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Automatic Railway Gate Control Open and Close Using IR Sensors

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ABSTRACT
Level crossing is that area where the rail line intersects with the road which is used by transportation or other vehicles.To prevent accidents a system named “Level Crossing” has been developed.Butin early days all the level crossings are operated by humans. So human interference was mandatory. But, manual control is not errors free. The railway gate or level crossing is opened or closed by a gate man who was informed from the nearest railway station about the arrival of a train. There’re also many level crossings in India which are unmanned. So they are potentially dangerous for road users. In India we must develop a prototype to be implemented to automatically control railway gate upon arrival as well as departure of train. The project should not be too much expensive but must be reliable. So we used ATMEGA 8 MICRO CONTROLLER which is quite reliable well as affordable.

I.INTRODUCTION
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which is quite reliable well as affordable.

INTRODUCTION OF L293D MOTOR DRIVER
Introduction to L293D it’s basically a high current dual motor driver/controller Integrated Circuit (IC). It is able to drive load having current up to 1A at the voltage ranging from
4.5V to 36V. Motor driver usually act as current amplifier because they receive a low current signal as an input and provides high current signal at the output. Motors usually operates on this higher current. L-293D has to built in H- Bridge driver circuits and is able to control two DC motors at a time in both

clockwise and counter clockwise direction. It has two enable pins and they should be kept high in order to control the motor. By changing the polarity of applied signal motor can be rotated in either clockwise or counter clockwise

INTRODUCTION OF DC GEARED MOTOR

A gear motor is an all-in-one combination of a motor and gearbox. The addition of a gearbox to a mot or reduces the speed while increasing the torque output. The most important parameters in regard to gear motors are speed (rpm), torque (lb-in) and efficiency (%). In order to select the most suitable assembly for your application, you must first compute the load, speed and torque requirements for your application.

- Increased torque: The reduction mechanism increases the torque output, allowing the combined unit to power loads that require more torque than the motor alone can produce. For higher torque applications, you want to use metal gears, as opposed to plastic.
- Reduced speed: The gear reduction mechanism also reduces the rotational speed of the motor's output shaft. This can be beneficial in applications where high speeds are not required or desirable.
- More efficient power transfer: The gears in a gear motor can transfer power more efficiently than a direct drive motor.
- Compact size and design: Combined power solutions are designed to be space-saving, both inline and right angle options are available. You can get a small DC gear motor, which is beneficial if space is limited.
- Compact size and design: Combined power solutions are designed to be space-saving, both inline and right angle options are available. You can get a small DC gear motor, which is beneficial if space is limited.
- Greater flexibility: The ability to adjust the gear ratio to provide the desired operating conditions allows for more control over the torque and speed output, which is helpful in various types of applications.

DEFENITION OF VOLTAGE REGULATORS

A **voltage regulator** is a system designed to automatically maintain a constant voltage. It may use a simple feed- forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.

A simple voltage/current regulator can be made from a resistor in series with a diode (or series of diodes). Due to the logarithmic shape of diode V-I curves, the voltage across the diode changes only slightly due to changes in current drawn or changes in the input. When precise voltage control and efficiency are not important, this design may be fine. Since the forward voltage of a diode is small, this kind of voltage regulator is only suitable for low voltage regulated output. When higher voltage output is needed, a zener diode or series of zener diodes may be employed. Zener diode regulators make use of

the zener diode's fixed reverse voltage, which can be quite large.

INTRODUCTION OF EMBEDED SYSTEM

Microcontroller is widely used in Embedded Systems products. An Embedded product uses the microprocessor (or microcontroller) to do one task & one task only. A printer is an example of Embedded system since the processor inside it perform one task only namely getting the data and printing it. Although microcontroller is preferred choice for many Embedded systems, there are times that a microcontroller is inadequate for thetask. For this reason, in recent years many manufactures of general-purpose microprocessors such as INTEL, Motorola, AMD & Cyrix have targeted their microprocessors for the high end of Embedded market. One of the most critical needs of the embedded system is to decrease power consumptions and space. This can be achieved byintegrating more functions into the CPU chips. All the embedded processors have low power consumptions in additions to some forms of I/O, ROM all on a single chip. In higher performance Embedded system, the trend is to integrate more & more function on the CPU chip & let the designer decide which feature he/she wants to use.

