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ADVANCE CAR PARKING SYSTEM USING SOLAR BATTERY

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Abstract

Today, purchasing of number of cars increase day by day which create traffic congestion on road and in public places like malls, institute, offices, multiplex system, hospital, market areas, there is a huge problem of vehicle parking. The parking issues in India are worsening every year. So, we have design a project which is useful in managing the parking system efficiently. It will count the number of cars entering and existing the parking area. As people purchase more car, the number of car on road increase which causes traffic congestion because it difficult for the people to find the proper space for parking there vehicle. Therefore, we built advance car parking system (ACPS) using Arduino Uno ATmega, IR sensor and Solar battery.

Keywords: Car parking problem, Arduino UNO, IR sensor, Solar battery

1. INTRODUCTION

The idea behind this project is arrived due to increase in the number of cars on road and in public places like Shopping Mall, Railway station, Bus stand, Hospital & offices the problem of car parking increasing. Traditional car parking system are require lots of manual laboring to supervise the parking management which is time consuming and energy is also wanted and there no security of vehicle car parking and your vehicle may get damaged due to adjacent vehicle being parked. So, we have automated the system. The Advance Car System is Arduino Uno based system which gives us information about availability of vacant slots for car parking. There are three parking slot in this project each parking slots have individual sensor. When a person wants to enter in the parking area then, the system will check for the free spaces and if any slot is vacant than it will indicate through LCD connected at gate and gate will open and drivers can park his car, if all slots are full then LCD will display the status of the slots and the gate remains closed. A solar panel is also connected in each slot so that electric vehicle in each slot for charging of electric vehicle while they are standing in the parking area. IR sensor mounted at gate will detect the presence and absence of the car. Servo motor acts as gate, it opens and closes when the IR sensor detects presence of car.

The vehicle parking area has many lanes / slots for car parking so, to park a vehicle one has to look for all the lanes which require lot of manual laboring and is also time consuming. In traditional system, a person has to search for a free space which is time consuming and there is no security of vehicle from getting damage when collide by other vehicle.

In section 2, we study the working description of advance car

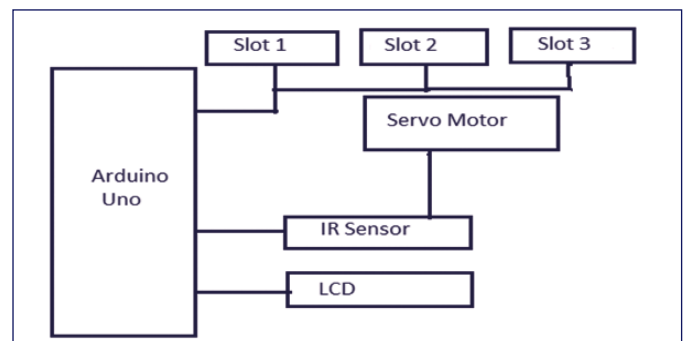
parking system (ACPS) using Arduino Uno ATmega, IR sensor and Solar battery. The summary of results is briefly discussed in section 3 and their conclusion given in section 4.

2. WORKING DESCRIPTION

In traditional system, a person has to search for a free space which is time consuming and there is no security of vehicle from getting damage when collide by other vehicle. So, we have design the advanced car parking system using solar battery and description are as given below.

- **At Entry part** - When a car arrives at entrance gate then the system shows the availability of vacant slot for car parking, if there is an empty slot available then it will display through LCD connected outside the parking area and the gate will display open and there is also a solar panel which is can be use to the electric vehicles while standing in the parking slot. It will save the time of driver car.

Fig. 1 Block diagram at entry part

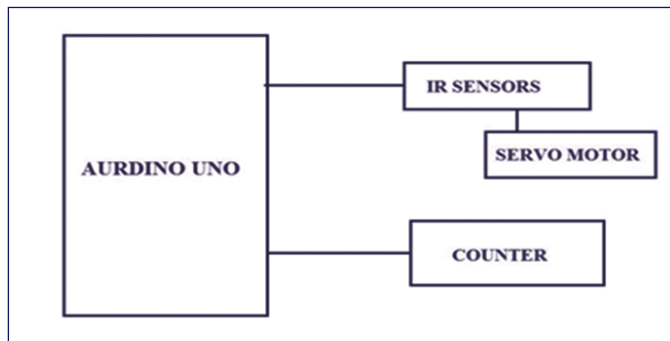


- **At Exit part** - When a car leaves the parking area then the available space is indicated by increase in the number of

