

# Automated Railway gate controller with alert system



## Team Members:

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## **Introduction:**

Over the last few decades, the development of an automatic level crossing gate control system has been an increasingly important research topic. This motivated researchers and scientists to focus on establishing automated level crossing gate control system methods. Different types of sensors have demonstrated their utility in real-world applications by sensing qualitative and quantitative electrical signals. There are two types of level crossings on the Bangladesh Railway: guarded/controlled level crossings and unguarded/uncontrolled level crossings. In the case of guarded level crossings, swing type gates, moveable barriers, or chains are currently employed to allow trains to pass through. Railway watchmen are normally in charge of these gates are either manually or mechanically operated. On the other hand, no such arrangement is utilized at unattended level crossings, which increases the risk of accidents between passing automobiles and rolling trains maintaining and operating the gate or moveable barrier. There is a high risk of serious accidents occurring at those crossings. That's why we proposed a solution of having the get automated by using IR sensor, Buzzer and other electronics instruments. It will be cost effective and live savings both at the same time.

## **Features:**

1. Detection of incoming and outgoing trains in crossings and stations.
2. Automated safety barricade and siren.
3. Screen to display information regarding train schedules etc.

## **Components and sensor:**

- Arduino Mega2560
- IR sensor(3),
- Breadboard,
- Buzzer,
- Display,
- Jumper Wire

## **Sensors & Components description:**

**IR Sensor:** An infrared (IR) sensor is an electrical device that detects and measures infrared radiation in its immediate surroundings. When an object approaches the sensor, the LED's infrared light reflects off of it and is recognized by the receiver.

**Buzzer:** A piezo buzzer is another name for an arduino buzzer. It's essentially a little speaker that can be directly connected to an Arduino. We may program it to emit a tone at a specific frequency. The buzzer makes sound by using the piezoelectric effect in reverse.

**Arduino Mega:** The ATmega2560 is the basis for the Arduino Mega 2560 microcontroller board. It contains 54 digital input/output pins, 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It comes with everything you'll need to get started with the microcontroller; simply plug it into a computer with a USB cable or power it with an AC-to-DC adapter or battery. Most shields created for the Uno and previous boards Duemilanove or Diecimila are compatible with the Mega 2560 board.

## **Workflow:**

The project is divided into 2 parts- Detection and application. In detection part we used 3 ir sensors positioned in 3 different places with different angles and height from ground to detect incoming train. These sensors are placed in such a distance so that passersby and the gate have enough time to response to an incoming train. When all the sensors detect object(train) then the buzzer will be on and generate sound for warning people about upcoming train. At the same time The gate closes automatically.

The whole project in simple pseudocode:

Input From Sensor1,Sensor2,Sensor3

Variable X,Y,Z

X=Sensor1

Y=Sensor2

Z=Sensor3

while (X==1 && Y==1 && Z==1)

