# Automatic Railway Gate Control System Using IR sensors

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**Abstract:** The primary thought of this undertaking is to build up an Automatic Railway Gate control system, which utilizes the Microcontroller in the plan. This project will build up a model of an entryway at the level intersection that runs consequently by utilizing a microcontroller, aside from that the interfacing program additionally had been produced for the integration part. The activity utilizing a microcontroller that coordinated with different circuits included, for example, power supply, IR sensor, motor, motor driver and LCD. All the circuits will join to show the activity of the microcontroller (AT89S52). This framework will make enhancements towards the programmed activity and diminishes human contribution, when there are issues that happened with ordinary entryway control system.

**Keywords-**railway-gate, IR-sensors, microcontroller, Gate control, Automatic

## 1. Introduction:

India is the big nation, which is having the world's biggest railroad. It connects with several trains running on target stations every day. As we realize that, it is difficult to stop the running train quickly aside from in some basic circumstance or when a crisis emerges. The genuine outcome thought to be looked because of train mishaps regarding loss of human life, injury, harm to Railroad property and some more. The idea of this article is to control the railroad door utilizing a microcontroller with no association of people.

Everywhere throughout the world, railroads assume a critical job and providing railway safety is a significant factor. Railroads are perhaps the least expensive method of transportation. Subsequently, everybody lean towards railroads to travel. In late overviews, numerous accidents occurred at the railroad intersections because of the carelessness in manual tasks. To give safety to the road users by diminishing the accidents that typically happen because of carelessness of road users and now and again blunders made by the guardians. To dodge the accidents, sensors set at some separation at both of the gates which recognizes the appearance and takeoff of the train. The data about the appearance and takeoff of the train is sent to the microcontroller. The microcontroller sends information to the motor and opens the gate and likewise shuts the entryway. Therefore, the hour of the entryway being shut is less contrasted with the manually operated gates. In a manually operated system, the entryway is shut by the guard when he gets data from station ace through a call that the train is showing up from the past station. Likewise, reliability is high, as it isn't exposed to manual blunders. Atul Kumar[1] clarified a detailed presentation about the current railroad innovation and furthermore talked about the

inconveniences of physically enacted rail route framework in International Journal of Engineering Research & Technology, pp.1-8, 2012. R.J[1]. Greene[2], Rail Crack Detection, messages from approaching and active trains by sensors. These messages contain detail data including the bearing and personality of a train at Annual Conference & Exposition on Experimental and Applied Mechanics, 2006[2].Karthik Krishnamurthi[3], Sensor based automatic control of railway gates-anticipated the programmed activity of railroad doors utilizing RF technology. The significant issue of this method was each train could be furnished with RF technology. In this manner it was financially possible to actualize in International Journal of Advanced Research in Computer Engineering & Technology (IJARCET,) Volume 4, Issue 2, February 2015[3].He utilized ZigBee RF module to convey between base station and trains. Be that as it may, ZigBee was a short separation imparting gadget. Along these lines it is essentially impractical to actualize his procedure. Kiruthiga.M[4], given Wireless Communication System for Railway Signals full automation at International Journal of Innovative Research in Science, Engineering and Technology, Volume 3, Special Issue 1, February 2014[4].With proposed design of automatic railway gate control system, we can operate without man and we can avoid accidents.

## 2. Basic Explanation about Components used in the design:

Microcontroller – Atmel 89S52:
 The AT89S52 is a low-power, high-performance device with 4K bytes of Flash memory dependent on the 8051 architecture. It is made up of 40 pins DIP. It has four 8-bit ports. An on-chip crystal oscillator with 12 MHz frequency is integrated on the microcontroller.

DC Motor:
A DC motor is electrical machine that converts electrical energy into mechanical energy. Practically all the kinds of DC motors have some internal mechanism, either electromechanical, to occasionally alter the course of current stream in part of the motor. Most sorts of rotary motion; a linear motor straightforwardly creates power and movement in an orderly fashion. A DC motor's speed can be controlled over a wide range, utilizing either a variable flexibly voltage or by changing the quality of the current in its field windings.

