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PARKING MANAGEMENT SYSTEM USING ARDUINO

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Abstract

With continuous growth in the population, there has been an increase in personal and public vehicles. Easy transportation is a basic need in today‟s world where time is most precious. So it is really necessary that transportation must be carried out smoothly with fast moving lives of people. Transportation congestion is a major issue that causes traffic delays and pollution. Car Parking plays a major role in traffic congestion and the parking facilities in urban cities are still unable to improve their facility. Parking is a routine and frustrating activity for many people in cities around the world so due to the traffic congestion Every day, one million barrels of oil are burned by automobiles waiting to park. Without a well-developed urban infrastructure, the world's population will continue to grow. Smart parking System at least in low air quality and densely polluted areas.. Whenever a car enters the parking space, the sensor recognizes the vehicle and servo motor rotate its shaft the gate open then vehicle goes in to parking slot so we can reduce the man. power and disturbances in parking areas and Sensor detects which slot is available and which slot is full by measuring the distance so that the driver can find the slot and park the car in
parking zone which is displayed on the monitor. This smart car parking system reduces waiting time, traffic congestion, pollution etc.

Keywords: Arduino, Servo motor, ultrasonic sensor, LED

1. Introduction

Embedded systems use the communication ports to transmit data between processor and peripheral devices. The area where embedded systems and development environment of other large scale computers is in the area of debugging. The developers working with desktop computer environments have systems that can run both the code being developed and separate debugger application that can monitor the embedded system programmers [1]. Some programming languages run with high efficiency that rudimentary interactive debugging is available directly on chip. The major challenges in embedded systems are Stability, Safety, Security, Launch phase, Design limitations, Compatibility and integrity. With continuous growth in the population, there has been an increase in personal and public vehicles. Easy transportation is a basic need in today’s world where time is most precious. So it is really necessary that transportation must be carried out smoothly with fast moving lives of people. Traffic congestion is a big problem that leads to increased pollution and traffic congestion Car parking is a significant contributor to traffic congestion. Parking is an often frustrating and worrisome activity for many people who often have to travel with their vehicle. An investigation revealed that one million units of oil are wasted every day while waiting for parking and traffic conditions [2]. As there is continuous race towards creating metropolitan cities without a well-defined and analyzed plan, convenient parking management of the vehicle, these issues will get worse. It is effectively introduced by 2050. Other than wastage of time in searching for parking space, the environment is also affected by the emission of damaging and terrible car gases. As a result, the smart parking system has become more important, in many places with poor air quality and high pollution due to vehicles. With Smart Parking System, individuals who want to park their car can

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beforehand check for the availability of parking slots using some application or with the help of some display screens in the parking area. Using the application the individual can know whether there is a vacant space or not without actually entering the parking space, thus saving the time and reducing traffic congestion. People can even make a parking reservation in advance. The advance booking help the person to identify the slot easily without any confusion [3]. The location of the slot will be shown so that there will be no time wastage. The Smart Parking System idea is illustrated. A soon as a car enters that space sensors will sense the vehicle and slot is will be displayed on the screen so that the person can easily identify the parking slots and park the vehicle.