ADVANTAGES OF EMBEDED SYSTEM

1. They are designed to do a specific task and have real time performance constraints which must be met.
2. They allow the system hardware to be simplified so costs are reduced.
3. They are usually in the form of small computerized parts in larger devices

EXAMPLES OF EMBEDED SYSTEM

- Automated tiller machines (ATMS).
- Integrated system in aircraft and missile.
- Cellular telephones and telephonic switches.
- Computer network equipment, including routers timeservers and firewalls
- Computer printers, Copiers.
- Engine controllers and antilock brake controllers for automobiles.
- Home automation products like thermostat, air conditioners sprinkles and securitymonitoring system.
- House hold appliances including microwave ovens, washing machines, TV setsDVD layers/recorders.
- Medical equipment.
- Multimedia appliances: internet radio receivers, TV set top boxes.
- Programmable logic controllers (PLC's) for industrial automation and monitoring.
- Stationary video game controllers.

EXISTING SYSTEM

Here we introduce an automatic railway gate control at a level crossing and track switching at a junction. By the presently existing system once the train leaves the station, the stationmaster informs the gatekeeper about the arrival of the train through the telephone. Once the gatekeeper receives the information, he closes the gate depending on the timing at which the train arrives. Hence, if the train is

late due to certain reasons, then gate remains closed for a long time causing traffic near the gates.
The system helps with the reduction of time for which the gate is being kept closed and thereby to provide safety to the road users and the trains by reducing the accidents.

PROPOSED SYSTEM

In this Proposed System, We have a Automatic Railway Gate Open and closing System using AVR Microcontroller. This System Consist of two IR Sensor at a Distance from both Sides of Railway Gate. When train approaches near First IR Sensor than it Sends Signal to Arduino controller, further AVR Microcontroller drives DC motor to Close the Gate and Buzzer Sound is produces to alert people crossing the Railway Line. When Train Crosses Second IR Sensor,than again buzzer sound produced and railway gate is opened.
The power supply setup of the system contains a step down transformer of 230/12V, used to step down the voltage to 12VAC. To convert it to DC, a bridge rectifier is used. Capacitive filter is used which makes use of 7805 voltage regulator to regulate it to +5V that will be needed for microcontroller and other components operation, in order to remove ripple.

OVER REVIEW OF THE PROJECT

We introduce a new automatic railway gate control and track switching system in order to avoid the three main accidents faced in the railway system. They are improper railway gate control, mistakes in track changing and head to head collision.
Our system consist of three IR transmitter receiver pairs, an MCU, relay circuit, gate control motor, track changing system and an anti- collision system. Two IR TX-RX pairs are used for the operation of railway gate. Both pairs are placed at a certain distance away from the gate at each direction. Transmitter and receiver are placed at face to face across the rail. IR receiver gets IR signal emitted from the IR transmitter continuously. If the train passes through the path of radiation, then the IR receiver at the end should not get signal, its output is connected to MCU, at the time MCU controls the relay circuit in order to close the railway gate. Gate control motor is connected to the MCU through a relay and a relay driver circuit. Energizing of the relay causes the gate motor to close the railway gate. Same time MCU provide RED signal to the vehicles on the road and GREEN signal to the train. The train passes through the gate and then it reaches the second IR TX-RX pair, at the time second IR receiver should not get signal, indicating the passage of train. Then MCU de- energizes the relay to make the gate at open position. And provide GREEN signal to road and RED signal to train.
The third IR transmitter receiver pair is placed nearer to the station to find out the arrival of another train towards the station. If it is detected MCU controls the track changing servo to choose the other track.
In order to avoid the head to head collision of trains, an anti-collision system is used with the trains. It consists of a LASER torch, an LDR and a transistor based switching circuit. LASER and LDR are placed on the front side of the train without direct contact with each other. The LDR can detect the LASER beam emitted from the opposite train arriving on the same track only. If LDR detects the LASER beam, the transistor based switching in this system stops the train motor.

```
#include <avr/io.h>
#include <util/delay.h>

void InitADC()
{
ADMUX=(1<<REFS0);
ADCSRA=(1<<ADEN)|(1<<ADPS2)|(1<<ADPS
1)|(1<<ADPS0);
}

uint16_t ReadADC(uint8_t ch)
{
ch=ch&0b00000111;
ADMUX = (ADMUX & 0xF8)|ch;
ADCSRA|=(1<<ADSC);
while(!(ADCSRA & (1<<ADIF)));

ADCSRA|=(1<<ADIF);

return(ADC);
}

void main()
{
```

HARDWARE COMPONENTS

Power supply
ATMEGA 8 MICROCONTROLLER
L293D Motor driver
RELAYS (IR SENSORS)

