International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 03 | Mar -2017 www.irjet.net p-ISSN: 2395-0072

Automatic Car Parking

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Abstract –*Automatic car parking obtain information about available parking space, process it and then place the car at certain position. It is inevitable for the people to update with the growing technology and generally people are facing problems on parking vehicles in parking slot in a city. The Automatic car parking which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area with the help of LCD display and it mainly focus on reducing the time in finding the parking slots and also it avoids the unnecessary travelling through filled parking slots in a parking area. Thus, it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere. Sometimes, it is very difficult to find a suitable parking place in parking lot. We have proposed a suitable solution to this problem. Arduino has already made a huge impact on learning.*

Key Words: Arduino, Ultrasonic sensor, IR sensor

1. INTRODUCTION:

As the population increased in the metropolitan cities, the usage of vehicles got increased. It causes problem for parking which leads to traffic congestion, driver frustration, and air pollution. When we visit the various public places like Shopping malls, multiplex cinema hall and hotels during the festival time or weekends it creates more parking problem. In the recent research found that a driver takes nearly 8 minutes to park his vehicle because he spend more time in searching the parking lot. This searching leads to 30 to 40 percent of traffic congestion. Here we going to see how to reduce the parking problem Automatic car parking using offerings are transforming cities by improving infrastructure, creating more efficient and cost effective municipal services, enhancing public transportation, reducing traffic congestion, and keeping citizens safe and more engaged in the community. Car parking is an issue of significance both at the local and at the strategic level of planning. This project's main purpose is to produce a real life solution to the car parking problem which the whole world is facing frequently. People usually roam around in the parking lots trying to find a suitable place to park in to solve that problem we have created the automatic car parking system, using an open source hardware, programmable sensors and the use of computers to provide an interface to understand the digital output produced.

2. ARDUINO

Arduino is basically an open-source computer hardware/software platform for building digital devices and interactive objects that can sense and control the physical world around them. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. It comes with an open supply hardware feature that permits users to develop their own kit. The software of the Arduino is well-suited to all kinds of operation systems like Linux, Windows, and Macintosh, etc. It also comes with open supply software system feature that permits tough software system developers to use the Arduino code to merge with the prevailing programing language libraries and may be extended and changed. For beginners, it is very simple to use and also cheap. It can be used to create such devices that can interact with the environment using sensors and actuators. Some common examples include robot, thermostats and motion detectors. This paper introduces the use of Arduino in one such area, that is, Automatic car parking, so that people can become aware of where free parking place is available and save time, while avoiding traffic congestion.

2.1 Functions :

- Digital read pin reads the digital value of the given pin.
- Digital write pin is used to write the digital value of the given pin.
- Pin mode pin is used to set the pin to I/O mode.
- Analog read pin reads and returns the value.

- Analog write pin writes the value of the pin.
- Serial begins pin sets the beginning of serial communication by setting the rate of bit.

3. Components and Compatibility:

The basic components used in our system are as follows:

1) Ultrasonic Sensors [x4]:

The Arduino Ultrasonic Range Detection Sensor is used with Arduino in order to calculate distances from objects. So if we start with the Arduino Ultrasonic Range Detection Sensor, it's an IC that works by sending an ultrasound pulse at around 40 KHz. It then waits and listens for the pulse to echo back, calculating the time taken in microseconds (1 microsecond = 1.0 × 10-6 seconds).You can trigger a pulse as fast as 20 times a second and it can determine objects up to 3 meters away and as near as3cm.It needs a 5Vpower supply to run. And then it waits and listens for the pulse to echo back, by calculating the time taken in microseconds. Adding the Arduino Ultrasonic Range Detection Sensor to the Arduino is very easy, only 4 pins to worry about. Power, Ground, Trigger and Echo. Since it needs 5V and Arduino provides 5V we are obviously going to use this to power it.

Fig.1 Ultrasonic sensor

2) Arduino Uno [x1]: The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 6 analog inputs, 14 digital input/output pins (of which 6 can be used as PWM outputs), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; all we have to do is simply connect in to PC with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno board is the first in a series of USB Arduino board and the reference model for the Arduino platform.

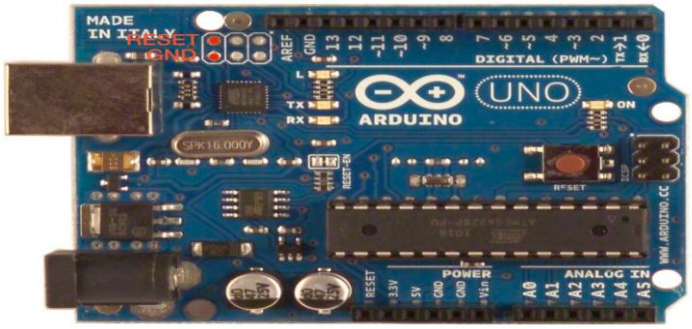

Fig.2 Arduino Uno Board

3) Infrared sensors[x2]:

An infrared sensor is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common application in real time. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor.