2. Review of Literature

In today life people are not depending on public vehicles. Everyone is using their own vehicles to travel. So that traffic increases. When people travel through a city the most difficult problem is to park the vehicle. This not only about cost time and fuel for vehicles seeking for a parking spot, but it also wastes time .And fuel for other drivers stuck in traffic. To begin, let us consider PGI (Parking Guidance Information) to better manage parking. Parking information can be broadcast over the Internet or shown on VMS (Change Notification Sign) on key highways or streets. It is an innovative platform in the ERP system that allows drivers to get parking information before or during a trip and book a parking place [4]. Different types of systems can be designed for parking, for example every visitor is given a tag and it will be authorized before entering the parking space ensuring the security measures. There can be a display for the number of vacant slots at the entry and exit gates. There can be an advanced system where user can beforehand book the slot and payment also be done by some application. In this way many approaches can be used to design Smart Parking system based on our requirements [5]. The collection and analysis of a brown circular image painted in the parking lot to provide information about available parking places in a smart parking system. It will be shown in real time on display gadget. The display shows how much parking there is in the parking slot. The software and hardware were used to develop this system. The rise of the Internet of Things, the smart city has become a reality. It always helps to improve the productivity and dependability of urban infrastructure. IoT helps with traffic, parking restrictions, and road safety. We present an integrated smart parking system built on the embedded platform. The smart parking system includes on-site parking. Each parking space availability is tracked and reported through deployment. It presents architecture for Smart homes. The system is separated into three layers: the detection layer, the network layer, and the application layer .The sensor class includes all sensing and sensing technologies and is responsible for collecting data from the sensor the parking slots and this data is then sent to the second layer that is network layer. Network layer depicts the data from sensing layer and the data is sent to application layer [6]. In application layer there are different applications for different purposes, which processes the data according to their needs, for example in this whenever car enters it displays empty slot through the sensor. This can reduce the time and fuel waste and also reduce the pollution. This ecosystem includes two flows: information and traffic. The traffic situation arises when people search for parking space; drivers can receive availability information, and can reach the desired place to park [7]. Drivers behave differently on the basis of few factors such as the information they have got and for how much time they are wandering for searching. Whenever car enters or exits a parking place at any time it will be detected by sensors deployed at the level of the slots and updated information for the driver, this flow is known as the information flow, In order to get the real status of parking spaces, sensors are fixed at the parking space. Sensors

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create a network and send data storage devices the recent information. The ecosystem consists of software system, sensor networks, vehicle network, and mobile network. The software network consists of data storage, e-parking, reservations, predictions [8]. The data storage which stores the data of the vehicles how many times it entered and exited through the gates. E-parking gives the instructions to driver where to park the vehicle, reservation of the parking can be done through application and save their slot in parking. In prediction the system predicts which slot will be filled and available through the software systems. The sensor networks consist of information sensing, crowd sensing and parking meter. The sensor gives the information to software system. The person is entered .by sensors the sensing network detect the person. The detected person information is given to system. The crowd sensing alerts the main control to close the gates .the parking meter which gives the specified time to park the vehicle in parking zone.

3. Implementation

The proposed work implementation is done using Arduino Uno, ultrasonic sensor, breadboard, LED, display and binding wire. The ultrasonic sensor is used to transmit and receive the sensor data and display it. The Arduino is used to upload C language code. It displays which slot is full and which slot is empty. The Arduino code is dumped in the board through a USB cable. Atmega328 controller is used to dump the code in board.

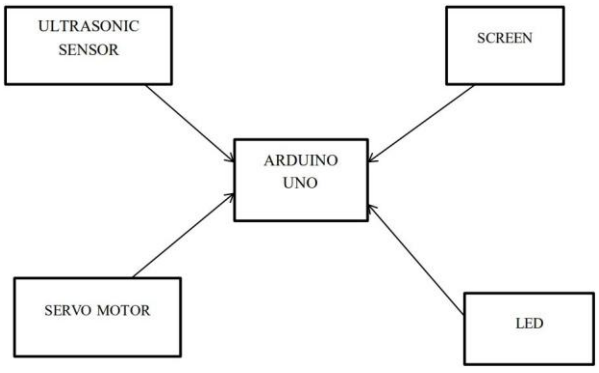

Fig 1: Overview of system

The block diagram representation of the system is shown in Fig 1. In this connected the entire device to the Arduino Uno board. The board which plays a crucial role in smart car parking system by connecting all the devices properly then only we get proper output by making any changes in the input of the system automatically there will be change in the output.