TX(Transmitter), RX(Reciver)
DC Geared motor

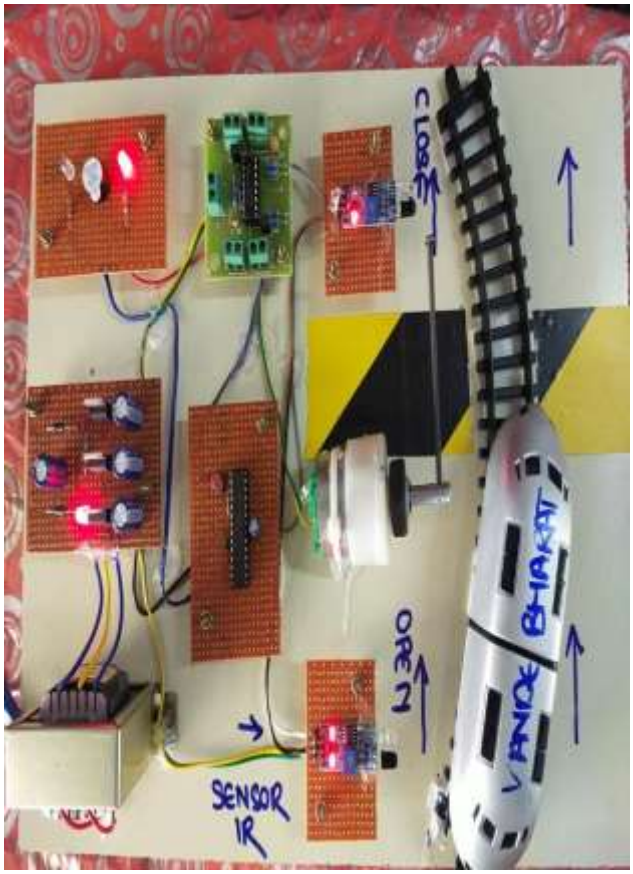
POWER SUPPLY

Conversion of 220V alternative current into 5V & 12V directcurrent by using these following steps and diagram. Here we are using components are,

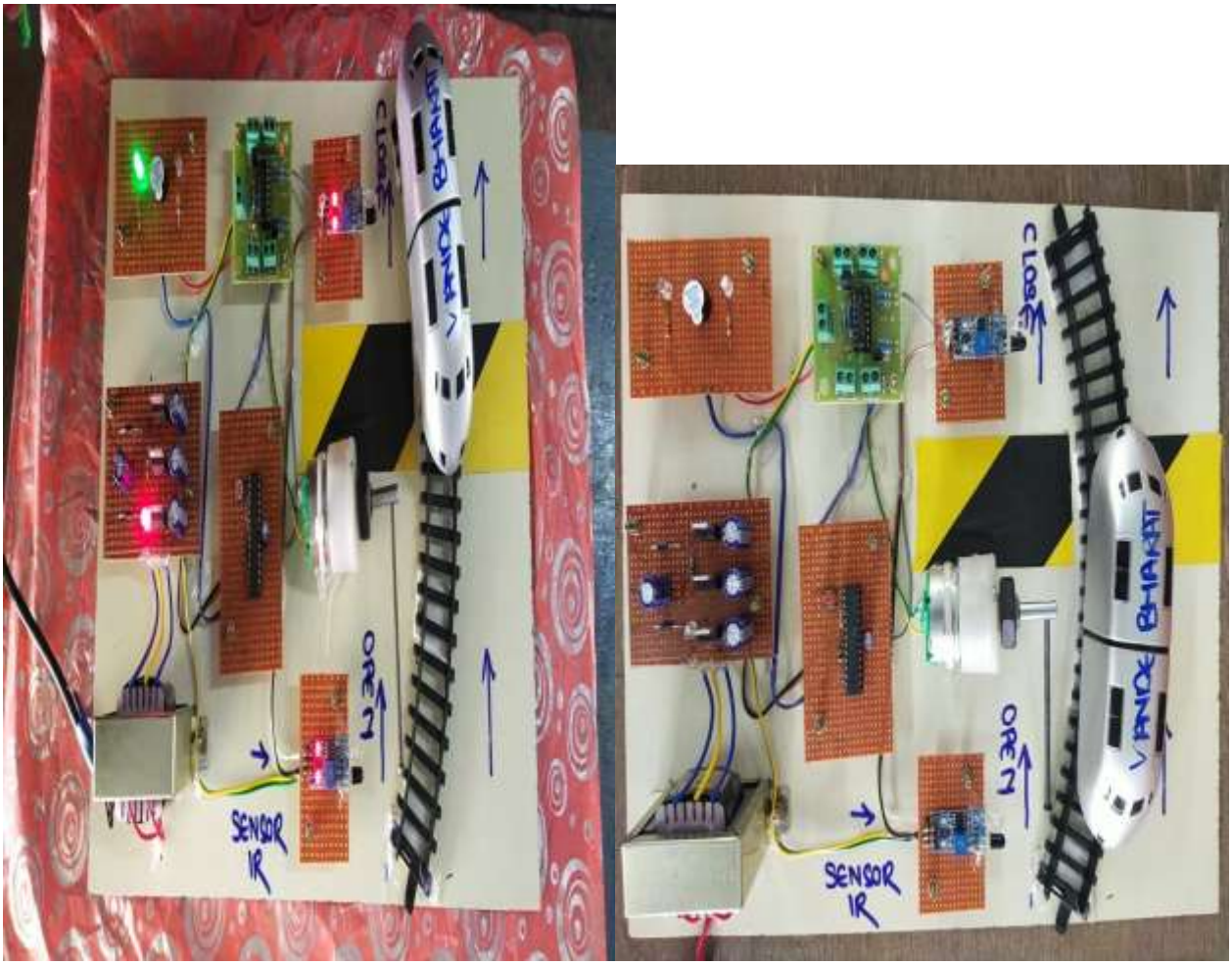
- step down transformer
- bridge rectifier
- capacitor
- voltage regulator

```
uint16_t adc1=0, adc2=0;
int flag=0;

InitADC();
_delay_ms(10);
DDRB=0XFF;
PORTB=0X00;

    while(1)
    {
adc1=ReadADC(5);
     adc2=ReadADC(4);

     if(adc1<500)  // OPEN
     {
if(flag==1)
     {
     PORTB|=(1<<2);
     PORTB&=~(1<<1);

     PORTB|=(1<<3);
     PORTB&=~(1<<4);
     _delay_ms(25);
PORTB&=~(1<<1);
PORTB&=~(1<<2);
flag=0;
}
}

else if(adc2<500) // CLOSE
{
if(flag==0)
{
PORTB|=(1<<1);
PORTB&=~(1<<2);

PORTB|=(1<<4);
PORTB&=~(1<<3);
_delay_ms(25);

PORTB&=~(1<<1);
PORTB&=~(1<<2);
flag=1;
}
}
```

