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SMART CAR PARKING SYSTEM USING ARDUINO UNO

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ABSTRACT: The increase in population results in a high vehicle density on the roadways, according to continuing research on metropolitan areas. As a result, it becomes a frustrating problem for the drivers to exit their automobiles because it is risky to find a slot to park our vehicle . This essay introduces an autonomous smart parking system for cars that is web-based project. This study presents an algorithm-based smart parking system that uses sensors and an Arduino UNO. To determine the location of the parking space, IR sensors are used. The closest and best parking spot that is available and occupied by individuals is located using arduino-based code techniques. Parking spaces may be seen from any location with the help of the sensor and LCD. In Slot, the sensor is used to detect cars. Arduino is connected to these infrared sensors. The Arduino provides a command to the IR sensor whenever a car is parked in a building, and the IR sensor then sends the command to the LCD, which has 20*4 size.

KEYWORDS :Smart parking, IR Sensors, Parking Slots, Authentification.

1. INTRODUCTION:

Numerous stories about the topic of stopping have appeared in daily newspapers across India, some Tier-1 cities such as Delhi, Mumbai, Chennai, Bangalore, and other major cities also.

Nowadays, it might be very difficult to locate a parking spot in crowded cities. There are not enough parking spaces but there are too many cars on the road. One of the major issues is realising there are no open parking spaces when we arrive at a parking spot. If there are large acres of spread area on one level or several levels, finding a parking space could be the simplest or the most difficult chore. Because the destination is unknown, unnecessary time and fuel are used. The difficulty we have finding an empty parking space after entering a large parking lot is another major issue. Perhaps these two issues have occasionally plagued us all, wasting valuable time. Because of this, all parking lots require effective parking management systems that will make parking simple and straightforward.

To solve this issue,will create a "Smart Parking System Project." This initiative provides

1. precise information about parking space availability,
2. Reduce traffic
3. Reduce pollution allowing drivers to park their vehicles efficiently and quickly.

2. LITERATURE SURVEY:

Parking scheduling has been transformed into an offline issue. The offline issue is characterised as a linear issue. An algorithm was used to solve the linear issue. Simulated experiments were then conducted. However, the directing of automobiles is not covered in this essay. In the paper [2], a parking lot solution based on IR sensors is suggested. The study [2] does not, however, address the issue of a sizable parking lot. A parking system based on the ZigBee network has been suggested in Paper [3]. Here, data regarding the parking space is gathered through a web service. Our method is based on the Arduino microcontroller, which is an 8051 type device. The Arduino runs the Arduino IDE application, which must be installed on the computer. We do simple microcontroller embedded C code that is immediately integrated into the Arduino system. We write straightforward embedded C code in the microcontroller and then upload it directly to the Arduino microcontroller. As a result, the code-based system keeps track of how many automobiles have entered the parking garage. Using a liquid crystal display board, the counting will be displayed.

3. PROPOSED ARCHTECTURE:

The following two key elements make up an arduino-based IOT-based car parking system. The first section consists of an IR sensor, and a servomotor, all of which are connected to an Arduino using jumper wires. As a result, whenever a car pulls into a parking space, an IR sensor recognises the presence of the vehicle, sets its output to high, and communicates the information to an Arduino board.

2. There is an LCD in the section that notifies users when our required parking place is empty for free. The availability of parking spaces can be checked by the user using this Infrared rays sensor(IR sensor) from a distance, and the 20*4 LCD should be used to show the current position of a slot.

3.1 Arduino UNO:

A wide variety of electronic and internet projects can be built using the open source Arduino Uno R3 model. A microcontroller that includes both structured and physical PC operating systems is the Arduino Uno R3.

Fig 1; Arduino UNO

3.2 Proximity IR Sensor:

An Proximity IR sensor is a piece of technology that produces infrared light to detect certain elements of its environment. An IR sensor can monitor an object's heat while also spotting movement.

These sensors are referred to as passive IR sensors since they do not emit IR radiation.

Fig 2 ; Proximity IR Sensor

3.3 Servo Motor:

The Servo car is recognised as the gate of the entrance system's barriers and for detecting the presence of a car nearby. The Arduino Uno R3 is connected to a servo motor in this project to simulate an entry barrier. Following the car verification, the controller physically opens the barrier gate using an app that only the controller Will have access to.

Fig 3 ; Servo Motor

3.4 20* 4 LCD display:

The 16*2 LCD panel, which we have used in various projects, is essentially a bigger (with more rows and columns) version of the 20*4 LCD display. The display is ideal for displaying a huge amount of text without scrolling because it offers space for 20 columns of characters on 4 rows.