parking slot by 1 and LCD will display the vacant outside the gate. Smart car parking is an automated, flexible, user friendly and highly efficient technology as the booking of parking slot for the driver's vehicle. The objective of this project is to build a Vehicle Parking management system which helps the drivers of the cars to park their vehicles with minimum wastage of time with accurate information of the availability of the space in parking area. The system that will track the entry and exit of cars, maintain a listing of cars within the parking lot, and determine if the parking lot is full or not.

Before the door the Infrared transmitter is mounted on one side and the receiver is placed directly in front of the transmitter across the door. When a car arrives the Infrared beam is blocked by the car and the receiver is devoid of Infrared rays and its output changes. This change in output is sensed by the microcontroller and accordingly it increments the count and opens the door if there is some capacity. The procedure for the exit of the cars is similar as the entry.

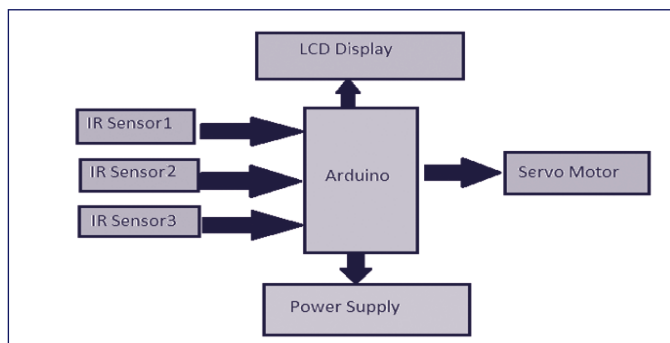
Fig. 2 Block diagram at exit part



- **Arduino Uno** - Arduino ATmega 8/168/328 is used in the project. It is an open source programmable microcontroller develop by ATmega microcontroller. It has total 28 pins. It operates an 5v battery supply. Clock speed is 16Mhz. It has reset power pin, receiver & Transmission pins, USB interface etc. It uses IDE (Integrated Development Environment) Software, used to write and run code on computer.

- **LCD** - Liquid Crystal Display (LCD) is a thin, flat display device made up number of monochrome pixels. It is use in to display the status of the availability of free the slots in parking area. Driver can see the number of empty or filled parking slots through the LCD connected at gate. A 16*2 LCD is used in this project.

Fig. 3 Block diagram of car parking



Pin description of LCD-

Pin 1 - Connected to Ground/ Source pin

Pin 2 - Voltage Supply (Vcc)

Pin 3 - It is called Control pin which used to control Supply

Pin 4 - Register pin/ Control pin. This pin toggles between command or data mode, 0 = data mode and 1= command mode

Pin 5 - Read/ Write pin. This pin is connected to microcontroller and toggles between read and write operation 1 represent read operation and 0 represent write operation

Pin 6 - Enable pin

Pin 7 to 14 - These pins are called Data pins

Pin 15 - This pin is positive terminal of the LED and connected to 5V supply

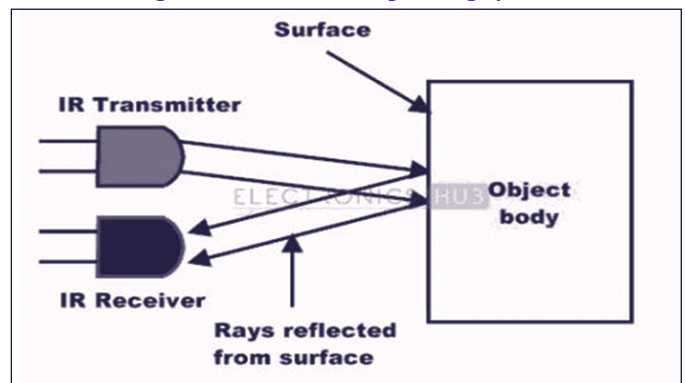
Pin 16 - This pin is negative terminal of LED and connected to GND

Fig. 4 LCD display of car parking system



- **IR Sensor** - IR sensor are use to detect the presence and absence of the car at gate. IR sensors are used in each parking slots in the project. They are connected to Arduino. When a car arrives at gate then the sensor detects at gate will open or close. Five IR sensors are use in this project.

