MICRO-CONTROLLER BASED AUTOMATIC ADVANCED RAILWAY GATE CONTROL SYSTEM



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Declaration

It is declared hereby that this project paper or any part of it has not been submitted to anywhere else for the award of any degree.

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Abstract

While trains are convenient for travel and for transporting goods, they have become a riskier mode of transport over recent years. At present time, a large number of accidents have occurred due to railway mishaps in Bangladesh. Mismanaged railway crossings and faulty rail lines are the principle reasons behind the accidents. Moreover, Bangladesh Railway has attributed a huge sector of those losses to massive manpower and maintenance expenses it engulfs. Both the problems can be resolved by an intelligent unmanned railway introduced in this paper, which will not only reduce the risk of human lives but also a huge amount of public property. The total system is an integration of a few stand-alone sub-systems powered by micro-controllers which perform simultaneously by synchronizing the data to improve the safety and efficiency of the railway transport in different sectors. A part of the system is a completely unmanned crossing system, which ensures the safe crossing of a train in the busy city areas. Sensing the flaws in the railway tracks is also included in this system. This research depends on microcontroller based subsystems to reduce the complexity, uncertainty and cost. Then the controller unit determines whether the obstacle is train or stuck and takes necessary steps by controlling the gate, alarm generator and signal lights. Experimental studies show that the proposed methodology provides a more cost effective, reliable and simpler railway gate controller than existing dominant work.

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CHAPTER I
Introduction

1.1 Introduction

The growing population and mobility in recent years in Bangladesh puts a pressure in road and railway networks. Railway communication is one of the most popular mode of travel for passengers and for transportation. With improvement through wider connectivity, rail communication is presently considered to be environment-friendly, comfortable and affordable in a densely populated country like Bangladesh. Efficient rail connectivity creates an enabling environment for business by reducing the cost of transportation. Realizing the importance of railway communication, a separate ministry named, the Ministry of Railways was established on 04 December 2011, and the railway sector has been given the highest priority in the Perspective Plan of Bangladesh 2010-2021: Making Vision 2021 A Reality', and in the Sixth Five Year plan of Bangladesh. A Railway Master Plan has been formulated to be implemented in the next 20 years with an objective of making railway an effective mode of mass transportation and to meet the peoples' demand. A target of implementing 235 projects in 4 phases amounting taka 2,33,944.00 crore has been fixed under this Master Plan.
Since the existing system has major short comings, this thesis is a first step in that direction which will meet the goal of Ministry of Railways by making a complete automated railway system. Which is much more effective, quicker and faultless than that of a human controlled one. This matter could hardly be solved without upgrading the existing system, taking needful countenance from the modern scientific technology.

1.2 Background

The project is a digital railway crossing system made with an Arduino pro mini and IR sensor and a few other components. The main aim of the project is to detect the presence of a train on the rail line and control the crossbar.
The working of the project starts with the IR sensor that senses the coming up train on the rail line near the rail crossing and uses that sensing signal the Arduino produce a voltage signal which controls the crossbar for open and close.

1.3 Objective

To accomplish a project, the objective of the project must be clear and can be understood to achieve. So, the objectives of this project are:

i. To develop a program that can detect the coming up rail and can communicate between the sensor and microcontroller.

ii. To create a program that can control the railway crossbar efficiently.

iii. To explore how the Arduino mini will operate.

1.4 Scope of Project

The purpose of the project is to build or design a system that can identify the train and then give a warning using the alarm. The data will be sent in the analog signal and then will convert into a digital signal using analog to digital converter (ADC). The developed program will process all data in order to control the crossbar. All the process will execute in the microcontroller. If the crossbar is being closed firstly it can be resolved. This project helps to control the gate without any operator and cost-free. Maintaining cost is also very low. The bar will slowly low or up, for this reason, it will not hurt anything and it also alarm before up or down. The system is totally safe and secure.

1.5 Report Outline

Chapter 1 introduction: The project is a digital railway crossing system made with an Arduino UNO and IR sensor and a few other components. The main aim of the project is to detect the presence of a train on the rail line and control the crossbar.

Chapter 2 Theory of the Project: To complete this project, many types of research and analyze the digital railway crossing system and their theories had been done. Several of sources were being the reference for this research such as texts book.

Chapter 3 Theoretical Model: In this Arduino IR sensor and Servo Motor interfacing, Arduino ace smaller than expected is utilized to. Control the entire procedure. A RI sensor is utilized for detecting condition which gives a flag on each 10mV change at its yield stick.

Chapter 4 Software and hardware development: There are a few C compilers available for the Atmega328 microcontroller. These compilers have many similar features and they can all be used to develop C based high-level programs

Chapter 5 results and discussions: After connecting all equipment according to the circuit we had created the body structure following to the other experimental example from the internet.

CHAPTER II

Theory of the Project

2.1 Introduction

To complete this project, many types of research and analyze the digital railway crossing system and their theories had been done. Several of sources were being the reference for this research such as texts book, journals and internet source. From the past research, many methods were achieved to solve the problem of this project and related to the theory.

2.2 Component List

1. Arduino UNO
2. LCD Display
3. Servo Motor
4. Buzzers
5. IR Obstacle Sensor
6. LED
7. Connector
8. Vero board
9. Soldering Iron

2.3 Arduino UNO

Arduino Uno is a controller board that have an obsessive chip ATmega328p.It has fourteen digital I/O pins, that contains 6PWM output pins, vi analog input pins. it's sixteen rate quartz, a USB association, a efficiency jack and a push button. All the parts required to fortify microcontroller hook up with a pc with the USB cable or power it with DC adapter or battery. associate degree extortionate quantity of concerning doing one thing inaccurate, worst case situation you'll follow the chip for some bucks and begin another time. The Uno R3 in addition integrates SDA and SCL pins contiguous to the AREF. In additament, there ar 2 early pins placed close to the RESET pin. One is that the IOREF that sanction the shields to conform to the voltage provided from the board. The opposite may be a not connected and is reserved for future functions. The Uno R3 works with all subsisting shields however will conform to early shields that utilize these supplemental pins. Arduino is associate degree

ASCII text file physical computing platform predicated on an easy i/o board and a development atmosphere that implements the Processing/Wiring language. Arduino are often acclimated to develop complete interactive objects or are often connected to package on your pc (e.g. Flash, Processing, MaxMSP). The ASCII text file IDE are often downloaded gratuitously (currently for macintosh OS X, Windows, and Linux).



Fig 2.1: Arduino UNO

"Uno" designates one in Italian and was opted to mark the relinquishment of Arduino code (IDE) one.0. The Uno board and version one.0 of Arduino code (IDE) were the reference versions of Arduino, currently evolved to a lot of early releases. The Uno board is that the initial in an exceedingly series of USB Arduino boards and also the reference model for the Arduino platform; for an intensive list of current, past or archaic boards optically tell apart the Arduino index of boards. Arduino may be a microcontroller kit for building digital contrivances and interactive objects that may sense and management physical contrivances. These systems offer set of digital and analog pins that may interface to sundry enlargement boards. the primary arduino was introduced in 2005 planning to offer a coffee price, price efficacious contrivances that move with environments utilizing sensors and actuators. associate degree arduino's microcontroller will be preprogrammed with a bootloader that simplifies the uloading of programs to the on-chip flash recollection. Arduino boards were designed by yankee firms. As on 2016, seventeen versions of Arduino hardware had been commercially engendered. Arduino may be a microcontroller kit for building digital contrivances and interactive objects that may sense and management physical contrivances. These systems offer set of digital and analog pins that may interface to sundry enlargement

boards. Arduino boards were designed by yankee firms. As on 2016, seventeen versions of Arduino hardware had been commercially engendered.

2.3.1 Specification Arduino UNO

Arduino is associate degree ASCII text file prototyping platform predicated on facile-touse hardware and code. Arduino consists of each a physical programmable printed circuit and a chunk of code, or IDE (Integrated Development Environment) that runs on your pc, accustomed create verbally and transfer coding system to the physical board. The Arduino Uno may be a microcontroller board predicated on the ATmega328 (datasheet). it's fourteen digital input/output pins (of that half dozen will be used as PWM outputs), half dozen analog inputs, a sixteen Mc oscillator, a USB association, a efficiency jack, associate degree ICSP header, and a push. It contains everything required to fortify the microcontroller; merely connect it to a pc with a USB cable or power it with a AC-to-DC adapter or battery to urge commenced. The Arduino Uno may be a microcontroller board predicated on the ATmega328 (datasheet). it's fourteen digital input/output pins (of that half dozen will be used as PWM outputs), half dozen analog inputs, a sixteen Mc oscillator, a USB association, a power jack, associate degree ICSP header, and a push. It contains everything required to fortify the microcontroller; merely connect it to a pc with a USB cable or power it with a AC-to-DC adapter or battery to urge commenced. The Uno differs from all preceding boards therein it doesn't utilize the FTDI USB-to-serial driver chip. Instead, it options the Atmega8U2 programmed as a USB-to-serial convertor.

