Vehicle speed monitoring system using Arduino and speed sensor

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Abstract: A smart vehicle speed monitoring system is proposed using arduino and speed sensor. Considering the road safety a new technique is described to identify the speeding vehicle and charge them fine for breaking the rules or intimating the consulted authority to take action. In past, lot of devices to detect rash driving on highways has been made. Most of the approaches require human concentration and involve a lot of effort, which is difficult to implement. In this paper we intend to design a system aimed at early detection and alert of dangerous vehicle driving patterns it was helpful parents because know days most of accident was caused by college student by over speed .by installing our device in bike we can get the speed of the vehicle if the vehicle cross the speed limit ,in our device we are using speed sensor to detect the vehicle speed and arduino to monitor the speed it will check the vehicle if the vehicle cross speed then it will intimate gsm board to send speed information to consulted authorities like parents or consulted person which we are specify by owner of the vehicle .

KEYWORDS: *ardiuno, gsm module, magnetic switches*

I. INTRODUCTION

Rash driving is the cause of many road accidents all over the world. More than 140,000 people were killed on India's roads last year, according to figures released by the government,. The traffic population has increased considerably in India as there is no means to control or monitor the speed of vehicles running on roads. This system proves highly effective in detection of over speed driving. It is not at all necessary that such accidents are results of driving under the influence of alcohol as even a person who hasn't consumed alcohol can drive in a reckless manner . To overcome this problem and decrease death rate due to accidents, introduction of new and innovative speed enforcement technology is necessary.

First of all, given the huge mileage of driveways, the number of patrol officers is far from enough to observe and analyze every driver's behaviors. Second, the guidelines of rash driving patterns are only descriptive and visual observations cannot specify the details of driving at night or in poor weather. In the present system, to detect rash driving police has to use a handheld radar gun and aim at the vehicle to record its speed. If the speed of the vehicle exceeds the speed limit, the nearest police station is informed to stop the speeding vehicle. This is an ineffective process as after detecting one has to inform the same and a lot of time is wasted. With the number of vehicles increasing day by day, this method cannot be trusted with the lives of people. To overcome from this our device will helps to find the over speed of the vehicle and take the action about the driver or rider mainly it helpful for the parents if their ward cross the limit our device will intimate immediately through text like your ward cross the speed

II   REQUIREMENTS

- ➢ ARDUINO BOARD
- ➢ GSM SIM MODULE
- ➢ MEGNATIC SWITCHS

III   Component Description

3.1 Arduino Board

An Arduino board is a one type of microcontroller based kit. The first Arduino technology was developed in the year 2005 by David Cuartielles and Massimo Banzi. The designers thought to provide easy and low cost board for students, hobbyists and professionals to build devices. Arduino board can be purchased from the seller or directly we can make at home using various basic components. The best examples of Arduino for beginners and hobbyists includes motor detectors and thermostats, and simple robots. In the year 2011, Adafruit industries expected that over 3lakhs Arduino boards had been produced. But, 7lakhs boards were in user's hands in the year 2013. Arduino technology is used in many operating devices like communication or controlling.

3.2 Arduino Technology

A typical example of the Arduino board is Arduino Uno.It includes an ATmega328 microcontroller and it has 28-pins

The most important parts on the Arduino board high lighted in red:

I: USB connector
2: Power connector
3: Automatic power switch
4: Digital pins
5: Analog pins
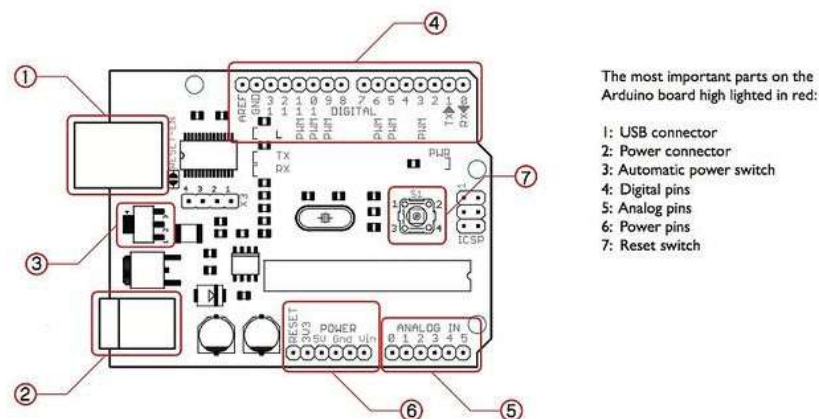6: Power pins
7: Reset switch