The ultrasonic sensor detects the vehicle which is trying to enter the slot. The first sensor's output pin is linked to the Arduino 2nd digital pin, while the output of sensors pin is attached to the Arduino 3rd digital pin. Both sensors power and ground are given to power and ground of Arduino board. The board consists of 5v. The Arduino will now read. Sensing information from these digital pins. A USB connection linked to the laptop will power the Arduino. The output will be printed when opened the serial monitor. The board is set to Arduino Uno. The port selected is COM4. In Fig 2 the components are connected to Arduino board through wire. The external power supply is given to board through power port. Adapter is connected to the power port of Arduino board. Add LED to Arduino. With the help of led lights, one can park their car in empty parking lot. Whenever the car is in the slot, the LED will be turned on. The LED will be turned off so that the automobile can park in the slot using sensors that can be linked to the Arduino board digital ports. The positive terminal of the LED is connected to the analogue pins on the Arduino board, while the negative pin is connected to ground. By using an ultrasonic sensor and servo motor to open and close the automatic gate in the parking lot. Every time the vehicle enters the parking area, the sensor detects the vehicle and the servo rotates its position 90 degrees so that the door opens. When the car moves away from the sensor, the servo motor will rotate its shaft to the original position. The sensor pins are connected to the Arduino boards digital pin and whenever sensor detects the object then the shaft rotates servo motor is used to attach the

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Arduino boards digital pin. The Arduino board consists of V_{cc} and Gnd.

4 Results and Discussions

The user can park the vehicle at the empty slot. So there will be no wastage of time. The pollution can be reduced. The person can know that which slot is full and which slot is empty. The vehicle occurs in front of the sensor. The sensor measures the distance and allows the person to park by viewing the screen which shows available slots. From the Fig 1 whenever the object occurs in front of the sensor LED glows indicates the slot one is occupied LED1 will be in on position and another LED2 will be in off position. Now first slot is free so we can park the vehicle at first slot.

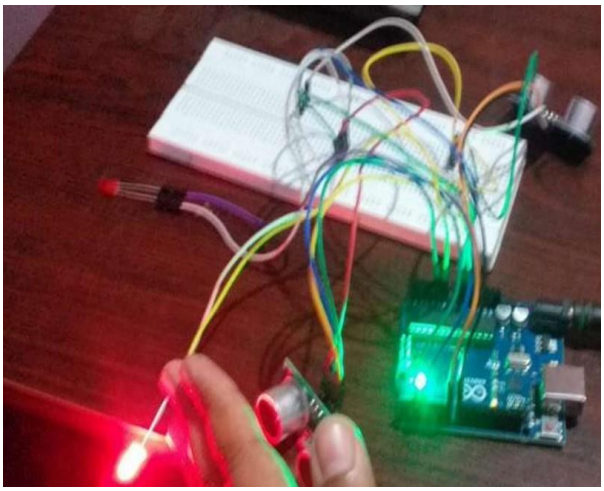

Fig 1: Slot one is occupied

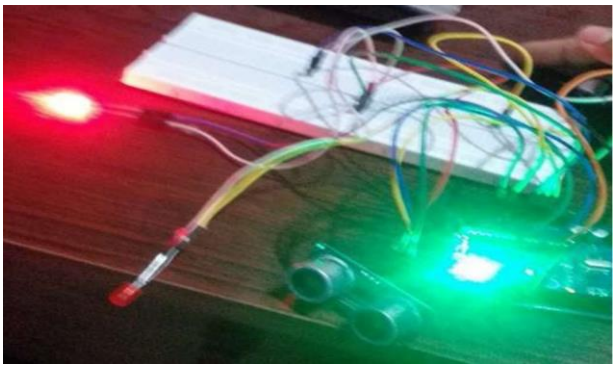

Fig 2: Second slot is full

Fig 2 shows LED2will be in on position and another LED1 will be in off position. Fig 3 shows the detection of the object ultra sonic sensor and the servo motor rotates its shaft to 90 degrees if the object goes away from the sensor it goes back to its initial position.

