SMART CAR PARKING SYSTEM

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Abstract : This project design named SMART PARKING SYSTEM using Iot , The major provocation of this project is to reduce the traffic congestion in stores , multi-storeyed buildings and malls due to unavailability of parking spaces .The project displays the nearest empty slot if present with respect to user location. Our project aims to make efficient use of parking spaces. It finds vacant slots in the parking space and assign that to the user. Smart parking system as described above can lead to an error-free ,reliable, and fast management system. In recent times the concept of smart cities have gained great popularity. Fortunately the evolution of the Internet of things this idea seems to be achievable. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. Consistent efforts are being made in the field of IoT in order to maximize the productivity and development of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. The paper also describes a high-level view of the system architecture. Towards the end, the paper discusses the working of the systemin form of a use case that proves the correctness of the proposed model.

Keywords - Ir Sensors, Servo Motor, Arduino Mega, Monitor Display

I. INTRODUCTION

Due to an increase in the number of cars in the cities, finding a suitable vehicle parking solution has become vital. The traditional parking methods cannot be used today as these methods require a considerable amount of area, and to meet the parking requirement lot of area would be required. The cost of land has grown exponentially in cities, so it becomes essential that the parking solution requires the least possible space and can accommodate the maximum amount of vehicles. An average person spends 10 to 15 % of his travel time looking for a suitable parking spot in metropolitan cities.The parking system requires a working mechanism that can operate the system. In addition to this, a detection system is required to help the person know whether there is an availability of a free parking spot. The need to consider the safety of cars and humans alike when designing this system. In this paper, the different types of parking systems and various kinds of sensors used to increase safety and efficiency

II. LITERATURE SURVEY

One of the issues with owning a car in a city in India is finding a suitable parking slot due to a lack of parking zones. The number of cars in India is more than 40 million, which corporations and personal individuals own. Now the number is increasing day by day because of the affordable prices of cars and the improvement of the economic status of a middle-class person. In recent time there has been an increase in the number of vehicles, but the space for parking has not increased according to the requirements. As a result, around 40% of road space is utilized for parking instead of transport activity which increases road accidents.

An arrangement of IR sensor, R-Pi board and ultrasonic sensor is proposed by for IOT based smart parking [3]. Information are sent wirelessly to the cloud for storage. User can view this information using an android application. A proximity type sensor senses the parking slot's occupancy or non-occupancy based on the length of time of flight (TOF) of sound waves. Obviously, a non-occupied parking slot will have longer TOF of light waves. This information is shared with RPi, which in turns transfers it to the cloud. The data from the cloud is accessed by the user with the help of android based application to see which slot is vacant in the nearest parking lot.

An android based mobile application integrating it with IOT module is presented to manage parking efficiently. In this system wireless sensor network (WSN), near field communication (NFC), Cloud and other IOT technologies are used. This paper proposed a micro controller-based and GSM parking lots is used for their monitoring. A mobile app is developed for viewing and reservation of parking lot. For this purpose, PIC16F87XA micro controller is used on the parking lot side to check and control the occupancy of the parking lot. On the user side the user must get register by providing required credentials. Once the registration is completed, they can search for available parking slots. A one-time password (OTP) is generated, on the time of

reservation of available slot. This OTP is used at the time of Entrance and Exit at the entry gate of parking. Total amount of receipt is sent to the user on the android application which then can be charged online.