The 58 pixel resolution of each c olumn ensures that it may be seen well from a fair distance. Aside from its size, the unique feature of the display utilised in today's tutorial is that it connects with the Arduino using the I2C protocol, requiring only two wires in addition to GND(Ground) and VCC(Power Supply). The Parallel to I2C module connected to the display, as seen in the photo below, makes this feasible. The I2C module can also be purchased separately and connected to the 16-pin display.

Fig 4 ; 20*4 LCD Display

3.5 ArduinoIDE:

Writing and uploading code to the Arduino UNO board is made incredibly simple by this software. Based on open source software, the code is. Using a USB cable, the programme was uploaded to the Arduino Uno board. Special coding guidelines are supported by the Arduino IDE for C languages.

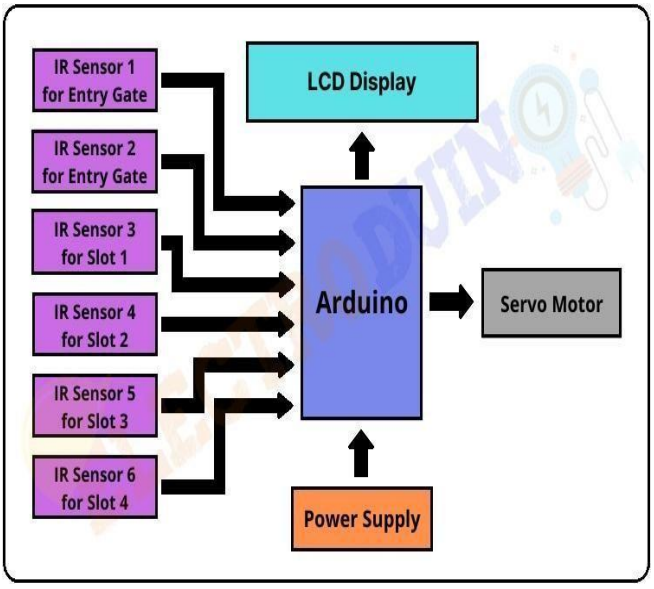

Fig 5 ; block diagram of Smart Car Parking System

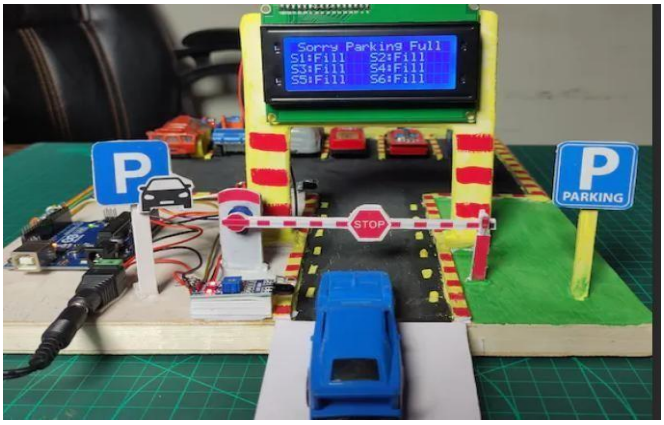

Fig 6 ;Propsed model diagram

4. WORKING:

Our project operates under the straightforward tenet of obstacle detection and visual feedback. An infrared transmitter and a receiver make up the proximity sensor, which is fixed to the parking lot ceiling. Infra-red rays are emitted by the IR emitter, and these rays typically reflect off of objects. These rays are picked up by the IR receiver, which transforms them into an electrical signal and a potential difference. The ensuing potential discrepancy aids in closing the circuit. The Ligh Emitting Diode(LED) are positioned along the driveway and turn on in response to input the IR sensor receives. In order to fix a certain distance based on the typical height of the cars used to send then receive the radiations, a threshold distance is calibrated using a potentiometer.

After putting together every part in accordance with the circuit layout and programming the Arduino board. Now, precisely position the sensors and servo motor.

We have four parking slots in this project to park our vehicle and we place four IR sensor with the following pins in the arduino Uno -3, 4, 5, and 6 are placed at slot numbers -1, 2, 3, and 4 respectively. IR sensor-1 and 2 are placed at the entrance and exit gates respectively and a servo motor is used to operate the common single entry and exit gate. We can place our LCD display based on our convenient place.

We used IR sensors 1 and 2 to identify whether or not vehicles were coming at the gate and IR sensors 3, 4, 5, and 6 to determine whether or not the parking space was unoccupied.

The LCD display initially indicates that all parking spaces are unoccupied when they are all empty.

The IR sensor-1 detects a vehicle when it approaches the parking area gate, and the system then permits entry into the car by opening the servo barrier. Once a vehicle has entered the parking lot and is parked there, an Light Emitting Diode(LED) display indicates that the specified slot is full. This way, the system permits 4 automobiles automatically.

