



---

## **AUTOMATIC GATE CROSSING AND IOT BASED TRAIN TRACK CRACK DETECTION SYSTEM USING IR SENSORS**

***Adluru Murali Krishna<sup>1</sup>, Davuluri Sanjay<sup>1</sup>, Annam Ruthwik<sup>1</sup>, Mrs. Vishnupriya.T<sup>2</sup>***

<sup>1</sup>Students, Electronics and Communication Engineering, R.M.D College Of Engineering, Chennai

<sup>2</sup>Asst. Prof. Electronics and Communication Engineering, R.M.D College Of Engineering, Chennai

---

### **ABSTRACT**

The aim of this project is to develop a prototype that control the railway gate and track by the micro-controller. Whenever train embrace base at the sensor, caution is operated at the railway crossing so that the general population get instruction that entryway will be shut. At that point the control module begins and shuts the gates on both side of the track. Once the train crosses, this module naturally lifts the gate. To control a gate Servo Motor is used. We are utilizing an installed controller worked around the Arduino UNO for the control. As per the instructions produced at the microcontroller, the proper action will be made. This logic was implemented in Embedded C and implemented to the Arduino Board.

---

---

### **1. INTRODUCTION**

This project explains with a topic of much latest relevance. It proposes a more and economical method for improving the safety of our level crossings. Road accidents at railway gate are a leading cause of death and injury worldwide. Surveys conducted by Indian Railway found that about 21% of total railway accidents in India is crossing accidents of which majority happens at passive railway crossings. The operation of railway gates at level crossings is not so good nowadays. Firstly the road users have to wait a very long time before the arrival of train and even after the train is departure. And secondly the chances of accidents that usually made by the carelessness of the road users or due to the time errors made by the gatekeepers is more. Here comes the importance of automatic railway gate controlling system. In this project we detect the arrival of train and close the gate.

#### **INRTODUCTION OF EMBEDDED SYSTEM**

An embedded system is one kind of a computer system mainly designed to perform several tasks like to access, process, and store and also control the data in many electronics-based systems. Embedded systems are a combination of hardware and software where software is usually known as microcode that is embedded into the hardware. One of its most important things of these systems is, it gives the output within the time limits. Embedded systems support to make the work more perfect. So, we regularly use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighborhood traffic control systems, etc.

---

### **2. EXISTING METHODS AND ITS DRAWBACKS**

Traditionally, whenever a train leaves the station, the station master make a call to the gateman about the arrival of the train. Once the gateman gets the data, he closes the gate based on calculating the exact time from station to the gate. However, the gate remain closed for long time even if the train is late.

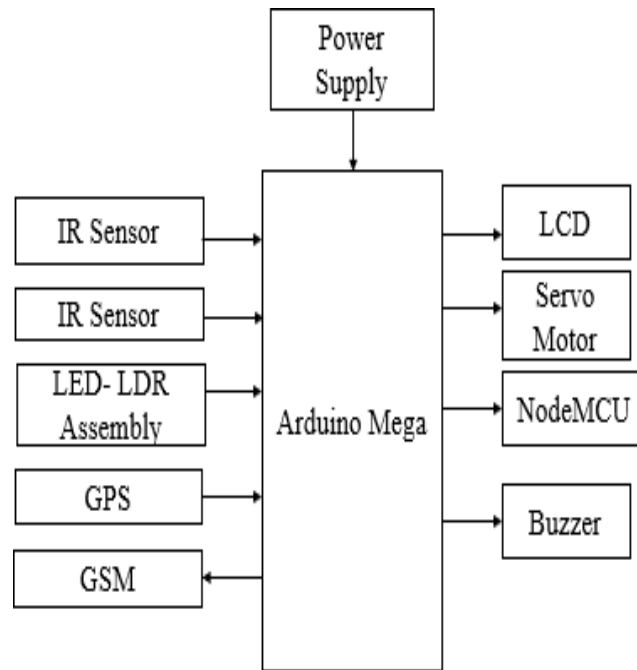
#### **Drawbacks:**

- This takes very less time compare to manual operation of the gates and decreases the manpower.
- Hence, this can be employ in an unmanned railway gate where there is decrease of accidents.

---

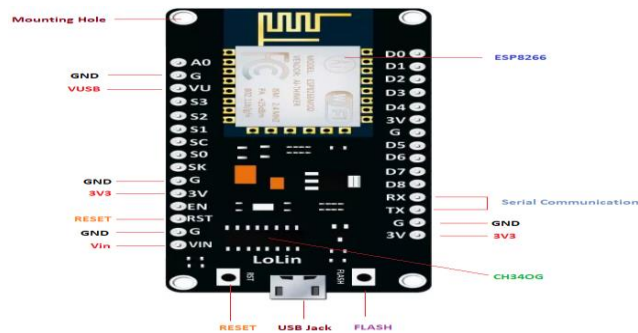
### **3. PROPOSED SYSTEM**

In the proposed system, IR are used to detect the train arrival and departure. This project uses two IR sensors to control the train arrival and departure. LDR and LED is used to check the damages. If any crack is detected then location which is traced by GPS is sent as SMS to the particular authorities and the location is updated to cloud server using Node MCU and buzzer warns.