IR Sensor:
 Infrared sensor is an electronic device that infrared beams consistently so as to detect the item. An IR sensor can measure the warmth of an article just as identifies the movement. IR sensor consists of two units, transmitter unit and a receiver unit.

IR Transmitter:
Transmitter unit comprises of a light emitting diode (LED) which produces infrared radiations. Thus, they are called IR LED's despite the fact that an IR LED looks like a normal LED; the radiation discharged by it is imperceptible to the natural eye.

IR Receiver:
Infrared receivers are additionally called as infrared sensors as they recognize the radiation from an IR transmitter. IR receivers come as photodiodes and phototransistors. Infrared Photodiodes are not quite the same as should be expected photograph diodes as they distinguish just infrared radiation.

Motor Driver Circuitry: (L293D)
 L293D is a double H-bridge motor driver integrates circuit (IC). Motor drivers go about as momentum speakers, since they take a low current and flow control flag and give a higher

current and flow signal. This higher current sign is utilized to drive the engines. It is utilized to turn the engine in clockwise and anticlockwise ways. It is a 16 pin IC.

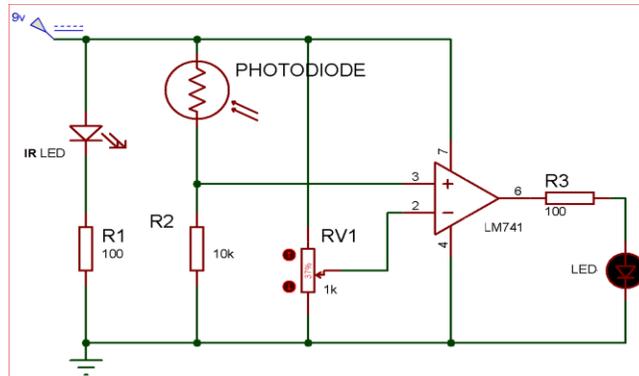Proposed Circuit Diagram of IR Sensor:



FIG.1 Circuit Diagram of IR Sensor

## 7. LCD:

LCD (Liquid Crystal Display) screen is an electronic introduction module. A 16x2 LCD show is exceptionally fundamental module and is consistently used in various gadgets and circuits. These modules are preferred in excess of seven parts and other multi segment LEDs due to its central focuses like LCDs are judicious; successfully programmable; have no requirement of demonstrating uncommon and even custom characters (not at all like in seven sections), liveliness, and so forth. A 16x2 LCD infers it can show 16 characters for each line and there are 2 such lines. This LCD has two registers, specifically, Command and Data. The command register stores the request rules given to the LCD. A command is a direction given to LCD to do a predefined task like presenting it, clearing its screen, setting the cursor position, controlling introduction, etc. The data register stores the data to be appeared on the LCD. The data is the ASCII estimation of the character to be appeared on the LCD.
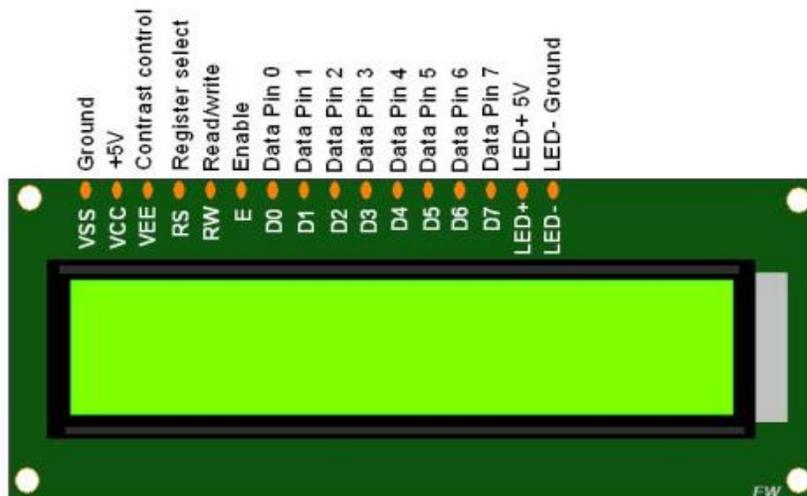