Fig.1: Arduino Pin Diagram

The pin configuration of the Arduino Uno board is shown in the above. It consists of 14-digital i/o pins. Wherein 6 pins are used as pulse width modulation o/ps and 6 analog i/ps, a USB connection, a power jack, a 16MHz crystal oscillator, a reset button, and an ICSP header. Arduino board can be powered either from the personal computer through a USB or external source like a battery or an adaptor. This board can operate with an external supply of 7-12V by giving voltage reference through the IORef pin or through the pin Vin.

Digital I/Ps

It comprises of 14-digital I/O pins, each pin take up and provides 40mA current. Some of the pins have special functions like pins 0 & 1, which acts as a transmitter and receiver respectively. For serial communication, pins-2 & 3 are external interrupts, 3,5,6,9,11 pins delivers PWM o/p and pin-13 is used to connect LED.

Analog i/ps: It has 6-analog I/O pins, each pin provide a 10 bits resolution.

Aref: This pin gives a reference to the analog i/ps.

Reset: When the pin is low, then it resets the microcontroller.

3.3 Arduino Architecture

Basically, the processor of the Arduino board uses the Harvard architecture where the program code and program data have separate memory. It consists of two memories such as program memory and data memory. Wherein the data is stored in data memory and the code is stored in the flash program memory. The Atmega328 microcontroller has 32kb of flash memory, 2kb of SRAM 1kb of EPROM and operates with a 16MHz clock speed. It's an electronic device its used for making computer that can sense and control more physical world then the desktop computers and ARDUINO is open source electronic prototyping Platform based on a simple microcontroller board we can develop the environment for writing software for the board to allowing create interactive electronic device.
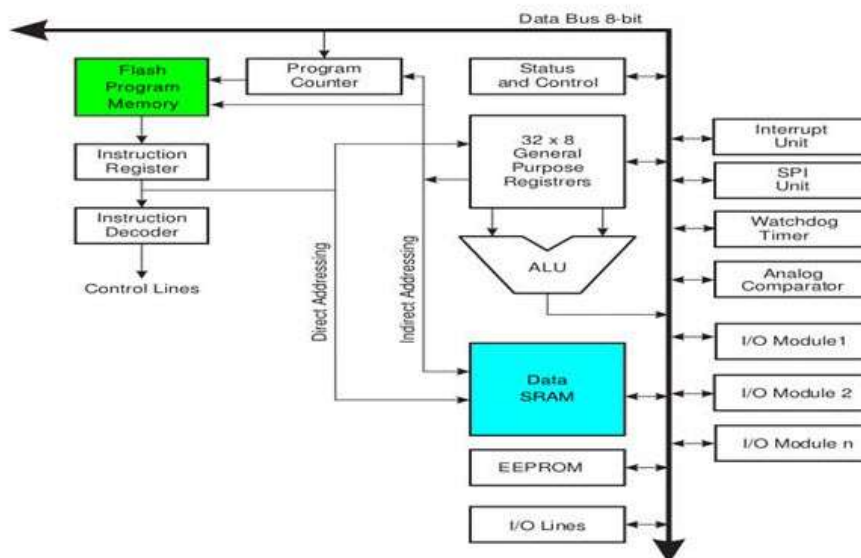

Fig.2: Arduino Architecture

ARDUINO can be used to develop interactive objects, taking inputs from a verity of switcher or sensor and controlling a variety of lights, motors and other physical output , ARDUINO they can communicate with software running your computer .The ARDUINO programming language is an implementation of wiring a similar physical computing platform .which is based on the processing multimedia programming environment .For programming the microcontrollers ARDUINO platform provide an integrated development environment (IDE) based on the processing project .it includes support for c and C++ programming languages.