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
FlashMemory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)

EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
Length	68.6mm
Width	53.4 mm
Weight	25g

2.3.2 Block Diagram of Microcontroller – (ATmega328p):

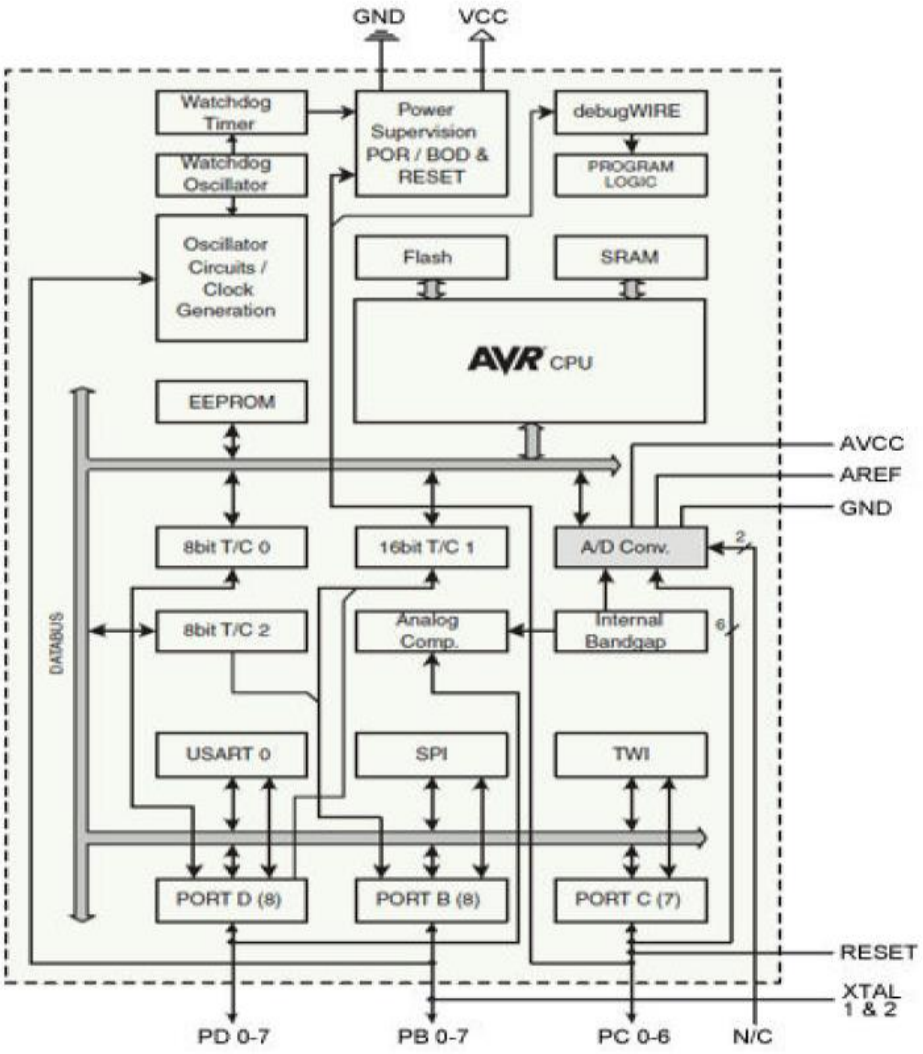


Fig. 2.2: Block Diagram of Atmega328 Microcontroller

2.3.3 Pin Configurations of Microcontroller

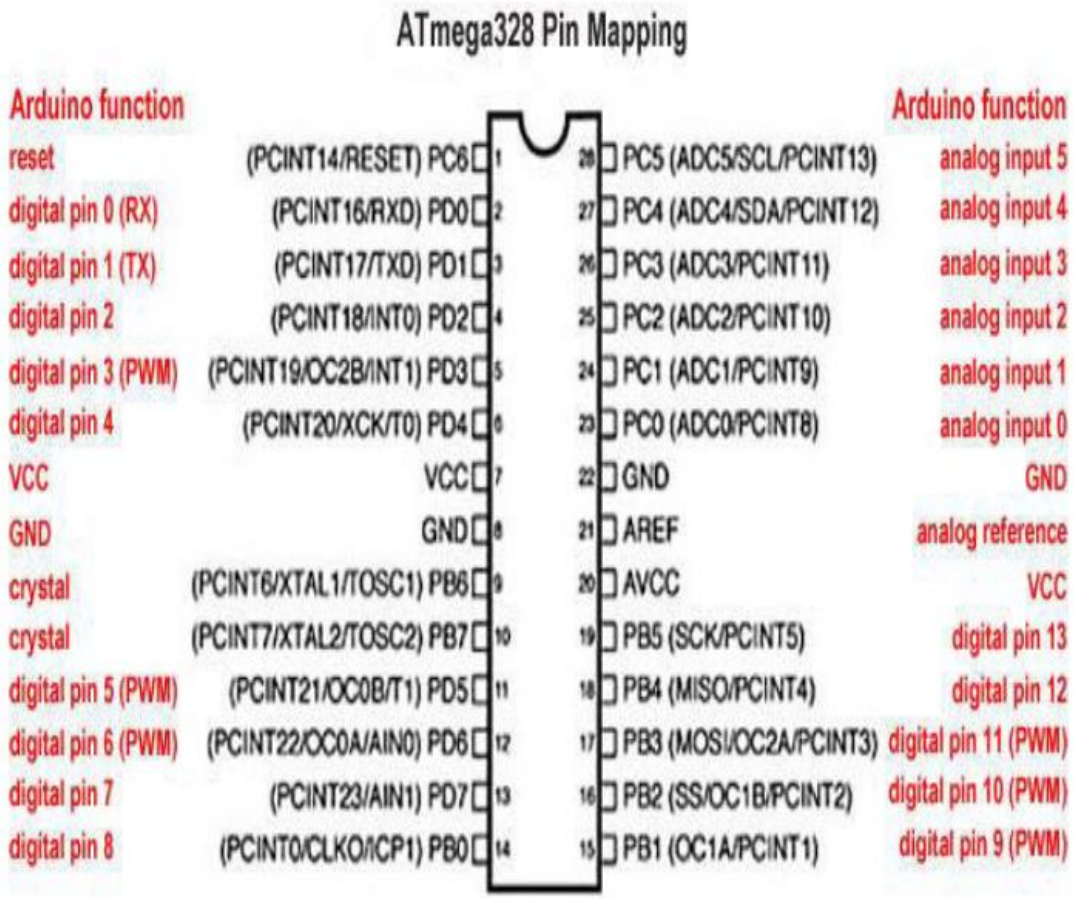


Fig 2.3: Pin Configurations of Microcontroller

2.3.4 Pin Descriptions

Programming Arduino Uno programmed with the software called Arduino IDE. From the Tools of the software needed to select the board and port. In our case we used a n Arduino Uno, so we had to select Arduino/Genuino Uno from the the board. Afterthat we had to select the port that contains our board to the computer. There was also have a huge collection of example code. It helps us more efficiently.

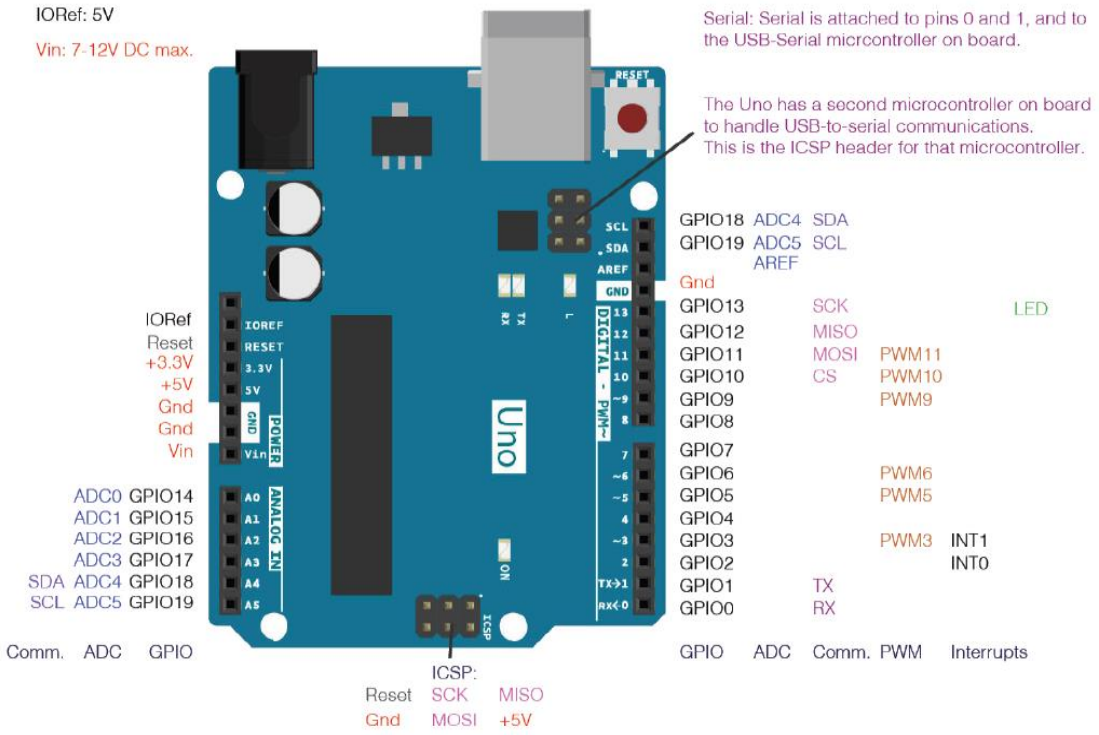


Fig 2.4: Pins of Arduino UNO

Warnings

Arduino has a poly fuse for instant resetting. If any short circuit or over current flow through the USB to board then the poly fuse automatically break the power connection until the short or overload abstracted. The limit of current is 500mA.