EXPERIMENTAL RESULT
RESULT



From the above discussion and information of this system we,upto now surely comes to know that it is highly reliable effective andeconomical at dense traffic area, suburban area and the route where frequencyof trains is more.As it saves some auxiliary structure as well as the expenditureon attendant it is more economical at above mentioned places than traditionalrailway crossing gate system. We know that though it is very beneficial but itis also impossible to install such system at each and every places, but it givescertainly a considerable benefit to us, thereby to our nation



APPLICATIONS

It deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed. And secondly, to provide safety to the road users by reducing the accidents that usually occur due to carelessness of road users and at times errors made by the gatekeepers**.**

ADVANTAGES

1. Preventation of Accidents Inside the Gate.
2. Reliable Machine, which operates the railway gate even without Gatekeeper which makes it useful for operation at unmanned crossings.
3. Power supply for the motor Operation and Signal lights is required.
4. Battery Which is Charged by means of a Solar cell can be used in remote areas where the power supply can' be expected
5. the potential for human errors is significantly reduced.
6. providing commuters with an added layer of assurance during their journeys.

CONCLUSION 'S AND FUTURE SCOPE

CONCLUSION

- To save the human life and vehicles from miserable train accidents is a challenge of the era of modern science and technology.

- The above proposed system is introduced. The results exhibit that it is one of the expedient approach for secure railway system.
- The IR sensors detect the train and stuck on the level crossing very quickly and communicate with the control unit.
- The control unit takes proper steps which lead the train and vehicles movements either to move forward or to stop to avoid collision.
- Consequently, this is able to play a great contribution to the railway gate automation with reliability and lowe cost**.**

FUTURE SCOPE

Image detection can be used for more precise, with the help of cameras. Damage detection can be included that help us to
automatically detect any issues with the system. Thermal for animal detection and suitable radiation for moving them away, that help us reduce the accidents in the area of the gate.
he message to WhatsApp BOT by using IoT technology. The appliances in home can be controlled ultimately. This gives the access to theuser to control the devices in the home using any internet connected device such as smartphone orlaptop. The user can be able to operate this from anywhere through single command.

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