Smart Car Parking System

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***Abstract*:- This project deals with an effective way of finding empty spaces and managing the number of vehicles moving in and out in complex multi storeyed parking structures by detecting a vehicle using IR sensors and thus providing a feedback. The fully automated smart car parking system is rudimental and does not require heavy lines of code nor expensive equipment. It is a simple circuit built for the exact need of purpose. This automated system is used to find the vacancy in parking spaces available and navigate the driver to reach the desired space using visuals and in an effective manner, thus reducing search time. This system is required for malls, multistorey parking structures, IT hubs and parking facilities. This makes sure the requirement of labour is insubstantial.**

Keywords: Automated, smart car parking system, IR sensor

I. INTRODUCTION

In the present scenario around us we see excess vehicles and the ineffectiveness to manage them in the correct order. As the population increases day by day the rate of utilization also increases and coping up with the numbers becomes a task. An omnipresent problem around the world is finding a parking space to park your vehicle. This task looks simple on side roads and interior lanes but the actual problem arises when parking in malls, multistorey parking structures, IT hubs and parking facilities where several hundred cars are parked and it becomes arduous to find a spot. The general approach to finding a parking space is to go around and drive aimlessly until a free space is found. Finding a parking space could be the easiest task or could be the most tedious one when it involves wide acres of distributed space across one level or multiple levels. The time and fuel are consumed unnecessarily because the destination is unknown. The easiest way of approach is to provide a destination specific driving within the parking structure. A smart car parking system gives a visual output indicating an available parking space rather than driving aimlessly. The driver looks up to the LED Screen to deduct a result of determining the parking space availability.This system not only makes the accessibility easy but also manages the congestion of vehicles avoiding long search and wait times.

Fig 1.1 Multi-storeyed parking structure

Fig 1.2 Underground parking structure

II. METHODS AND MATERIAL

A. Methodology

The parts which are going to be used in these projects are Arduino IDE software and Proteus Software .

B. Components Used

- LED Screen
- Infra-Red Sensor
- Arduino IDE
- Servo motors
- Arduino UNO
- Wires
- Resistance

1. LED Screen

A LED display is a flat panel display that uses an array of light-emitting diodes as pixels **for a video display**. Their brightness allows them to be used outdoors where they are visible in the sun for store signs and billboards.

Fig 2.1 LED Screen

2. Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing

text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information.

Fig 2.2 Arduino UNO

3. Infra-Red Sensor

An infrared sensor is an electronic device, that emits infrared rays so as to detect a few parts of the environment. An IR sensor can gauge the warmth of an object as well as detects the motion. These sorts of sensors measure just the infrared light that falls on them, as opposed to transmitting it that is called as a passive IR sensor. Most of the objects radiate some type of warm radiations. These sorts of radiations are imperceptible to our eyes. It can only be identified by an infrared sensor. The emitter is just an IR LED (Light Emitting Diode) and the detector is basically an IR photodiode which is delicate to the IR light of a similar wavelength as that discharged by an IR LED. When the imperceptible light falls on the photodiode, the resistance and the output voltages change in relation to the size and intensity of the IR light. They require very low power and do not require any kind of contact for detection, they are not affected by oxidation or corrosion. IR sensor is used in this project by considering all these advantages.

Fig 2.3 IR sensor

4. Servo Motors

Servo Motor has three pins, one of them goes to Vcc, other one to GND while the center pin is the controlling pin and goes to any digital PIN 9 of Arduino board. In Proteus you need to connect the +5v and ground pins to servo motor.

Servo Motor is a common motor used in engineering projects for precise circular motion. We can move the servo motor at any desired angle, which is not possible in the case of other motors i.e. Stepper or DC.

For example, suppose I want to move an antenna at a precise angle of 47.5 degrees then if I use DC Motor, I have to use an encoder. So, in such cases instead of using a DC motor, I will prefer Servo Motor.

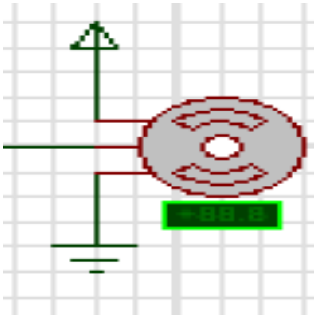

Fig 2.4 IR sensor

5. LED

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 ceramic resonator, 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 or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.Lower vitality utilization

Fig 2.5 Arduino UNO

C. Working

The smart car parking system works on the simple principle of detecting obstacle and sending a visual feedback. Resistors are provided to ensure the safe working of LEDs and IR sensors. For this project based on size a 12V battery is used to power all the components.

Stage-1: When car enters the parking area IR sensor that is present before IN gate will detects the passing vehicle and the gate will be opened automatically.

Stage-2: The car will enter into the parking area at that time person doesn't know which slot is empty, for this there will be an indication of LED's for every slot when the Green light glows the

slot is empty when the red light glows the slot was filled. By this the person easily know which slot is empty.

Stage-3: The operation of exit side will be same as that of the entrance. When the car is leaving the parking area, the IR sensor that is present before the OUT gate will detect the passing vehicle and the gate will be opened automatically.

Stage-4: In front of the parking area, there will be an LCD display that is used to show the status of the parking the parking slots, whether the is available or not.

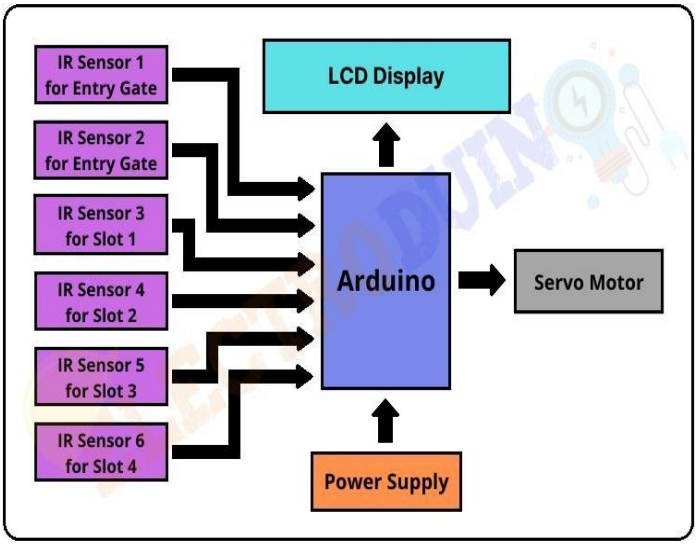

Fig 2.5 Working Block Diagram

IV. CONCLUSION

Automation is a step in the right direction for a future fulfilled in the world of transportation. This design provides an effective solution to the common problem discussed. The smart car parking system was designed, fabricated and tested which provided accurate results when the threshold distance was calibrated and the obstruction was detected. The switching of LEDs based on the vehicle in the parking space was instantaneous based on no vehicle and vehicle detected. The design is flexible and can be altered based on the space available and can be installed even in tight and constrained space. Based on the number of Yellow LEDs detected a common information board is displayed indicating the count of parking spaces available.

It can be concluded that with correct connection of some simple electrical components, it is possible to create an automatic smart car parking system, thus decreasing aimless driving, fuel and time, as well as making the process of parking considerably simpler.

REFERENCES

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