Different from other

The Atmega16U2 programmable as a USB to serial converter instead of utilize the FTDI USB to serial driver chip.

Pins Specification

LED: A LED is built in the board, which is driven by pin 13.when the digital pin get voltage the LED is on, either its off.

VIN: 5volts from the USB or external power supply (battery or adapter) will be used to power up the board. The voltage is gone through the VIN pin.

5V: There is a dedicated 5v pin on the board. This is a Out pin. We can use a bypass 5v voltage from this if we needed.

3.3V: There is also a 3.3V power supply generated by the board. It contains 50mA maximum current

GND:It contains also three ground pins.

IOREF: For operating microcontroller with voltage reference, this pin will be used. A configured Shield can read the IOREF pin voltage to select the appropriate power source or enable voltage translators.

Reset: It can be used to add a reset button to resetting the board.

Power

The Board can be powered by the USB or external DC power supply. Power can come from AC-DC adapter or DC battery. By 2.1mm center positive plug the adapter can used as power supply. Or an external battery can power up the board by connecting in VIN and GND pin.

The external power should be always higher than 7v. Because the minimum working voltage of the board is 7v. If it's less than 7v it may not work properly, %v pin cannot supply five volts and the board become unstable. If the input power is exceeds 12v then the voltage regulator may overheat and damage the board. The range is 7-12v. The Board can be powered by the USB or external DC power supply. Power can come from AC-DC adapter or DC battery. By 2.1mm center positive plug the adapter can used as power supply.

Memory

The ATmega328p has 32 KB storage. Which 0.5KB storage is occupied by the bootloader. It has 2KB of SRAM and 1KB of EEPROM, which can be read by the EEPROM library.

Input and Output

The fourteen digital pins of arduinouno may be used as input and output. pinMode(), digitalWrite(), and digitalRead() area unit the functions. There operational voltage is 5v. All of the pins will give or receive 20mA in operational condition. 40mA is that the most current for every pins, that's the worth for I/O. should not be exceeded 40mA either it cause harm the microcontroller.

Some of the pins have uncommon functions:

Serial Pin: zero,1(RX,TX). There wont to knowledge receive and transmission. These pins area unit connected to ATmega8U2 USB to TTL. Serial Chip: two,3. Those pin may be designed to trigger an occasional price, a falling edge, or a transmission price.

PWM(Pulse breadth Modulation): three,5,6,9,10 and 11. Those pins area unit give 8-bit PWM output with the analog operate.

SP1: 10(SS), 11(MOSI), 12(MOSI), 13(SCK). For SPI communication with the SPI

library, these pins support the board.

TWI: A4 pin and A5 pin support TWI communication with the wire library.

There is half dozen analog pins for input A0 to A5, all the pins area unit give ten bits of resolution. They quantify ground to 5v by default. there's AREF pin and Analog Reference() operate to transmit the higher surcease of their vary. another pins on the board:There is half dozen analog pins for input A0 to A5, all the pins area unit give ten bits of resolution.

AREF: Reference voltage of analog inputs. Analog Reference().

Reset: By lowing this pin we will reset the microcontroller.

Communicate

There is a great deal of facilities for human activity through a laptop with Arduino Uno or different microcontrollers. Arduino Uno board provides 5v serial communication that is offered on the RX and American state pin. there's a serial communication over USB and thru a virtual com port to the pc package. The 16U2 microcode coverts the standerd USB COM driver.there's no would like for external drivers. A .inf file is needed. A Serial Monitor is includes with the package. that sucks sample matter information to send or from the board. RX and American state LEDs on the arduino can flash once the information transmitted or received from the pc. Wire library are includes to the Arduino Uno IDE package for simplifying I2c bus, ATmega328p fortifies I2C and SPI communication. Utilizing SPI library for SPI communications. Once uplosading code physically reset is requiring instead of package reset.Uno board is functioning in a very approach that reset by running package on a connected laptop. ATmega8U2/16U2 is connected to reset pin via one hundred nanofarade capacitance. The other implication will have connected the road declarative capability to reset the chip. The bootloader may have a shorter timeout state of affairs that remains betokens. The coordination of the DTR is as lower because the deliver project. The compatible style that produces the items higher once UNO is connected with servo with terribly tight. we will use the operate as we all know. Life is sure with disorder of the machine. Magician makes the planet nice so the planet will do a far better fever to North American nation. UNIX is that sort of package that to a lower place the tower of the mountain of the parisifel tower. The interface of this project is to believe that we tend to can not be serious like that. this can be not one thing that we wish should.

If it's unheeded to deformed information, it'll interrupt the in no time alittle bytes of information causation to the board before a affiliation is closed. If a code running on the board receiving only once or different information for initial command, assumed of the package with the human activity for a moment once a second gap to causation this information. ARduino Uno board contains a trace that might be incapacitate the autoreset. For re-enable it is soldered along. The labeling are RESET-EN. For machine reset it is through with one hundred ten ohm resistance from 5v to the reset line.

Revised

The 3 options of the revised issue as follows:

1.0 pin out: SDA and SCL integrated pins that ar proximate to the AREF pin and 2 different pins have placed proximate to the RESET pin and therefore the IOREF that sanction the shields habituating to the voltage that provided from the board. Shields and AVR are compatible and used the board, that operates five.5V and embody the three.3V. the long run functions of revised that matter the output pin isn't connected.

2.4 Servo Motor

If you have got a guided model automotive, airplane, or heavier-than-air craft, you're utilizing a minimum of some servos. Servo motors (or servos) ar self-contained electrical contrivances (optically make out Figure one below) with nice preciseness that rotate or push elements of a machine. you'll realize servos in several places: from toys to home physics to cars and airplanes.. during a model automotive or craft, moving servos levers back and controling the forth and steering or alter wing surfaces. By rotating a shaft connected to the engine throttle, a servo regulates the haste of a fuel-powered automotive or craft. Servos even so appriciate the scenes in contrivances we tend to utilize a day. In 21st-century vehicles, but servos manage the car's speed: not solely The accelerator pedal however additionally consistent to the amount management on a radio, sends associate electrical signal that tells the car's pc however way down it's being ironed. when hard that info and different knowledge from different sensors the pc sends a sign to the servo annexed to the throttle to regulate the engine rate.



Fig 2.5: Servo Motor

2.4.1 How servo motor work

The simplicity of a servo is among the options that build them thus reliable. the center of a servo could be a minuscule electrical energy (DC) motor, kindred to what you would possibly realize in a reasonable toy. A minuscule motor doesn't have a lot of force, however it will spin genuinely prompt (diminutive force, vastly prodigious distance) These motors run on electricity from A battery and spin at high rate (rotations per minute) however place out terribly low force (a convoluting force wont to do work— you apply force after you open a jar).

An arrangement of gears takes the high speed of the motor and decelerates it whereas at constant time incrementing the force. (Rudimental law of physics: work = force x distance.) A minuscule motor doesn't have a lot of force, however it will spin genuinely prompt (diminutive force, vastly prodigious distance). The gear style within the servo case converts the output to a far additional gradual rotation speed however with additional force

2.5 IR Obstacle Sensor

An IR Obstacle Sensor works in accordance with the infrared reflection principle to detect obstacles. When there is no object, the infrared receiver receives no signals; when there is an object ahead which blocks and reflects the infrared light, the infrared receiver will receive signals. An obstacle avoidance sensor mainly consists of an infrared transmitter, an infrared receiver and a potentiometer. According to the reflecting character of an object, if there is no obstacle, the emitted infrared ray will weaken with the distance it spreads and finally disappear. If there is an obstacle, when the infrared ray encounters it, the ray will be reflected

back to the infrared receiver. Then the infrared receiver detects this signal and confirms an obstacle in front.