III. BLOCK DIAGRAM

This outline of Smart Car Parking System in view of IoT, and finger impression is displayed in the figure 1. It involves PC, Arduino, IR sensors, Servo Motor, Monitor Display.
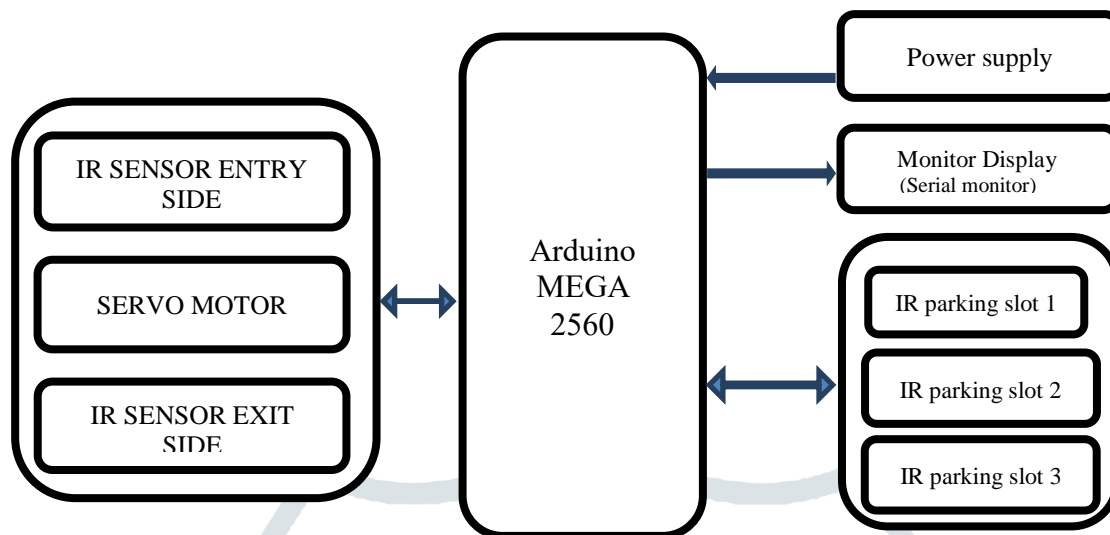

Figure 1 Block Diagram

3.1 Infrared Sensor

IR sensors consist of an IR transmitter such as an LED or Laser and an IR receiver. There are two general classes of Infrared (IR) ranging sensors:

    i.   Reflected Intensity – Simpler and more conventional modules consist of LED emitter and Photocell measuring a proportion of reflected light by the object. The closer the thing, the stronger the reflected signal and vice versa.

    ii.   Time-of-Flight (ToF) – These builds on the above principle but uses a much more coherently operated pair of a laser and reflected light sensor capable of measuring the time of reflected light travel.
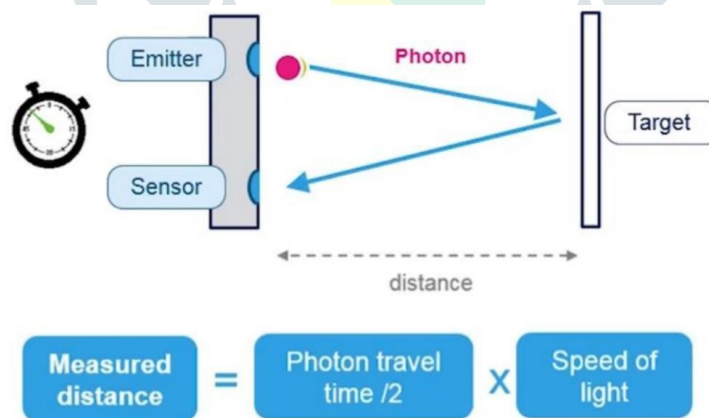

Fig.7. Principles of ToF infra-red ranging sensor

1) Advantages

    i.   Can easily measure the distance to objects with reflective indexes starting from 1%.
    ii.   Ambient light rejection.
    iii.   A long sensing range which is up to 3m, can detect high clearance vehicles.

2) Limitations

    i.   Consumes higher power than magnetometers.
    ii.   Approximately three times more expensive than a Magnetometer.
    iii.   It is very sensitive to any visual obstruction, Meaning causing false readings.

3.2 Servo Motor

A servo motor is a rotary actuator that allows for precise control of angular position. It consists of a motor coupled to a sensor for position feedback. It also requires a servo drive to complete the system. The drive uses the feedback sensor to precisely control the rotation of the motor. Servo motor comprises the three-wire system known as Power, Ground, and Control whereas the DC motor is a two-wire system known as Power and Ground. Servo motor has an assembly of four things DC motor, gearing set, control circuit, and a position sensor. Servo motor torque curves are relatively flat up to the motor's maximum speed, unlike stepper motors, whose torque drops sharply beyond a certain operating speed. The maximum torque required by the motor is typically the sum of torque during acceleration, torque due to the load, and torque to overcome friction.