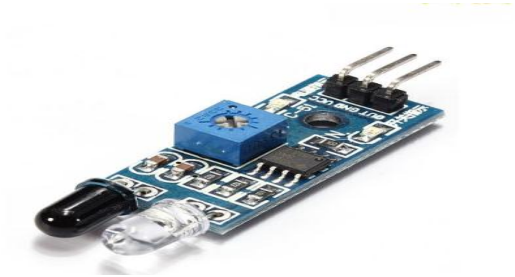

Fig.3 Infrared sensors

4) LCD display[x1];

A liquid crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light modulating properties of liquid crystal. LCD are available to display arbitrary images or fixed images with low information content, which can be displayed. The LCD panel is made by glass. Any mechanical shock will damage the LCD module. It is easy to interface with micro-controller because of an embedded controller.

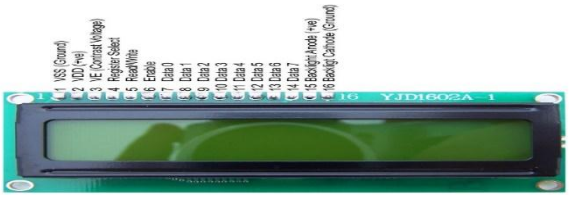

Fig.4 LCD 16*2 Display

4. Hardware Connections –

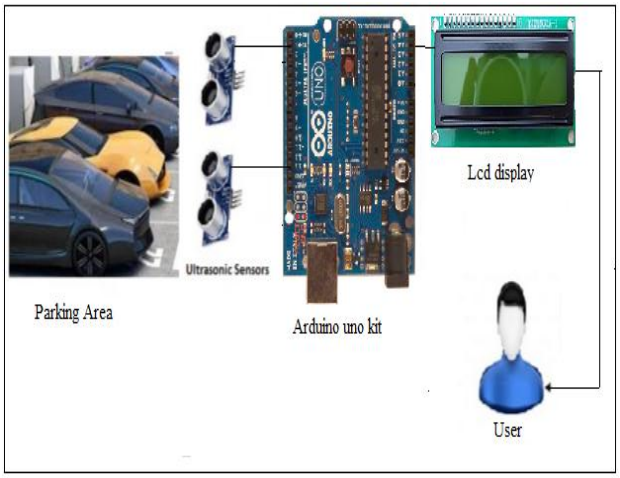

Fig- 5: Hardware connection

The proposed system reduces the number of vehicles failing to find a parking space and minimizes the costs of moving to the car park. The cost defined here is the time that the user must wait for the service, thus helping users. Automatic car parking save time and money and reducing environmental pollution. If user want to know about where is available parking slot then user can see into LCD display. The LCD display will provides the facility to find where is nearest parking area and available parking slot. If parking area is full then user will go check another nearest parking area where parking slots is available then user enter into the parking area and park the car. We are using the IR sensor to detect obstacle which is interfaced with dc motor. When any obstacle detected by the IR sensor Gate will get open and closed for entering into parking area.

5. Software -

To achieve the desired results, a programming language and interface was needed to devise a logic that make the Arduino board understand the requirements asked of it. Arduino comes with its own code editor, which accepts the C and C++ languages. Additionally, support for Java has also been provided by the use of modules that create a virtual runtime environment for the hardware to run. Also, the ultrasonic sensor needs to be programmed in order to function. Coding for that has also been done in the Arduino using embedded c programming.

6. Execution Plan –

Step 1: Connections

Hardwiring the devices on Breadboard which includes the sensor and the Arduino Board.

Step 2: Software

Programming the sensor and the Arduino to function the way desired and then assigning values to the outlets of the Arduino and the sensor i.e. Vcc, ground, trigger, echo, etc.

Step 3: Data connection

Connecting the Arduino to the USB port of the PC, for data streaming.

Step 4: Arduino connection

Arduino connection with LCD display and ultrasonic sensor interfacing using desired coding

Step 5: Final assembly of the design required for functioning.

Step 6: Test and execute

7. Conclusions -

Our project ensures to find free parking places for public. As soon as parking place is found to be empty it is detected using ultrasonic sensors which report it further. We achieved this by programming the sensors and Arduino. Pushing the data to webpage gives us tabular output which shows availability of parking places. The project aims at fast results so that anyone can easily find place for parking and save time in doing so. As Arduino is the latest technology, using it gives uniqueness to our project.

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