Fig 2.6: IR Obstacle Sensor

2.6 LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc.

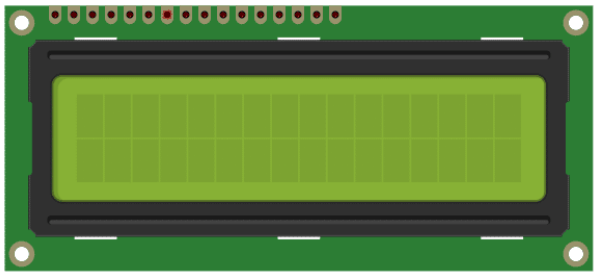


Fig 2.7: 16*2 LCD Display

Features of LCD Display

5 x 8 dots with cursor

Built-in controller (KS 0066 or Equivalent) + 5V power supply (Also available for + 3V) 1/16 duty cycle

B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED) N.V. optional for + 3V power supply.

2.7 Buzzers

Piezoelectric Sounders are sound segments which create sound appropriate for use as info signals without implicit wavering circuits. This trademark enables them to be utilized in an extensive variety of utilizations. They come as the SMD type, which is ideal for little, high-thickness mounting and the stick type, which can be utilized for general purposes. Piezoelectric signals are sound parts which produce a monotone utilizing an inherent wavering circuit. [3]



Fig 2.8: Buzzer

2.8 LED

The LED is a light source which utilizes semiconductors and electroluminescence to make light. There are two noteworthy sorts of light radiating diodes: LED and OLED. The LED is unique in relation to EL light in that it utilizes a little semiconductor precious stone with reflectors and different parts to make the light more splendid and centered into a solitary point. The OLED is fundamentally the same as the EL light in configuration, utilizing a level sandwich of materials. It is unique in relation to the LED and EL light in that it utilizes natural particles in the layer that radiates light.



Fig: 2.9: LED

2.9 Vero board

Vero board is a brand of strip board, a pre-shaped circuit board material of copper strips on a protecting board. Which is the conventional name for a broadly utilized sort of hardware prototyping board described by a 0.1 inch regular network of gaps, with wide parallel strips in copper cladding running one way the distance crosswise over one side of the board? It is ordinarily additionally known by the name of the first item Vero board, which is a trademark, of British organization Vero Technologies Ltd and Canadian organization Pixel Print Ltd. In utilizing the board, breaks are made in the tracks, for the most part around gaps, to isolate the strips into different electrical hubs. With consideration, it is conceivable to break between gaps to take into consideration segments that have two stick pushes just a single position separated, for example, twin column headers for IDCs.

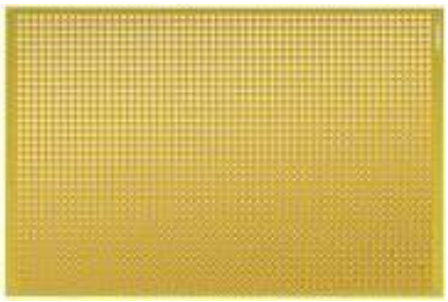


Fig 2.10: Vero Board

2.10 Soldering Wires

Weld is fundamentally a metal wire with a "low" softening point, where low for our motivations implies low enough to be dissolved with a binding iron. For gadgets, it is customarily a blend of tin and lead. At the point when the fastening wire chilled an electrical association will lead. This is getting a decent mechanical association between the wires. The fibers of each wire ought to be turned together, carry on more like a solitary element. The initial step is to set up the wires at that point tinning the wears, by join the wires and weld graft together.

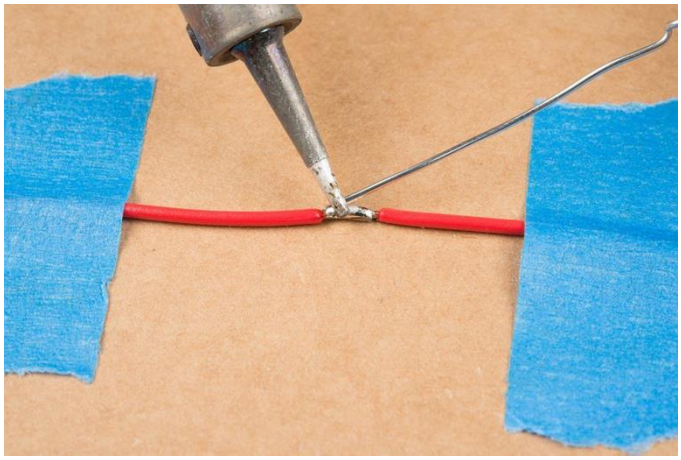


Fig 2.11: Soldering Wires

2.11 Transformer

A transformer is a passive electrical device that transfers electrical energy between two or more circuits.

.



Fig 2.12: 220v to 12V step down transformer

A varying current in one coil of the transformer produces a varying magnetic flux, which, in turn, induces a varying electromotive force across a second coil wound around the same core. Electrical energy can be transferred between the two coils, without a metallic connection between the two circuits. Faraday's law of induction discovered in 1831 described the induced voltage effect in any coil due to changing magnetic flux encircled by the coil.

Transformers are used for increasing or decreasing the alternating voltages in electric power applications, and for coupling the stages of signal processing circuitsBasically, transformer are two types.

1. Step up transformer
2. Step down transformer

We have used step down transformer as required for our project. Which is 220v to 12v 3000ma step down transformer.

2.12 Full wave rectifier

A Full wave rectifier is a circuit arrangement which makes use of both half cycles of input alternating current (AC) and converts them to direct current (DC). ... This arrangement is known as a Bridge Rectifier. It uses the entire AC wave (Both positive and negative sections). Each diode uses 0.7v when conducting and there are always two diodes conducting.

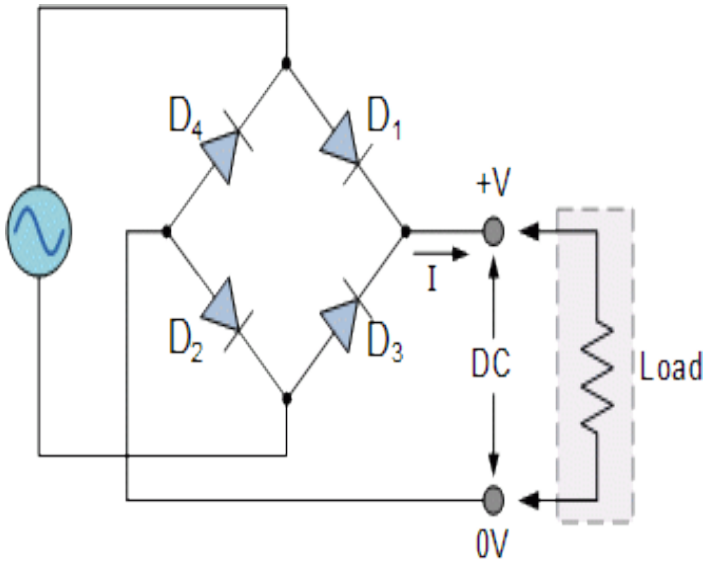


Fig 2.13: Full wave rectifier is a circuit diagram

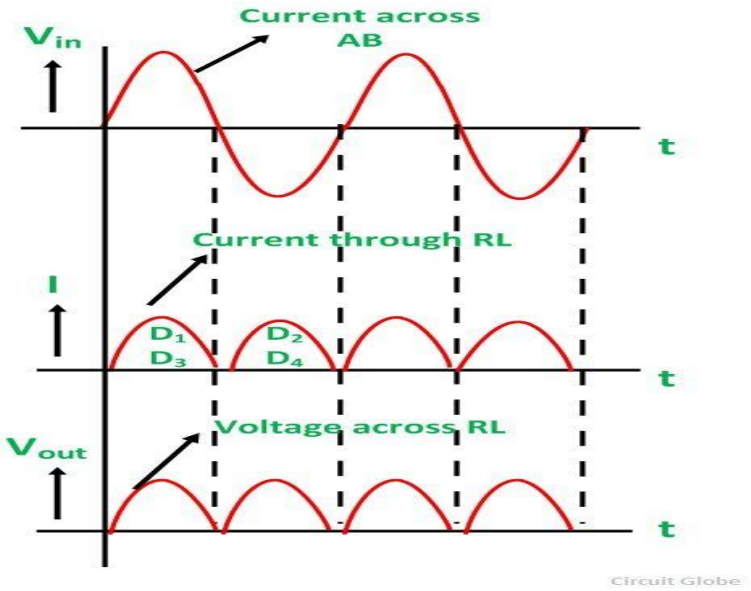


Fig 2.14: Full wave rectifier wave from

2.13 Buck Converter

A buck converter (step-down converter) is a DC-to-DC power converter, which steps down voltage from its input to its output. The basic operation of the buck converter has the current in an inductor controlled by two switches. In the idealized converter, all the components are considered to be perfect. Specifically, the switch and the diode have zero voltage drop when on and zero current flow when off, and the inductor has zero series resistance. Further, it is assumed that the input and output voltages do not change over the course of a cycle



Fig 2.15: DC-DC Buck Converter

2.14 Summary

The chapter describes some important equipment that related to the project. Describes of all equipment like Arduino, Microcontroller (Atmega328), Servo Motor, Buzzer, LED, Connector, Vero board, that works properly use for show data read related this project.