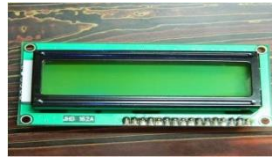
Block diagram

Node MCU is an open-source and updated kit that plays a main role in implementing your own IoT product using a few script lines. Many GPIO pins on the board are to connect the board with other pins.

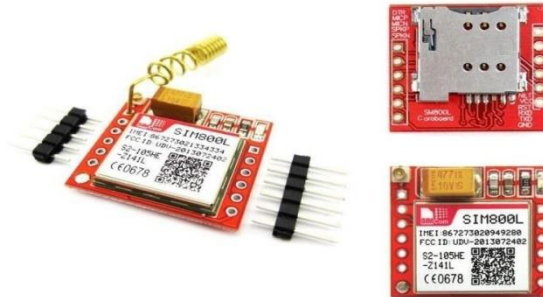


Arduino Mega 2560 is a microcontroller board on the ATmega2560. It has 54 digital i/p and o/p, 16 analog inputs, 4 UARTs, a 16 MHz crystal oscillator, a USB cable, a power jack, an ICSP header, and a reset button. It contains everything wants to support the microcontroller, connect it to a computer with a USB cable or power it with a AC- to-DC adapter to get started.





**GSM** is used for mobile communication system in the world. It is an open an digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.



**Global Positioning System (GPS)** is a satellite based system that uses satellites and ground stations to measure and computes its position on Earth.



**Servo Motor** is a type of motor that can rotate with great exactness. Normally this type of motor contains of a control circuit that provides feedback on the exact position of the motor shaft, this feedback allows the servo motors to rotate with great exactness.



A **Light Dependent Resistor (LDR)** is a device whose resistance is a function of the incident electromagnetic radiation.



**LCD** (Liquid Crystal Display) is the product utilized in scratch pad shows and other PCs. Like innovation for light-producing diode (LED) and LCDs permit Presentations to be a lot many sender than innovation for cathode beam tube (CRT).

---

#### 4. SOFTWARE COMPONENTS

**Arduino IDE** where IDE stands for Integrated Development Environment. An official software introduced by Arduino.cc, that is mostly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are similar with this software that is an open source and is readily available to install and start compiling the code.

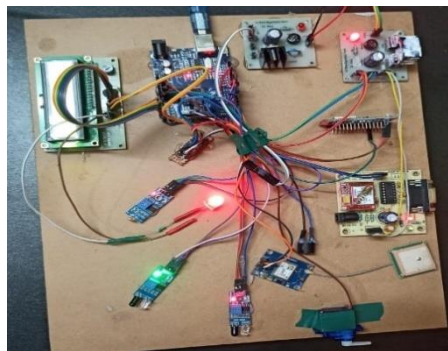
---

#### 5. RESULTS AND DISCUSSIONS

After completing the connection the circuit board starts working by giving the AC power supply, when the train arrives first sensor the gate is closes and LCD displays Gate is Close and when train arrives second sensor the gate is opens and LCD displays Gate is Open.

Next train track crack detection is when there is any gap between the track or any cracks in the track then the light rays is directly falls on the LDR sensor. Then it warns us by alarm through buzzer and sends the exact location to our mobile where the track is damaged.

Thus, the automatic railway gate crossing and IoT based train track crack detection system using IR sensors is completed successfully.



#### PROPOSED MODEL

##### Advantages

- Reduce Accidents
- Less human involvement
- Safety and quality of services
- Accurate gate open/close.

##### Applications

- Railway Gates
- Shopping Malls

---

#### 6. CONCLUSION

In this work, a smart railway crossing system is introduced based on IR Sensor and Arduino MEGA. We developed a project for this and successfully verified the opening and closing of the gate during train arrival and also for crack detection. It is user friendly, and has more options, which can be useful by the user to perform the more operations. The goals that are achieved are: 1. Less human involvement 2. Efficient management of railway gates 3. Cost effective 4. Easy construction of the sensors on the train 5. Decreases errors due to human intervention. This work produced a very quick and enhanced working model of a smart railway gate. This is very helpful to the people living in the croud areas with unmanned railway gates.

---

**REFERENCES**

---

- [1] B. B. Singh, K. Selva kumar, and S. V. Kumar, "Automation in unmanned railway gate crossing," in Intelligent Systems and Control (ISCO), 2015 IEEE 9th International Conference on. IEEE,2015, pp.
- [2] Dr. velayutham .R , Sangeetha vani.T and Sundara lakshmi.K ,"Controlling Railway Gates Using by Trains Detecting with GPS" 2017 International Conference on circuits Power and Computing Technologies [ICCPCT].
- [3] G.Hemanth kumar and Ramesh G.P, " Intelligent Gateway Train Tracking and Gate Crossing Includes Emergency Way Using 2D Communication " at International Conference on Information,Communication (ICIC 2018).
- [4] S. Biswas, R. H. Bhuiyan, S. Hoque, and T. N. Khan, "Pressure sensed fast response anti collision system for automatic railway gate crossing control," American Journal of Engineering Research(AJER), no. 11, 2013.
- [5] Bharti S.Dhande , Utkarsha S.Pacharaney "Unmanned Level Gate Crossing Controller and Train Track Crack Detection System Using IR Sensors and IoT Technology" at International Conference on Inventive Communication and Computational Technologies (ICICCT 2017)