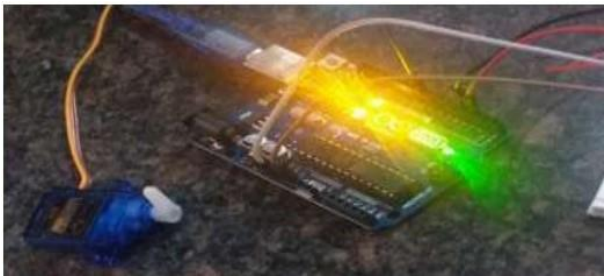

Fig 3: Opening and closing of gate

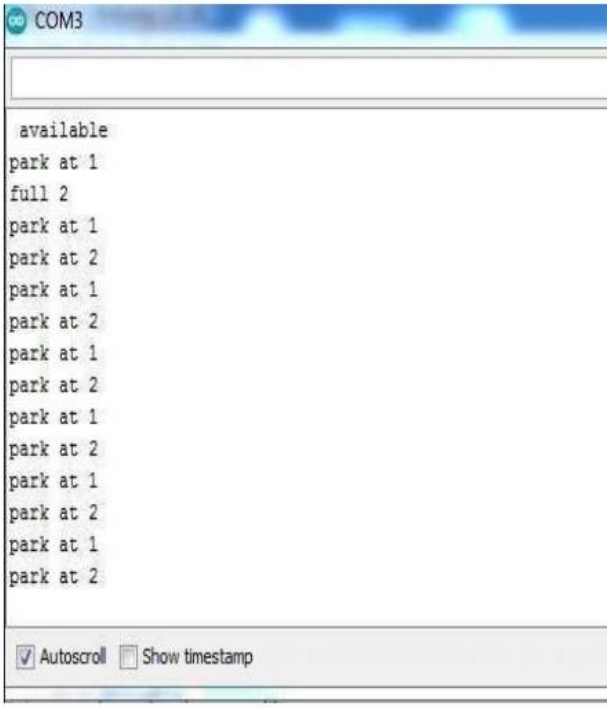

Fig 4: Empty slots

Fig 4 shows serial monitor displays available slots so that the person can park the vehicle at any slot. The person can know there is no vehicle in the parking area then there will be no disturbance in the parking zone.

Fig 5 shows the person can identify that the slot2 is full through the screen and parks the vehicle at empty slot. Whenever the object is identified the sensor measures the distance and displays which slot is full and the screen show which slot is free

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by viewing screen the person can know the available slot.

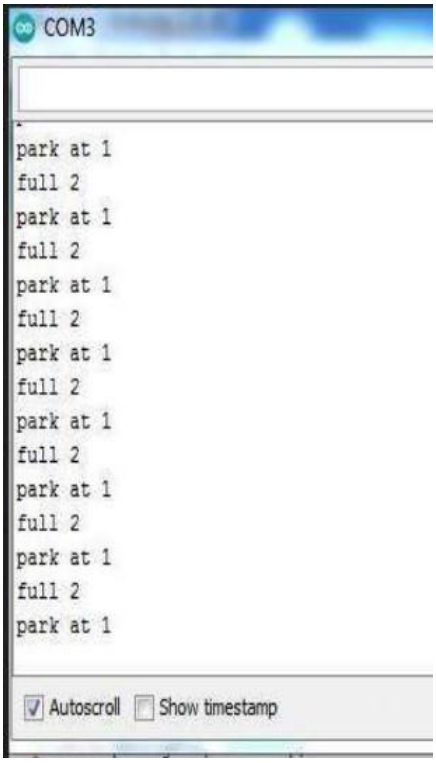

Fig 5: Shows slot2 is full

Fig 6: slot1 is full

Fig 6.shows the driver can identify that the slot1 is full and parks the vehicle at empty slot without any wastage of time

5 Conclusions

It is simple and safe smart parking. This does not imply any some sensors / devices, how many sensors is enough when there are positions in the parking area. All connections are made very easily. The equipment used in this project is easily available on the internet and is cost effective. The user must logon to the screen in order to park his automobile in the parking lot. It will show how many slots are vacant. LED will be in on position for those slots which are already occupied and off for those which are empty. Conclude that driver can park at their desired location and as soon as vehicle will be parked. so that pollution and wastage of fuel can be reduced. Here will be no disturbance in parking area.

Future Scope: There is a lot of scope in this field as there is a great emphasis on building smart cities in our country. This project can be further extended by providing some additional functionality to the users like advance parking reservation from their location and navigation can also be provided from the app. It will be used to only allow authorized users into the parking area and can easily be caught if violated It may also be used with smart toll collecting and traffic congestion monitoring systems.

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