CHAPTER III

DESING & FEBRICATION

3.1 Block Diagram

In this Arduino IR sensor and Servo motor interfacing, Arduino Uno is used to

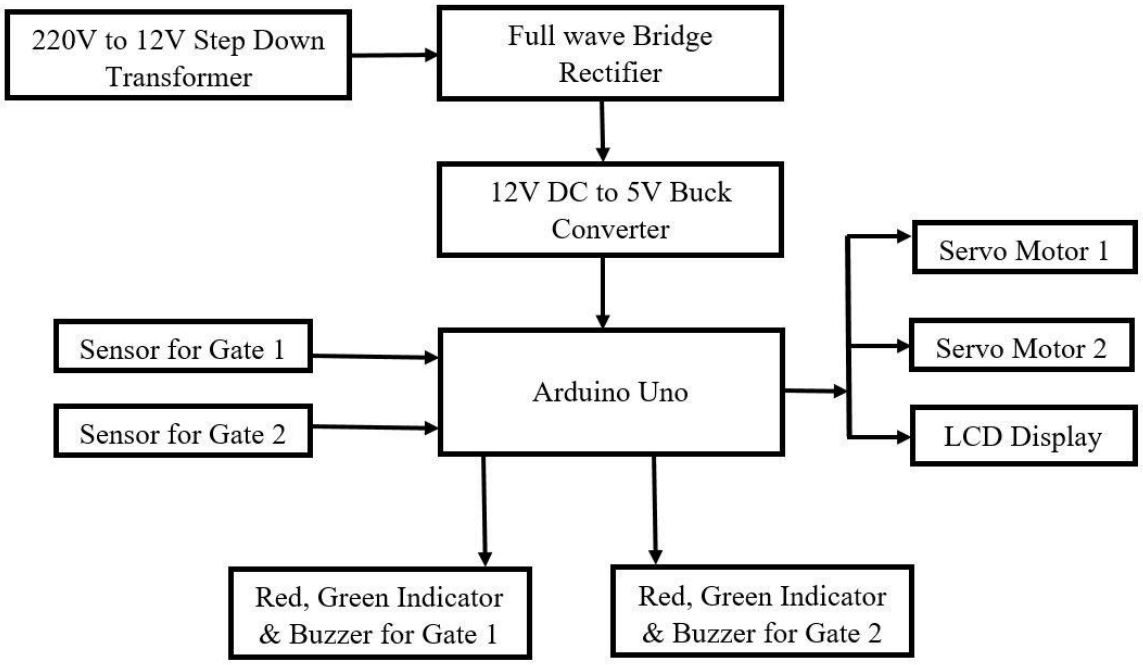


Fig 3.1: Block Diagram

Control the entire procedure. A RI sensor is utilized for detecting condition which gives a flag on each 10mV change at its yield stick. You can without much of a stretch check it with a voltmeter by interfacing Vcc at stick 1 and Ground at stick 3 and yield voltage at stick 2 of the IR sensor. For a precedent, if the yield voltage of the IR sensor is 250m volt that implies the Servo Motor is run a LED on. Arduino peruses yield voltage of IR sensor by utilizing Digital stick 3 and stick 3 plays out a computerized estimation of run servo engine. After Arduino sends these flag to the servo engine.

3.2 Circuit Diagram

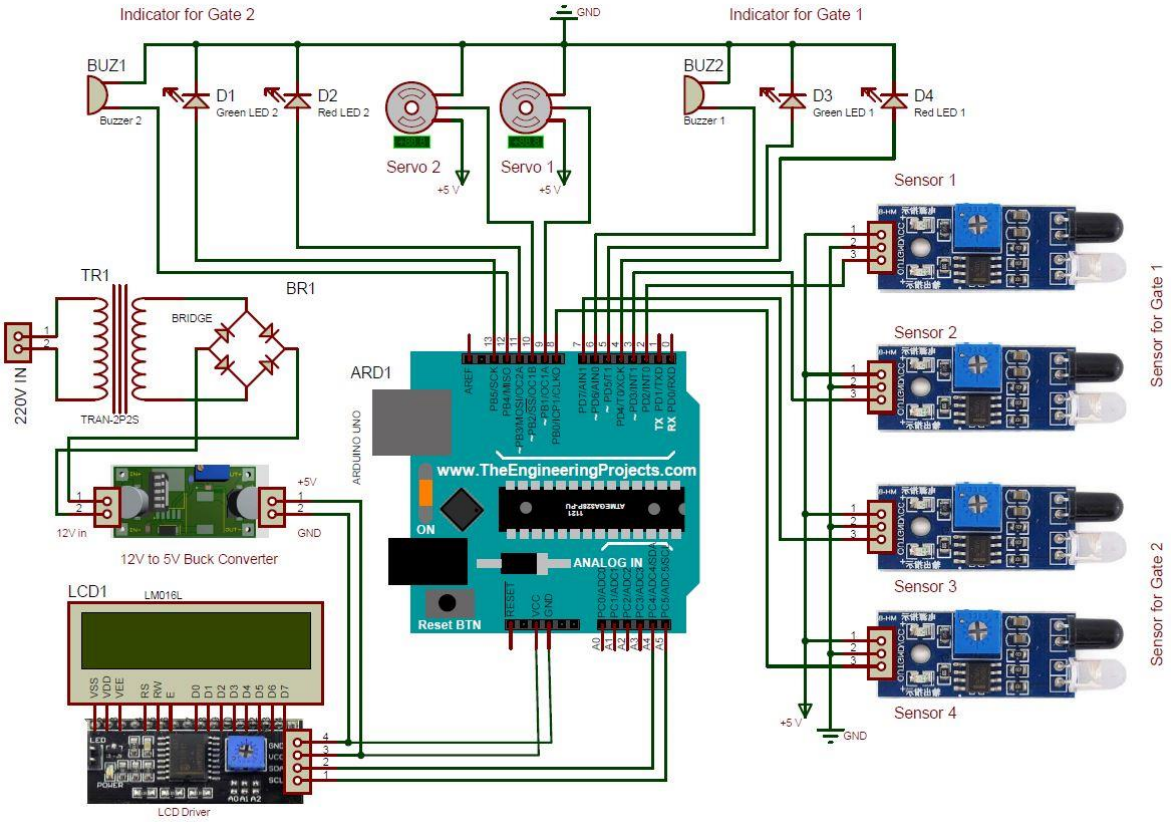


Fig 3.2: Circuit Diagram

Circuit diagram for Automatic Railway Crossing using Arduino, IR sensor, is shown in the above figure. Make the connections carefully as shown in the schematic. Data pins of LED are connected to Arduino digital pin number 6, 7, 10, 11. IR sensor is also connected to Digital Pin 2, 3, 4, 5 of Arduino. Servo motors are connected to Arduino digital pin number 9 and 10.

3.3 Description of our code

The ASCII text file Arduino atmosphere makes it simple to write down code and transfer it to the I/O board. It runs on Windows, Mac OS X, and Linux. The atmosphere is written in Java and supported process, avr-gcc, and different open supply code. The screen shot of Arduino 1.6.8 is shown below

