023. Link

[:http://www.ijiemr.org/downloads.php?vol=Volume-12&issue=Issue 01](http://www.ijiemr.org/downloads.php?vol=Volume-12&issue=Issue 01)

DOI: 10.48047/IJIEMR/V12/ISSUE 01/74

Title Smart Parking System

Volume 12, ISSUE 01, Pages: 795-804

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Smart Parking System

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Abstract

Modern congested cities have trouble finding parking these days. Parking spaces are scarce, but there are too many vehicles on the road. Our biggest problem is that when we enter a parking lot, there are no open spaces to park our vehicles. A second problem is finding an empty parking slot after entering a large parking area. It is very common to encounter these two problems from time to time, which waste valuable time. That's why we need efficient parking management systems in all parking areas that will provide confusion-free and easy parking. Smart parking is designed to provide confusion-free and easy parking. By utilizing this project, drivers can park their vehicles with the least amount of time wastage with an accurate description of the parking space. This system is capable of finding vacant parking spaces automatically. When there is an empty slot in the smart parking system, newly registered vehicles are allowed to enter the parking lot. When nobody is available, the servo barrier blocks the entrance. Visitors can see the status of the parking area's availability on a 16x2 LCD.

Keywords: Smart parking, Arduino, Servo Motor

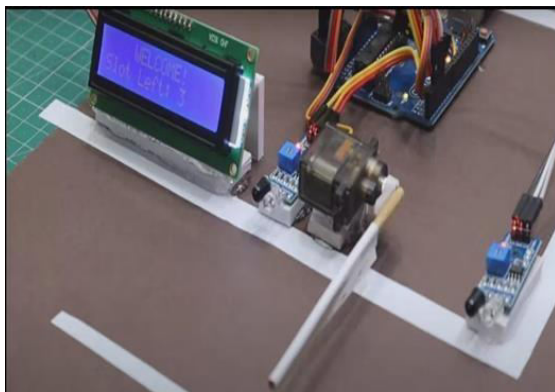
Introduction

Smart parking is a method of managing parking that is more systematic and trouble-free than manual parking. As a result, users will receive better services.[1] The system counts the number of vehicles in the parking area and checks if there is any vacancy. An entry and exit path are provided. When a vehicle enters, the

display shows the number of empty slots inside. When any vehicle leaves, the count decreases and is displayed. If the parking area is full, the display will show a message regarding that. This whole process includes the use of Arduino.

Display, Servo Motor and Sensor. The sensor detects whether the vehicle is

entering or leaving. The report then shown on display. [1] This system is equipped for finding empty parking spots naturally. While a parking spot in a automated parking structure is empty, recently enlisted vehicles are permitted to enter the parking garage. However, the entrance is blocked with a servo barrier. The system finds a slot for you. The LCD screen displays the status of the free spaces outside the parking lot in 16x2 size.



Existing System & Drawbacks

The existing “Smart Parking System” uses multiple people to direct vehicles to available parking spaces. As humans can make mistakes, even a small amount of confusion in the prediction of empty slots can create a big problem.

- Existing parking systems are completely manual and require someone to open and close boom barriers at all times. They are completely dependent on guards.
- Parking managers count grants and non-permit cars physically, which is a time-consuming task.

Proposed System & Advantages

The proposed system allows drivers to park their vehicles with minimal time wasted and accurate information about their vehicle's availability. This system is capable of finding empty parking spots automatically. Newly registered vehicles are allowed to enter the parking lot if there is an empty slot in the smart parking system. Otherwise, the entrance is blocked by a servo barrier if no available slot is found. There is a 16x2 LCD display outside the parking lot that shows the status of free spaces. In this system we don't need more people to guide the drivers of vehicles.

With this project, we are informed beforehand whether parking slots are available or not, which allows us to park vehicles without confusion.

This project helps us save a lot of time and effort.

Literature Survey

This chapter explains a few of the smart parking applications along with their method of working. The following paragraphs provide a very brief summary of the basic methodology of these applications. The survey table has all the features that can be examined based on the study of these applications. Finally, this

chapter includes all the problems with existing systems.

Buying a vehicle is not generally viewed as an extravagance. Having a vehicle is to a greater degree a need rather than an extravagance. People are expanding vehicle proprietorship as their monetary circumstance gets to the next level. The intricacies and strains of stopping develop thus. For parking garage spaces to run as expected, participation and cooperation alongside proficient stopping the board programming are fundamental.

From a straightforward espresso machine to an enormous farm hauler, all that in the present society is mechanized.

Present day machines have made our lives such a great deal simpler that we can't comprehend how we would work without them. Furthermore, as though improving on work wasn't sufficient, an ever increasing number of endeavors are being made toward complete mechanization of normal undertakings, which will help us on an unheard of level.[4]

Furthermore, programmed stopping frameworks and Airbnb stopping were acquainted with the stopping area. The programmed stopping framework has demonstrated to be multiple times more productive than the customary stopping

framework due to powerful stopping the executives programming. The justification for the mix of programmed stopping frameworks through programming for stopping the board is on the grounds that ordinary and customary stopping frameworks, which are presently being used, have various imperfections.