3.4 Features of ARDUINO (ATMEGA328)

- ➢ **Microcontroller -   ATMEGE328**
- ➢ **Operating voltage   - 5v**
- ➢ **Input voltage (recommended) - 7 to 12v**
- ➢ **Flash memory - 32k (it's a memory it can erasable by electrically)**
- ➢ **SRAM - 2kb (static memory it will store the bits data)**
- ➢ **EEPROM - 1kb (electrically erasable programming   read memory)**
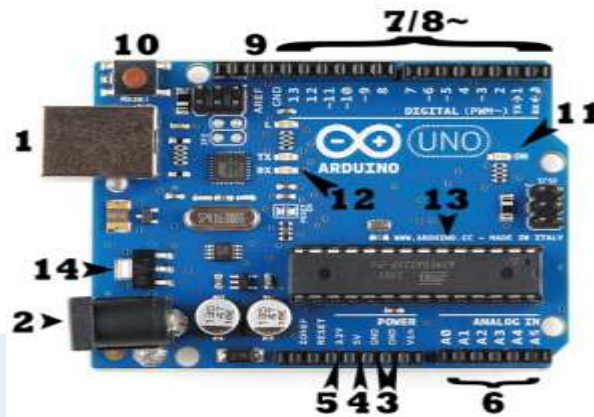- ➢ **Clock speed   - 16 MHz**

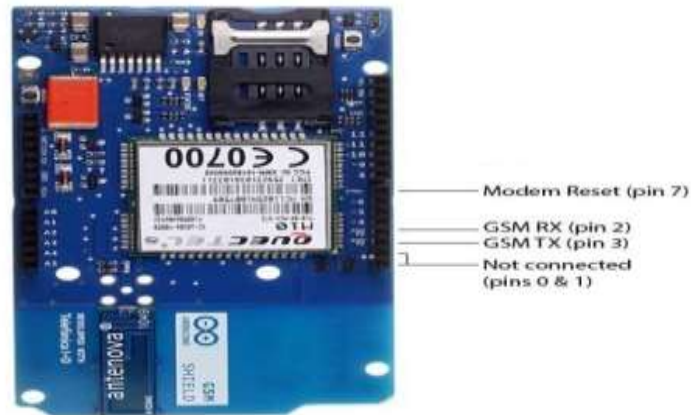**Fig. 3: GSM (global system for mobile) module**

Fig.4: GSM (global system for mobile) module

GSM Shield allows an ARDUINO board to connect to the internet, make/receive voice calls and send/receive SMS messages. It is possible to communicate with the board using .large number of methods for communication with the shield. The shield uses digital pins 2 and 3 for software serial communication with the ARDUINO mega. Pin 2 is connected to the M10's TX pin and pin 3 to its RX pin. for working with an ARDUINO Mega. The modem's PWRKEY pin is connected to ARDUINO pin 7.

IV MAGNETIC SWITCHES

Fig. 5: Magnetic Switches

The reed switch is comprised of two pieces, a switch and a magnet. The switch has two wires extending out from it, when a magnet comes near the switch it causes a small mechanical piece to move and close the switch momentarily.Solder a 10kOhm (current limiting) resistor between A0 and ground on the protoboard. Connect long pieces of stranded wire to A0 and 5V- these wires will wrap around the bike and attach to the reed switch.

Secure both the magnet and reed switch to your bike wheel with electrical tape (either wheel is fine). As shown in the images above, the magnet connects to one of the tire spokes and the reed switch connects to the frame of the bike. This way, each time the bike wheel turns the magnet moves past the switch. Connect the leads form the reed switch to the long wires from your protoboard

V. Basic Functions of Arduino Technology

- ➢ 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.

VI. Advantages of Arduino Technology

- ➢ It is cheap
- ➢ It comes with an open supply hardware feature that permits users to develop their own kit
- ➢ The software of the Arduino is well-suited with all kinds of in 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.