FIG.2 LCD

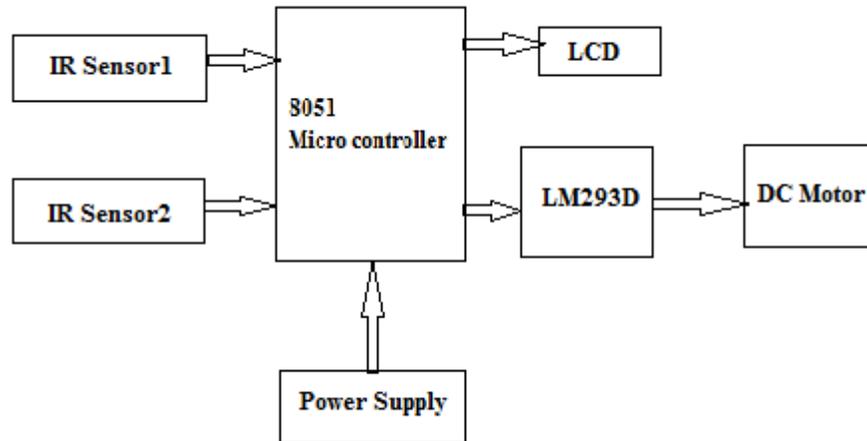**3. Basic required Block diagram for the design of automatic railway gate system:**



Fig. 3 Block Diagram of Railway Gate System

**3.1. Block Diagram Description:**
This system makes use of a micro controller which is programmed by the user using keil software and also two IR sensors which are placed on either side of the lever gate to detect the arrival and departure of the train. The dc motors rotate in clockwise and anti-clock wise directions to open and close the gate. As the sensors are placed at a particular distance away from the gates when the train arrives the gates automatically closes so that we can avoid accidents and also can reduce the waiting time of vehicle users. As it does not involve any involvement of human we can completely avoid human errors. When the train cuts the IR rays of sensor 1 the rays get reflected back on to the photodiode and the information is send to the controller. The controller drives the dc motor in clockwise direction and the gate will be closed. Similarly, when the IR sensor 2 is detected again the information is send to the controller and the controller rotates the motor in anti-clockwise direction and gates will be opened.
Fig.4 Automatic Railway Gate System
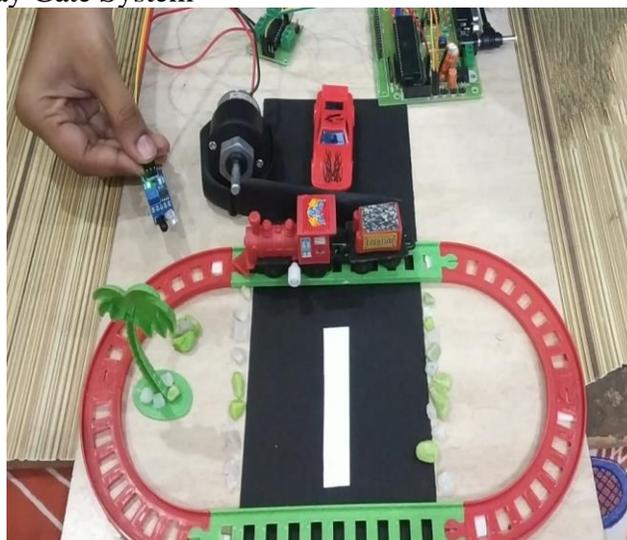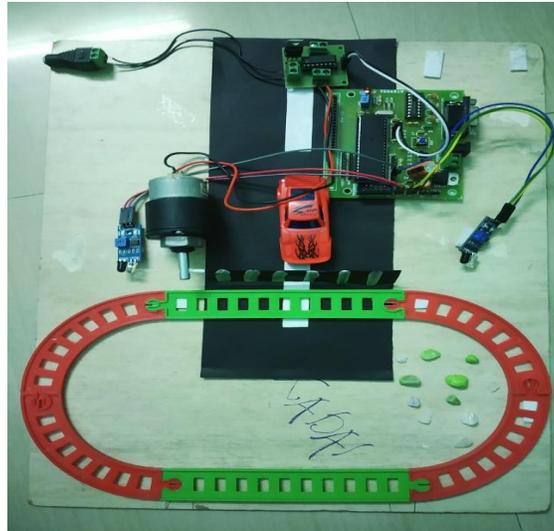
## 4. Circuit Description:

The Sensors are fixed at the certain distance on both sides of the gate, that is before the train arrive and after the train departure. The distinguished sign is send to the Microcontroller (AT89S52) and checked whether there are Vehicles or People Between the door. At in arrangements, the gateway motor will push ahead bearing to close the entryway. It will stay shut at certain time until the train has crossed the passage and shown up at the ensuing sensor establish the motor backward bearing so the entryway will open. Here we are using installed controller worked around the 8051 family (AT89C52) for the control according to the data configuration conveyed at the data port of the scaled down scale controller, the fitting picked move will be made. The logic is created by the program written in Embedded C language. The program is made, by using the KEIL small scope vision condition. The program formed is then changed over in HEX code after recreation and devoured on to microcontroller using FLASH scaled down scale vision. Present undertaking is organized using 8051 microcontroller to stay away from railroad incidents happening at unattended railroad portals, at whatever point executed in soul. This endeavor utilizes two ground breaking IR transmitters and two recipients; one set of transmitter and receiver is fixed at upside (from where the train comes) at a level higher than an individual in precise plan and furthermore the other pair is fixed at downside of the train course. When foreside receiver gets started, the portal motor is turned on one way and the entryway is closed and stays shut until the train crosses the entryway and shows up at aft side sensors. Exactly when toward the backside receiver gets impelled engine turns in reverse manner and passage opens and engine stops.

## 5. Conclusion& Future scope:

Automatic railway gate control system offers a powerful method to decrease the event of railroad accidents. This framework can contribute a great deal of advantages to both street clients and railroad executives. The proposed work has many significant focal points it will lessen the mishaps happening at the railroad level crossing, it will expand the accuracy and decrease mistakes happening because of manual activities. It will diminish the impact of train and will likewise deal with the course of a specific train to maintain a strategic distance from any postponement in arriving at its goal. Train will consistently be on time at the station no postpone will be caused which happens in manual activity. As the system is totally robotized, it dodges

manual mistakes and in this manner gives extreme security to street clients. By this instrument, nearness of a watchman isn't fundamental and programmed activity of the door through the engine activity is accomplished. Microcontroller 8051 plays out the total activity i.e., detecting, entryway shutting and opening activity is finished by programming coding composed for the controller. The system takes a shot at a straightforward guideline and there isn't a lot of multifaceted nature required in the circuit. Along these lines, the programmed railroad entryway control utilizing 8051 smaller scale controllers is work productively and it diminishes the human work and time. This is the simple to control the railroad entryway activity and it decreases the event of faults. We can have a few disadvantages if just IR sensors are utilized. To beat this, alongside the IR sensors we can utilize vibration sensor which are to be set on the track which detects the vibrations of the train and the doors will be shut and opened. A vibration sensor utilizes piezoelectric impact to distinguish the vibration in the track which identifies the appearance and flight of the train. The yield signal from the vibration sensor is taken care of into the small scale controller and it robotizes the door tasks. The significant use of the vibration sensor is impact recognition.

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