Before, the customary stopping framework's usefulness might have been good, however current structures face new difficulties that call for savvy fixes, for example, Airbnb stopping. Lease Park, a main stopping the board programming supplier, has recorded probably the most well-known issues with manual stopping frameworks.

High reliance on monitors:

Since customary stopping frameworks are totally manual and expect somebody to open and close blast boundaries consistently, they are totally dependent on monitors. The gatekeepers are likewise responsible for physically entering data, taking care of installments, refreshing accessibility status, and dealing with the general activities of the parking area.

Manual checks:

Leaving chiefs count grants and non-license vehicles physically, which is a tedious undertaking. Actual assessment of the vehicle's status and written by hand tickets are expected in this situation. In this on the off chance that such a manual methodology brings about half section mistakes, huge misfortunes are probably going to happen.

Expanded work costs:

Perusing, composing, and entering information takes a great deal of time and exertion. Capital uses are expanded pointlessly because of cash spent on work that performs redundant manual activities that can be effectively and productively robotized. Furthermore, the work costs engaged with the support of a manual stopping framework is more since all tasks must be done physically.

Significant delay for Clients:

In manual stopping the executives frameworks, clients should sit tight in line for significant stretches of time to both enter and leave the parking area because of obsolete or manual activities. Clients' time is wasted thus, and the organization's drawn out suitability is endangered.

Incapable administration of guests:

Guests are much of the time permitted section into premises by monitors without first affirming with the individual they are visiting, which could bring about some unacceptable individual being allowed admittance. Because of this, manual stopping the board frameworks present a high-risk component to other people and building inhabitants. They offer a larger number of detriments than benefits. Changing to computerized stopping frameworks with the assistance of completely coordinated stopping the executives programming would be the best method for battling this issue. They are Eco- accommodating, easy to utilize, and practical.

Advantages of a Smart Parking System:

- There is a heightened sense of security due to the fact that patrons do not actually walk to and from their own space.
- It is highly feasible for extremely small sites that are unable to accommodate a conventional ramped parking structure.
- There is high parking efficiency.
- There is no requirement for driving while looking for an available space. This greatly reduces and lowers emissions.

- The patrons wait for their car in a highly controlled environment. There are fewer instances of vehicle vandalism.
- There is a minimal staff requirement if it is used by known parkers.

ARDUINO UNO

The Arduino Uno is an open-source While the Uno communicates using the original STK500 protocol, it differs from all While the Uno communicates using the original microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc.[3] The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production

files for some versions of the hardware are also available.

PROXIMITY SENSOR

A proximity sensor is a sensor able to detect the presence of nearby objects without physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. The proximity sensor targets are equipped with different sensors. For example, a capacitive proximity sensor or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

Proximity sensors can have high reliability and a long functional life because of the absence of mechanical parts and the lack of physical contact between the sensor and the sensed object. Proximity sensors are also used in machine vibration monitoring to measure the variation in distance between a shaft and its support bearing. This is common in large steam turbines, compressors, and motors that use sleeves-type bearings. A proximity sensor adjusted to a very short range is often used as a touch switch.

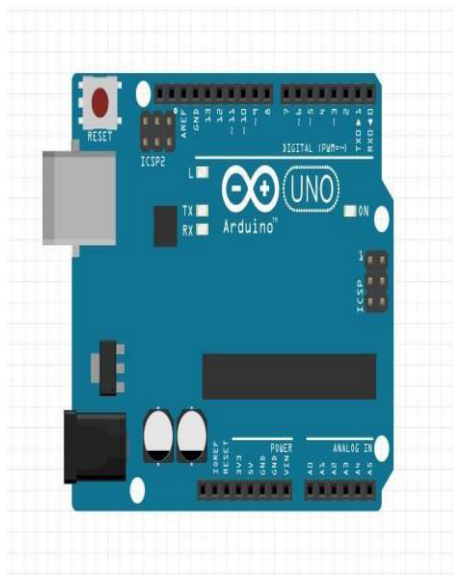


Fig: Proximity Sensor

LCD SCREEN

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images or fixed images with low information content, which can be displayed or hidden. For instance, preset words, digits, and seven-segment displays, as in a digital clock, are all good examples of devices with these displays. They use the same basic technology, except that arbitrary images are made from a matrix of small

pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a positive LCD display with a backlight will have black lettering on a background that is the color of the backlight. A character negative LCD will have a black background with the letters being the same color as the backlight. Optical filters are added to white and blue LCDs to give them their characteristic appearance.



Fig: LCD Screen

I2C MODULE

I2C Module has a inbuilt PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. These modules are currently supplied with a default I2C address of either 0x27 or 0x3F. To determine which version, you have checked the black I2C adaptor board on the underside of the module. If there 3 sets of pads labelled A0, A1, & A2 then the default address will be 0x3F. If there are no pads the default address will be 0x27.