VII. Applications of Arduino Technology

8.1 The Obstacle Avoidance Robot Operated with Arduino

The main concept of this project is to design a robot using ultrasonic sensors to avoid the obstacle. A robot is a machine and it is a combination of programs instructions and motors. It can perform some task with some guidance or automatically. This robotic vehicle has an intelligence which is built inside of the robot. When a obstacle problem comes ahead of it then, it guides itself. This robot is designed with a microcontroller from Atmel family of Aduino board.
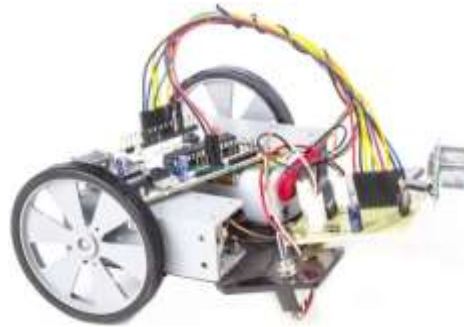
Fig.6: Arduino Operated Obstacle Avoidance Robot Project Kit by Edgefxkits.com

8.2 Arduino based Controlling of Electrical Appliances using IR

The main goal of this project is to control the electrical appliances using an IR remote. This project uses the TV remote to transmit the coded data, then it is received by a sensor which is interfaced to the control unit. The proposed system controls the electrical loads depending on the transmitted data from the remote. Operating electrical appliances are very difficult for handicapped or senior people. This project gives the solution by integrating household appliances to a control unit which can be operated with a TV remote.

Fig.7:Arduino based Electrical Appliances Control using IR Project Kit by Edgefxkits.com

8.3 Arduino based Home Automation

The main goal of this project is to design a home automation system using an Arduino board with Bluetooth being controlled remotely by any Android OS based smart phone. This home automation system provides a modern solution with smart phones.In order to achieve this, a Bluetooth device is attached to the Arduino board at the receiver side and while on the transmitter side, a GUI application on the smart phone sends ON/OFF commands to the receiver where loads are connected. By touching the particular location on the graphical user interface (GUI), the different loads can be remotely turned ON/OFF via this technology. When we touch the exact location on the GUI, then the loads can be turned ON/OFF remotely. The loads works with an Arduino board through Thyristors and Opto-Isolators using triacs.

Fig.8:Arduino based Home Automation Project Kit by Edgefxkits.com

8.4Underground Cable Fault Recognition using the Arduino Board

The main concept of this project is to find the location of the underground cable fault from the base station in kms using an Arduino technology. The underground cable fault is a common problem in many urban areas. When a fault occurs in the underground cable, at that time the repairing of that cable is very difficult due to not knowing the location of the cable. This project is built with a set of resistors to represent the cable length in kilometers and fault creation is designed with a set of switches at every known kilometer to cross check the exactness of the same. When a fault occurs at a particular distance and the particular phase is displayed on an LCD which is interfaced to the Arduino board.
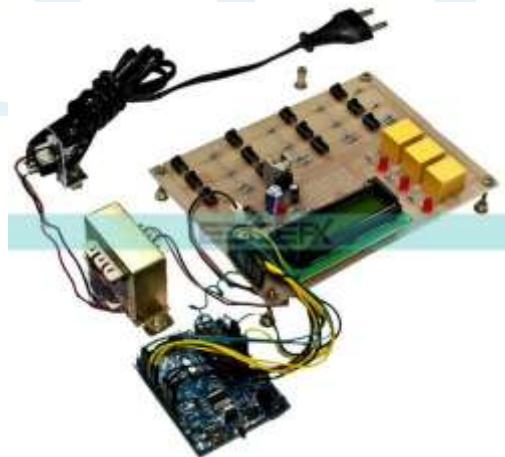

Fig.9: Arduino based Underground Cable Fault Detection Project kit by Edgefxkits.com

This is all about Arduino technology and its applications. So this is the basic information regarding Arduino which can be used for many applications like controlling of actuators for example generators, motors & based on the input of the sensors.

VI. CONCLUSION

As the number of accidents on highways increases day by day, so it is necessary to check speed of the vehicles on highways so as to remove accident cases and to provide a safe journey by controlling high speed of the vehicle. It also minimizes the difficulties of traffic police department and make ease to control the rash driving on highways. The police can perform their duties while sitting in control room and can provide their service with more ease and accuracy. This concept can be extended in future by integrating a camera with the system which could capture the image of the number plate of the vehicle to sends that to the traffic authorities.

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