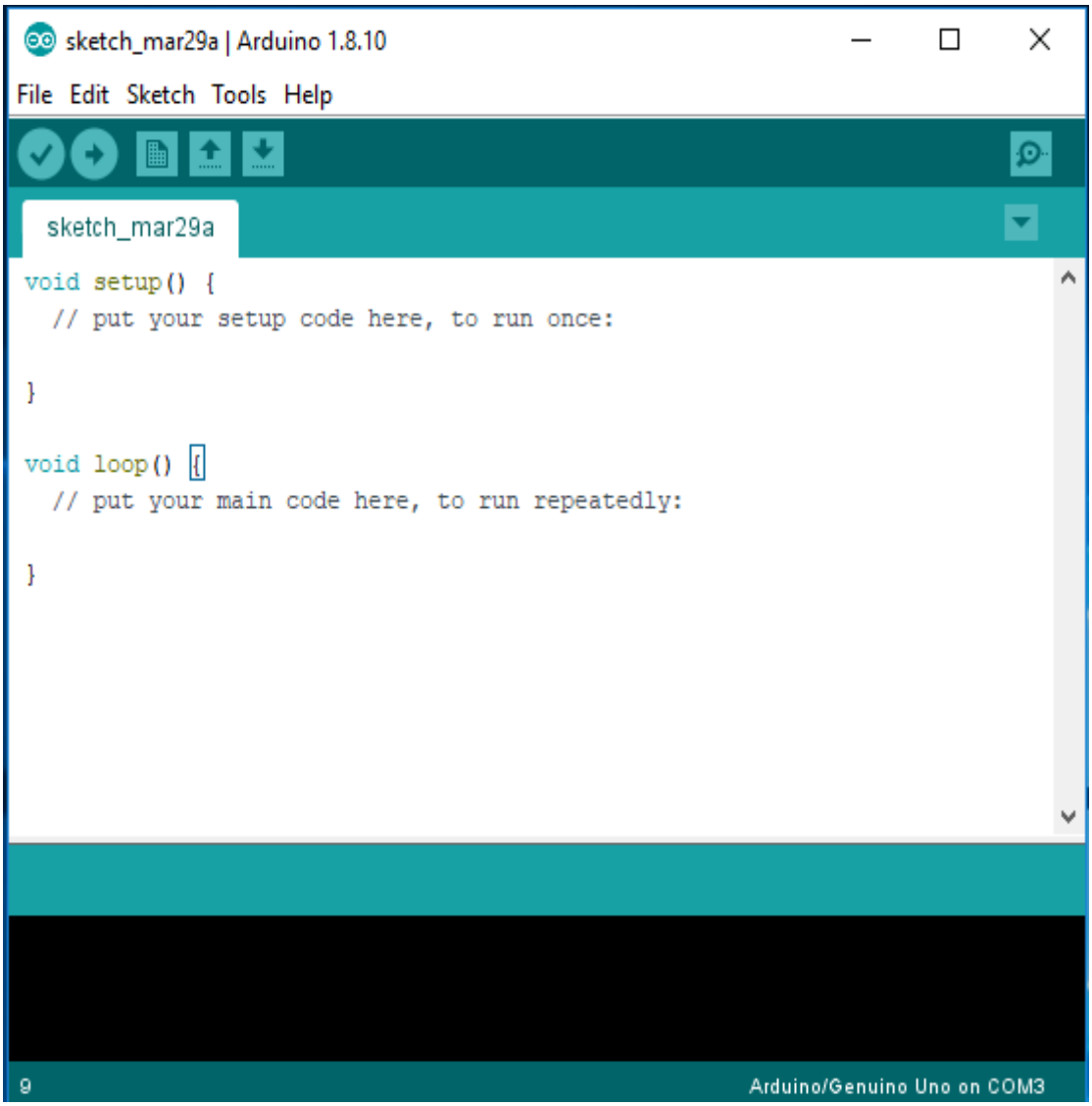


Fig 3.3: Arduino Compiler

It is in addition capable of assembling and uploading programs to the board with one click. there's generally no requisite to edit create files or run programs on a command-line interface. Albeit building on command-line is feasible if needed with some third-party implements like Ino. The Arduino IDE comes with a C/C++ library known as "Wiring" (from the project of an equivalent name), that makes several mundane input/output operations rather more facile. Arduino programs area unit indited in C/C++, albeit users solely would like outline 2 functions to create a runnable program.

The compiled window of my code is show.

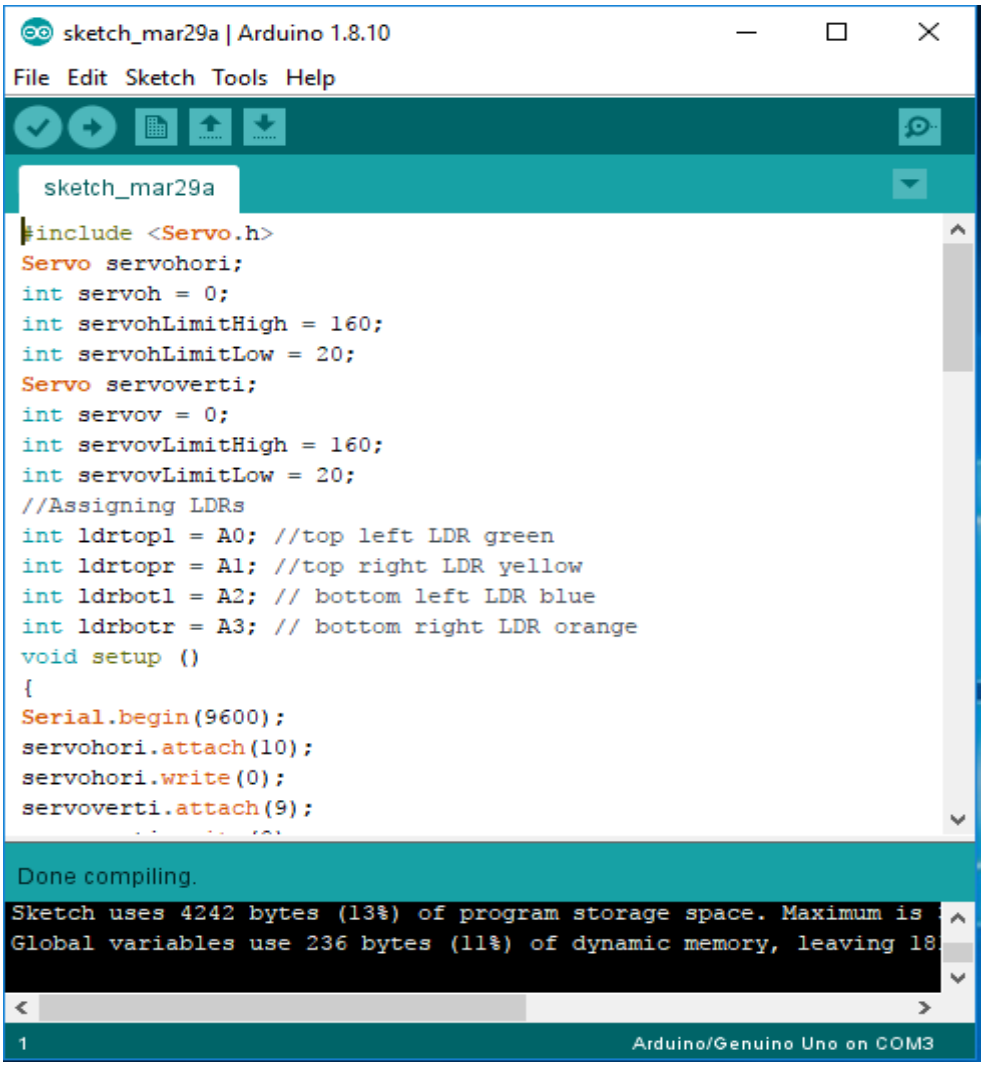


Fig 3.4: Compiled Code ino.

3.4 Program structure

The basic structure of programming language in Arduino is quite simple, and is made up at least with two differenced parts. These two necessary parts, or functions, enclose blocks that have different statements or instructions.

void setup()

{instructions;}

void loop()

{instructions;}

It is in **setup()** where you find the part in charge of gathering the configuration, and in **loop()** you find the instructions of the program that will be executed over and over again in a loop. Both of these parts are indispensable so that the program works fine.

The function of the configuration setup() must have the definition of the variables. It is the first part that is going to be executed, only one time, and is used to configure or initialize pinMode, configuration of serial communication and others.

```
void setup()
{
pinMode(pin, OUTPUT);
}
```

The loop function has the code that will repeatedly be executed (reading of inputs, activation of outputs…). This is the nucleus of all programs in Arduino, and is the one that realizes most part of the work.

```
void loop()
{
digitalWrite(pin, HIGH);
delay(1000); // waits one second (1000 ms)
digitalWrite(pin, LOW);
delay(1000);
}
```

3.5 Functions

A function is a piece of code that has a name and a group of instructions that are executed when the function is called. User functions can be written to do repetitive tasks and to reduce the size of the program.

These functions are associated to a type of value “type”. This value will be the one given back by the function. If the function does not return any type of data, a *void* function will be used. After declaring the type of data the function returns, its name must be written with parameters between brackets.

```
type functionname(parameters)
{
instructions;
}
```

3.6 Syntax

 Keys { }: they are used to define the start and the end of a block of instructions.

type funcion()

{

instructions;

}

 Semicolon ; used to separate instructions from each other. It is also used to separate elements in instructions such as *for loops*. It is important to make sure that there is a *";"* at the end of every line, or else there will be a compilation error.

 Comments: comments are text that are ignored by the program and are used for descriptions of the code to help in the understanding of the program. They start with a /* and end with */. For a single line of comments, // can be used at its start. They do not use space of the Arduino memory.

3.7 Variables

A variable is a way of naming and storing a numeric value for a following use. As its own name says, variables are numbers which can constantly change, just the opposite of constants. Variables must be declared and even assign an initial value. It is helpful that descriptive names are given to variables, so that they are used in a very easy way, and to help other people read the code. Every single variable must be defined at the start of the code with the type data they are going to store such as *int*, *long* or *float*. It is also necessary to write a name, and an initial value if needed. Variables may be declared at the beginning of the program, inside functions and even inside loops. If you declare a variable at the setup () part, they're called global variables and can be used along the whole program. On the contrary, local variables can only be used in the specific functions or loops.