3.3 Arduino Mega

Arduino is an open source microcontroller and can be used to interface with Infrared sensor and Display Unit. It is a very cheap platform to develop simple embedded projects. Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

3.4 Monitor Display

The Serial Monitor is an essential tool when creating projects with Arduino. It can be used as a debugging tool, testing out concepts or to communicate directly with the Arduino board. The Arduino IDE 2.0 has the Serial Monitor tool integrated with the editor, which means that no external window is opened when using the Serial Monitor. This means that you can have multiple windows open, each with its own serial monitor. The Serial Monitor provides a way to send/receive information to/from your Arduino code. You can use it to view debug messages printed by your program, or to send commands that control your program.

IV. PROPOSED SYSTEM

The equipment arrangement of the control framework is essentially the blend of IR Sensor , Servo Motor, a Connecting circuits and a microcontroller (Arduino). The total circuit chart of undertaking can be isolated in three unique segments: Entryway, Display Unit, Slots with IR Sensor Detection and Microcontroller
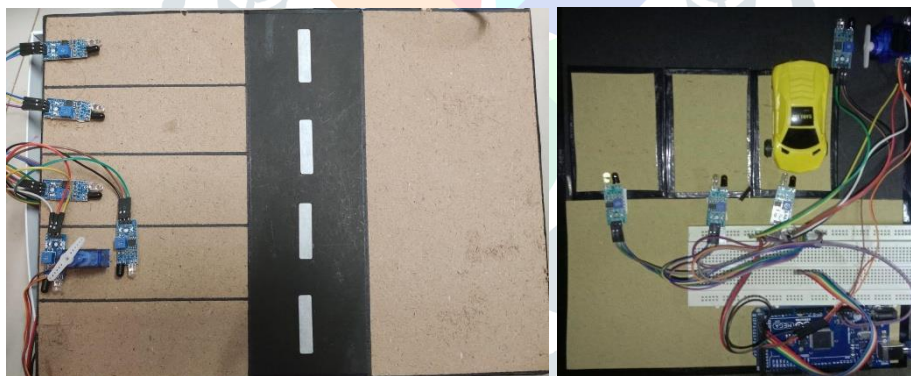

Figure 2 Hardware Setup

V. RESULTS

The hardware execution has also been done in a proper manner and the results have been verified. The hardware execution is shown in figure 3.
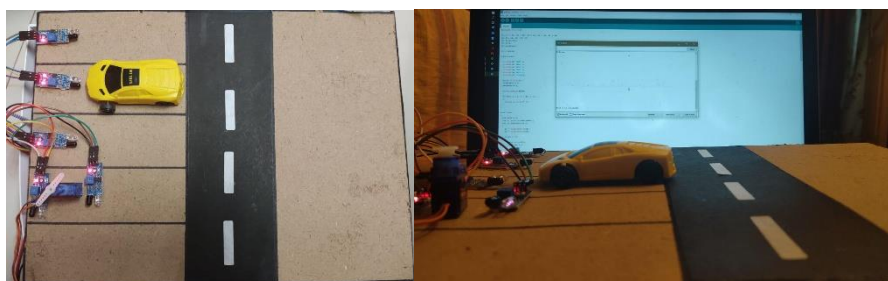

Figure 3 Smart Car Parking System

VI. CONCLUSION

Thus the principal objective of this framework is executed and verified. In this framework, we have just validated individual can open the entryway Gate working through Servo motor and IR sensor. In which the user can also able to access the parking facility by information provided by the Monitor Display regarding the availability of nearby free left out parking slots to them . At the end, the main reason for parking systems is there is a lack of parking spaces in metropolitan cities. This due to the cities was developed a long time back when cars were considered a luxury. But due to various factors, cars have moved from a luxury owned by 1% to a necessity that the medium class owns, which is around 40% to 60%. Hence traditional parking solutions would not hold today. In this paper, the concept of smart parking was also discussed, which uses sensors and IoT to detect whether there is a free parking space available or not. The various types of sensors, their applications, advantages, and limitations were also discussed. The selection criteria mainly depend on where the sensor is to be placed and the current infrastructural condition.

VII. ACKNOWLEDGMENT

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