The mechanism barred the entrance gate by closing the servo barrier in the event that there is no more room for parking. Additionally, the LED display reveals that slots 1, 2, 3, and 4 are all taken.

The IR sensor-2 identifies the car when it exits a slot and approaches the parking area gate, at which point the system opens the servo barrier. The slot is then empty as indicated by the LED display. Once more, the system willlet the entry of a new vehicle.

5. WORK FLOW

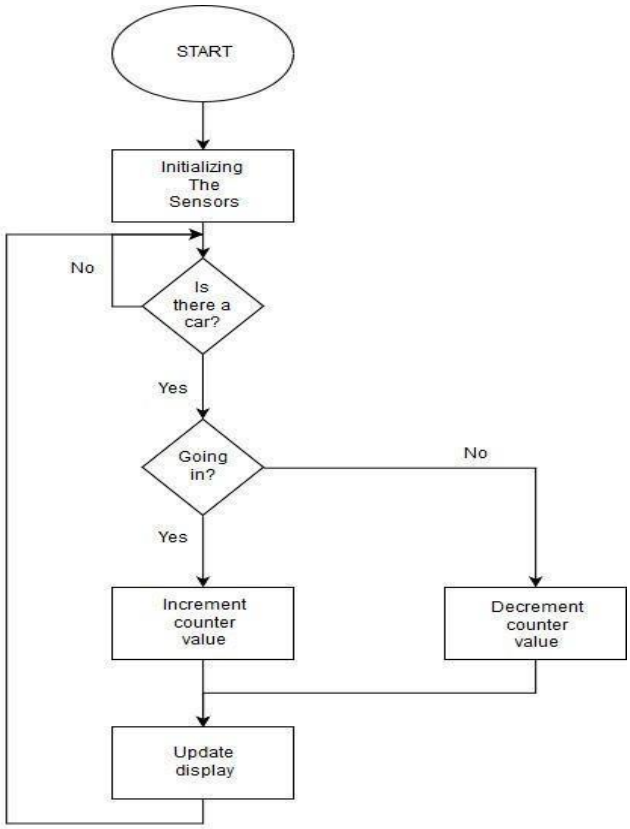

Fig 7; work flow of smart car parking system

6. RESULTS

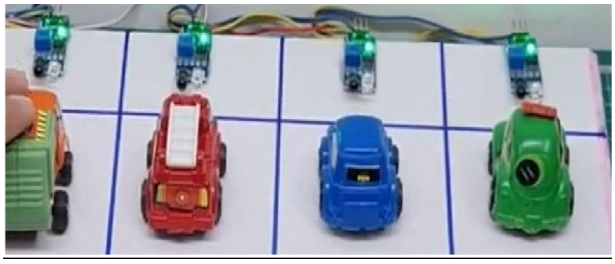

Fig 8 ; IR Sensor Detecting car

Fig 9 ; LCD Display Output

In the proposed model the IR sensor present in the entrance will detect the car and it will send the signal to the Arduino UNO. From Arduino to the signals will go to the servo motor then the gate will open.

After car enter into the parking lot there will be a LCD display which help the driver to find the empty slots present in the parking .

LCD Display will also show the parking slots which are empty and which are full.

If incase the whole parking lot or area is full then the LCD Display will show “Sorry Parking Full”.

While the cars are leaving from the parking area the IR Sensor which is present at the exit side will detect the car and send the information to the Arduino uno and from there to the information will go to the servo motor then the gate will open and the car can leave parking area without any problem.

7. CONCLUSION

Our solution helps drivers find parking in unfamiliar cities by identifying vacant spaces. This technique significantly reduces the time that people typically wait to park their cars. The suggested technique offers the best solution, ensuring that the majority of vehicles successfully locate a vacant parking space. The performance of the Arduino UNO-based system may effectively satisfy the needs and requirements of existing automobile parking difficulties, consequently reducing the time required to find a empty parking space and rendering real-time information, according to our preliminary test results. cheap cost, and an effective large-scale parking system are all provided by this smart parking system. When a slot is occupied, an LED light flashes; when a slot is unoccupied, an LED light is automatically switched off to indicate that the parking space is available for occupants. When a car pulls into the parking lot, the driver parks the vehicle in the nearest

Available empty slot. Additionally, it prevents vehicles from idling through occupied parking spaces in a city.

8. FUTURE SCOPE

Future studies can improve this framework by adding additional applications, For instance, online reservations made using GSM. The customer can reserve their parking space either at home or on the way

to the shopping centre. The client may spend less time looking for vacant parking spaces as a result. To further examine, unique sensor frameworks are introduced to improve this framework in order to identify the query and direct the driver or customers as quickly as possible. We'll try to reduce the mechanical construction and make it more environmentally friendly.

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