Fig. 5 IR sensor of car parking system



- **Servo motor** - Servo motor is a rotary actuator. It is used to rotate use and object upto 180. It is connecting at the gate to open or close the gate. It works on 5 volt DC supply.

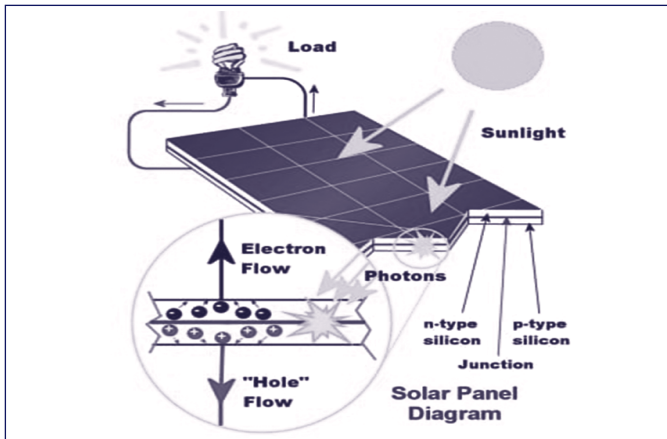
Fig. 6 Servo motor of car parking system



• **Solar panel** - A solar panel is connected which is used to charge the electric vehicles while staying in the parking slot. Solar panel is a device which is used to convert solar energy into electrical energy as sunlight is available at free of cost therefore, it reduce the cost of charging. Also driver have to move to other locations for charging their vehicle which is time and energy consuming. The projects also provide the charging facility at the same time during parking the vehicle.

Solar cells are made up of semiconductors like silicon. It works on the principle of photovoltaic effect. According to photovoltaic effect, when sun light falls on the solar panel then the lots of free photon produces which is used to generate electrical current. There are two types of semiconductor n-type and p- type. Phosphorus and Boron are generally used for doping in semiconductor. This will use to create positive & negative terminal of photovoltaic cells.

Fig. 7 Working of Solar panel



• **Solar Energy** -The sun produces lots of photon which falls on solar cells and generates electric current. Sun is made up of 70 % of Hydrogen. Therefore, nuclear fusion constantly occurs in sun which creates lot of pressure within the sun and proton present inside sun collides with each other under high temperature and pressure and creates helium. This produces huge amount of solar energy which we can use to charge the electric vehicle.

• **Jumper Wire** - Jumper wire is an electric wire that is a type of electrical wires which have connector or pin at the end. They are used to inter connect the component.

• **Battery** - 9v battery supply is used in the project to run the component.

• **PCB Board** - A printed circuit Board or PC board is made from non - conductive material in which conductive lines are drawn. It provide strength and base to the electronic component are mounted on the PCB Board and connecting wire are use to connect the component.

3. RESULT DISCUSSION

This car parking system will save space and time by utilizing the parking space properly. It is much safer and secure way of parking system because it promotes pedestrian safety. Benefit for drivers in crowded area- This parking system allows the drivers to parked their vehicle without wasting much time. This parking system is more accurate and flexible. Eco friendly-Solar panel are use to charge the electric vehicle therefore, this parking system become eco - friendly we can save fuel for future use. In Institute, Industries, Hospital, Multiplexers this parking system can be planted which will manage the parking system the area. There is less chance of getting damage to the vehicle by using this car parking system. Minimum number of staff required to run this parking system as compared to the conventional system.

4. CONCLUSION

The Advance car parking system will add new valve to the urban people Life Style. The project will detect the vacant slots in the parking area which helps the driver to find an accurate place for parking .Hence, it will reduce the traffic congestion in the city and solar panel are installed at parking area to charge the electric vehicle and save energy. The advance car parking system can be implemented within the parking areas of multiplex hospital, industrial and other places at entry point of the gate. This will help to organize the parking problem efficiently. Since more number of cars can fit in a small area vehicle can be parked close to each.

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