3.8 Software Configuration

Programming software of this Home automation system is known as ARDUINO-IDE .This is open source programming platform**.** The open-source ARDUINO environment makes it easy to write code and upload it to the input/output board. Here we use ARDUINO-1.6.8 platform. To configure software we have to use ARDUINO IDE named arduino.exe

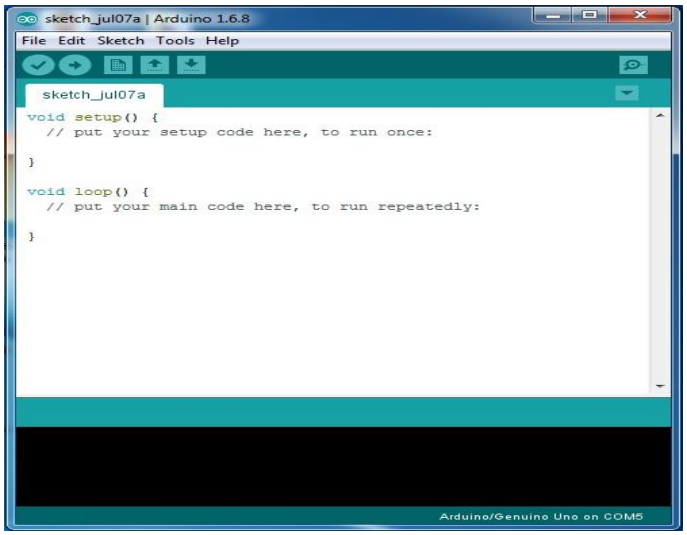


Fig 3.5: Programming platform for ARDUINO

To configure this programmer with computer we need a USB cable then check serial port and select the programmer from IDE platform such as, to select Uno it needs to click **Tools > Board > Arduino/Genuino Uno**

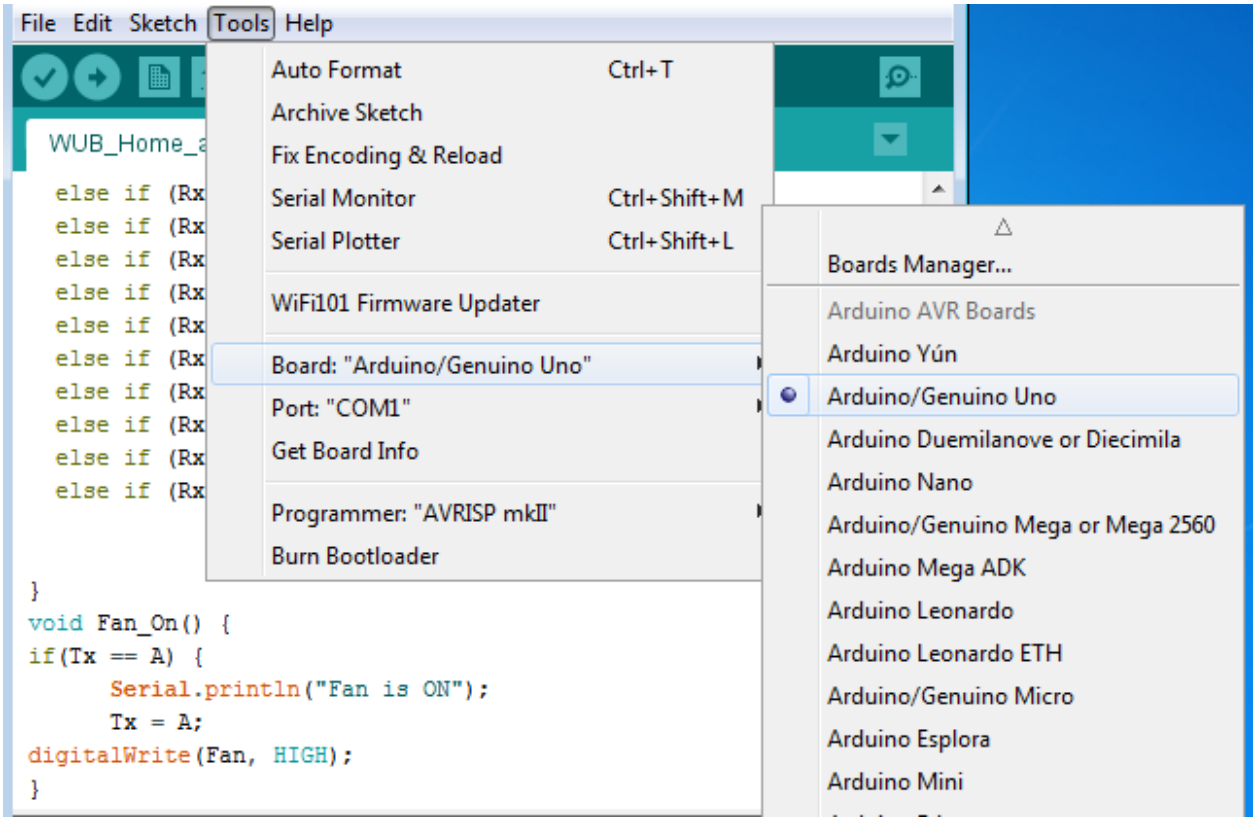


Fig 3.6: IDE configuration for ARDUINO UNO

3.9 Programming ATMEGA328P

To program ARDUINO-UNO R3, it needs to write the program correctly which is verified by Arduino IDE. Connection of arduino Uno is shown below

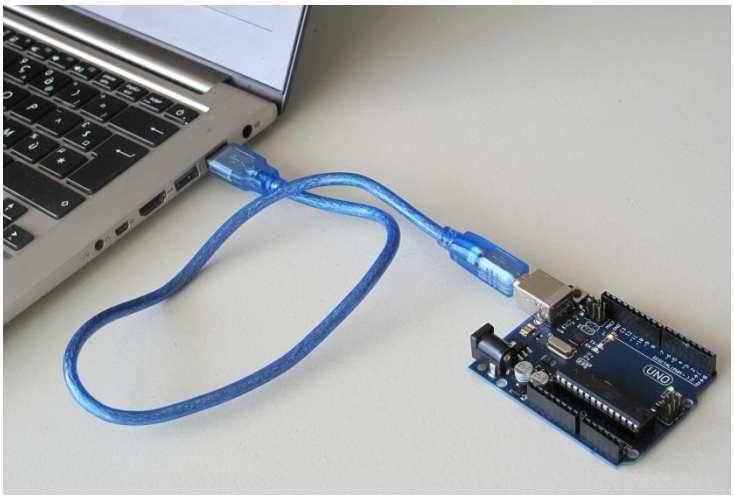


Fig 3.7: Interfacing ARDUINO Uno with Computer

Now this circuit is ready for programming, to do this action simply open IDE on computer then upload configuration code which is programmed as demand.

3.10 Proteus

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

The first version of what is now the Proteus Design Suite was called PC-B and was written by the company chairman, John Jameson, for DOS in 1988. Schematic Capture support followed in 1990, with a port to the Windows environment shortly thereafter. Mixed mode SPICE Simulation was first integrated into Proteus in 1996 and microcontroller simulation then arrived in Proteus in 1998. Shape based auto routing was added in 2002 and 2006 saw another major product update with 3D Board Visualization. More recently, a dedicated IDE for simulation was added in 2011 and MCAD import/export was included in 2015. Support for high speed design was added in 2017.Feature led product releases are typically biannual, while maintenance based service packs are released as required.

CHAPTER IV
Results and Discussions

4.1 Introduction

This chapter will present all the results and calculations and relevant discussions.

4.2 Result

After connecting all equipment according to the circuit we had created the body structure following to the other experimental example from the internet. After preparing the body structure and connection of the circuit we prepared a logic program with the help of C++ program by Arduino. Our project picture is given below:

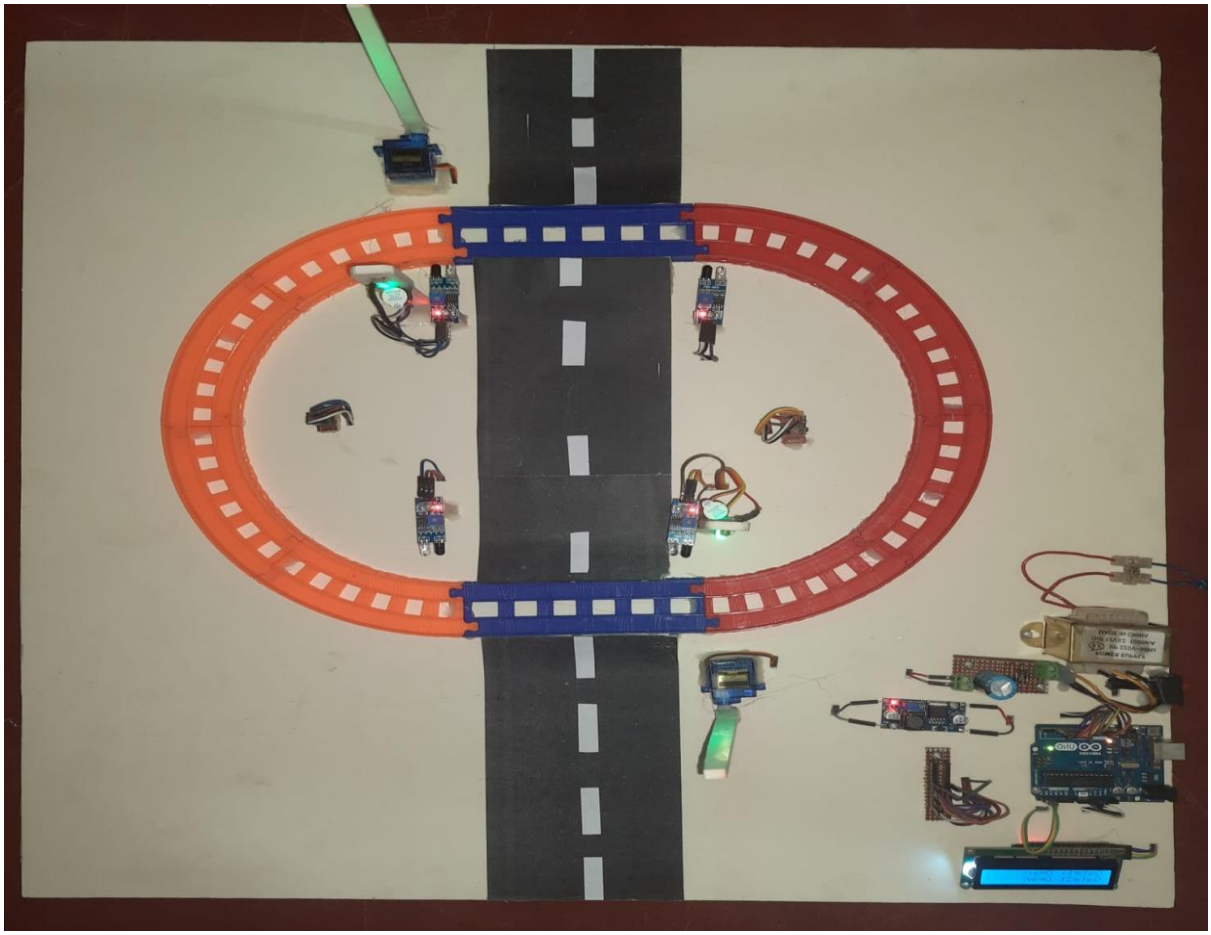


Fig. 4.1: Our Project Picture

After complete the program, we uploaded the program to the Microcontroller. Then we interface the software and hardware part. After completing the entire program and

4.3 Cost Analysis

Cost is essential for any project, In this project we collect all equipment from local market.

Table 5.5: Cost of Our Project

Sl. No.	Components	Unit	Unit Price	Price in (BDT)
01	Arduino UNO	1 Pc	1050/-	1050/-
02	Servo Motor	2 Pcs	140/-	280/-
03	IR Sensor	4 Pcs	70/-	280/-
04	LCD	1 Pc	440/-	440/-
05	LCD Driver	1 Pc	80/-	80/-
06	LED	4 Pcs	3/-	12/-
07	Wire connector	50 Pcs	2/-	100/-
08	Glue Gun Stick	5 Pcs	25/-	125/-
09	White PVC Board	1 Pc	600/-	600/-
10	Buzzer	2 Pcs	15/-	30/-
11	Verro Board	1 Pc	25/-	25/-
12	Reel Connector	1 Set	20/-	20/-
13	Train & Track	1 Set	400/-	400/-
14	Others	1 Unit	100/-	100/-
Total Cost				= 3542/-

4.4 Advantage and Disadvantage

Advantage

- The revolution point of the engine is corresponding to the info beat.
- The engine has full torque at stand still(if the windings are invigorated)
- Precise situating and repeatability of development since great stepper engines have a precision of 3-5% of a stage and this mistake are non-aggregate starting with one stage then onto the next.
- Excellent reaction to beginning/halting/switching.
- Very solid since they are no contact brushes in the engine. Thusly the life of the engine is essentially subject to the life of the bearing.

- The proverbs reaction to the computerized information beats gives open-circle control, making the engine less complex and less expensive to control.
- it is conceivable to accomplish moderate speed synchronous pivot with a heap that is specifically coupled to the pole.
- a extensive variety of rotational paces can be acknowledged as the speed is corresponding to the recurrence of the information beats

Disadvantage

- The framework can be actualized all the more effectively by joining more proficient sensor arranges.
- A blend of manual remote control and sensors based control can be utilized for the better activity.

4.5 Limitations of the Work

Mention few limitations or challenges faced in my work. In this project, we have faced few problems as like as

- Only 4 sensor are use, More sensor is required if more crossing need to add.
- Sensor Position need to be measure and it depends on train length.

4.6 Discussion

Initially four pairs of IR transceivers were used in the project. The drawback became evident quite quickly and changes had to be made in the design. The combination of IR and sonar sensors provides better results than that found from either of them working independently. IR sensors are very much affected by light of any kind while sonar sensors trigger at any obstacle within the specified range. Using both these sensors provide a much more reliable train detection system. The system however loses its effectiveness under rough weather condition such as storm or heavy rain. In this regard, a system comprising of heat sensors or pressure sensors within the track is more successful at train detection. But left on their own, they are more prone to false detection. The system could be made more useful under different conditions if a number of different kinds of sensors could be integrated in a proper way.

CHAPTER V

Conclusion

5.1 Conclusion

The task work" Automatic Railway Gate Control", these days such a large number of mishaps occur at the railroad entryway on account of manual control. To maintain a strategic distance from these serious mischances we need to change manual work to this most recent innovation (Automatic Railway Gate Control), we can dodge the greatest number of mishaps.

5.2 Future Scope

- GPS Module can be added to find train location
- IOT can be implement so that location can be seen online
- GSM may be added so that anyone can get train information using sms.

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Appendix

Program Code:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);  // set the LCD address to 0x27 for a 16 chars and 2 line display
#include <Servo.h>
Servo myservo1;
Servo myservo2;
int pos = 0;

int s11=2;
int s12=3;
int s21=7;
int s22=8;

int r1r = 4;
int r1g = 6;
int r1b = 5;

int r2r = 11;
int r2g = 13;
int r2b = 12;



void setup() {
myservo1.attach(9);
myservo2.attach(10);
pinMode(s11, INPUT_PULLUP);
pinMode(s12, INPUT_PULLUP);
pinMode(s21, INPUT_PULLUP);
```

```
pinMode(s22, INPUT_PULLUP);

pinMode(r1r, OUTPUT);
pinMode(r1g, OUTPUT);
pinMode(r1b, OUTPUT);
pinMode(r2r, OUTPUT);
pinMode(r2g, OUTPUT);
pinMode(r2b, OUTPUT);

digitalWrite(r1r, LOW);
digitalWrite(r1g, LOW);
digitalWrite(r1b, LOW);
digitalWrite(r2r, LOW);
digitalWrite(r2g, LOW);
digitalWrite(r2b, LOW);


lcd.init();
lcd.backlight();
lcd.setCursor(4,0);
lcd.print("WELCOME");
lcd.clear();
}

void loop() {

int sensorVal11 = digitalRead(s11);
int sensorVal12 = digitalRead(s12);
int sensorVal21 = digitalRead(s21);
int sensorVal22 = digitalRead(s22);


////////////////////////  Gate 1 ////////////////////////////
if (sensorVal11 == LOW || sensorVal12 == LOW)
```

```
{
myservo1.write(90);
lcd.setCursor(0,0);
lcd.print("Gate1: Close  ");
digitalWrite(r1r, HIGH);
digitalWrite(r1g, LOW);
digitalWrite(r1b, HIGH);
delay(1000);
}


if (sensorVal11 == HIGH && sensorVal12 == HIGH)
{
myservo1.write(180);
lcd.setCursor(0,0);
lcd.print("Gate1: Open  ");
digitalWrite(r1r, LOW);
digitalWrite(r1g, HIGH);
digitalWrite(r1b, LOW);
}




////////////////////////  Gate 2 ////////////////////////////
if (sensorVal21 == LOW || sensorVal22 == LOW)
{
myservo2.write(90);
lcd.setCursor(0,1);
lcd.print("Gate2: Close  ");
digitalWrite(r2r, HIGH);
digitalWrite(r2g, LOW);
```

```
digitalWrite(r2b, HIGH);
delay(1000);
}


if (sensorVal21 == HIGH && sensorVal22 == HIGH)
{
myservo2.write(180);
lcd.setCursor(0,1);
lcd.print("Gate2: Open  ");
digitalWrite(r2r, LOW);
digitalWrite(r2g, HIGH);
digitalWrite(r2b, LOW);
}
}
```