Fig: I2C Module

SERVO MOTOR

A servo motor is a rotary actuator or linear actuator that allows precise control of angular or linear position, velocity, and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. Servomotors are used in applications such as robotics, CNC machinery, or automated manufacturing. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

Servo motors are used in modern automobiles to control their speed. When the accelerator is depressed, it sends electrical signals to the car's computer. The computer then processes this information and sends a signal to the servo attached to the throttle to adjust

the engine speed.

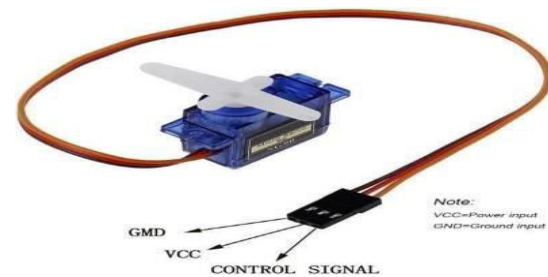
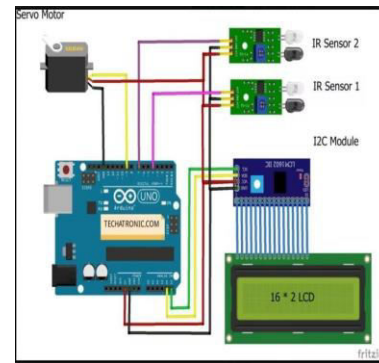


Fig: Servo Motor

BREAD BOARD

A breadboard is used to build and test circuits quickly before finalizing any circuit design. The breadboard has many holes into which circuit components like ICs and resistors can be inserted. A typical breadboard is shown below:[3]

The bread board has strips of metal that run underneath the board and attach to the holes on the top of the board. The metal strips are laid out as shown below. Note that the top and bottom rows of holes are

connected horizontally while the remaining holes are connected vertically.

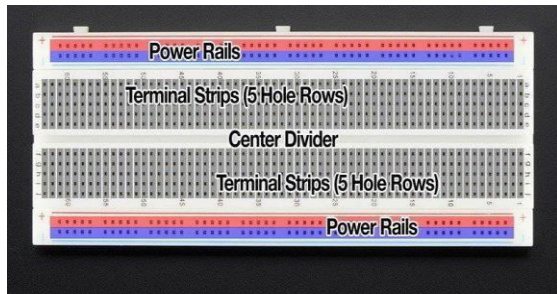


Fig: Bread board

JUMPER WIRES

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much simpler than jumper wires.

Though jumper wires come in a variety of colors, the colors don't actually mean anything. This means that a red jumper wire is technically the same as a black one. But colors can be used to your advantage in order to differentiate between types of connections, such as ground or power.

Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the

wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you are likely to use most often. When connecting two ports on a breadboard, a male-to-male wire is what you'll need.



Fig: Jumper Wires

ARDUINO CABLE

Cable For Arduino UNO/MEGA is the most common A to B Male/Male type peripheral USB cable for Arduino. It is compatible with most Arduino boards such as Arduino Mega, Uno, Arduino Duemilanove. Often used for printers and other peripherals. While still a bit bulky in shape for small embedded systems, this is a standard cable found everywhere. Use this cable with Arduino UNO and others, but not with Arduino Leonardo-based boards. A cheap USB cable or a faulty USB cable can harm your printers or Arduino boards

and cause errors repeatedly when printing / programming critical data. In order to maintain the integrity of your printers, you must use high-quality USB A to B printer cables. Techtonics.in sells high-quality USB A to B cables at a reasonable price. Connect your Arduino, USB printer, scanner and more to your computer. Transmit data or programs at high speeds with error-free, high-performance transmission.



Fig: Arduino Cable

Further Enhancements

The future application of this system is to add a few features like displaying the exact number of empty slots on the LCD screen. LCD screen can be replaced with a mobile phone to get information about the parking area and availability of empty slots.[5]

Conclusion

The framework makes stopping simpler and more productive than the manual strategy. Subsequently, the framework will

offer better administrations to the client. The framework includes the quantity of vehicles in the leaving region and checks assuming there is any opening. The way for both section and exit is something very similar. At the point when a vehicle enters the leaving region, the LCD screen shows the quantity of void openings situated inside

Implementation

You may effortlessly locate available parking spots by using this system. Newly registered vehicles are allowed into fully automated parking provided there is a free spot, unless a servo barrier is obstructing the entrance. This is due to the system not detecting any spots available. Visitors can check the number of open spaces on a 162 LCD outside the parking area.

Essential Parts

Arduino UNO Ir sensors two Servo motor, jumper wires, a 16x2 LCD on a breadboard, and an Usb connection with an I2C module enabling uploading the code the leaving region. At the point when a space opens up, the servo hindrance opens and permits vehicles to enter the parking garage. After a vehicle is left inside the parking area, the count of accessible spots diminishes by

1. At the point when any vehicle leaves the parking area, the servo obstruction

opens and the count increments by 1 and is shown on the LCD screen. Assuming the stopping region is full, the LCD screen will show a message that the stopping is full and the servo obstruction stays shut. This entire cycle incorporates the utilization of Arduino, LCD screen, Servo Engine and Nearness Sensor. The sensor distinguishes whether the vehicle is entering or leaving. The report is then shown on a LCD screen.

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