{

    buzzer=1

    gate=1

```

    }
    X,Y,Z=0
    buzzer=0
    gate=0

```

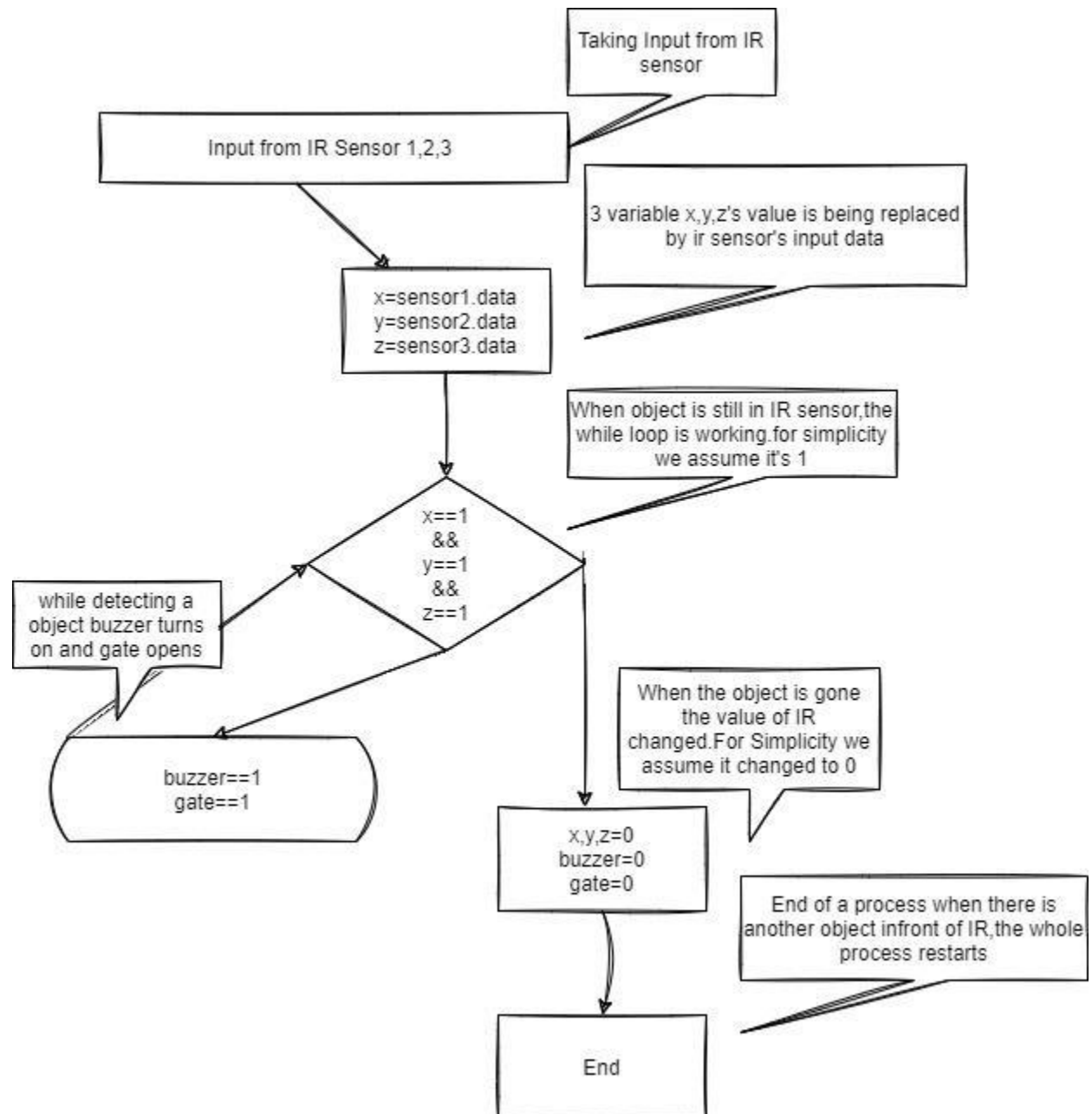


Fig: workflow pseudocode

## **Overall working pipeline of the team:**

1. Project was selected through a research of various articles, research papers.
2. Possible components and sensors were identified and a feasibility study was carried out.
3. Project proposal submitted to supervisor and got approval
4. Requirements for developing the project are being arranged (example: components and sensor purchase, necessary software installed)
5. Project development conducted
  - Physical infrastructure setup
  - Program developed with sensors
  - program integrated with physical infrastructure
  - Testing hardware and program infrastructure and their  
Integration.
6. Demo video created

## **User Manual:**

When an ir sensor detects a train or an object, the signal created by the ir sensor is automatically passed to the arduino, which then gives the signal to open the gate. There is no manual for this project because it is a fully automated system.

## **Future Work and prospects:**

Except for the Arduino, the entire project cost us only 600 tk. We'll aim to add additional sensors and components, as well as develop more optimized and efficient algorithms, to better recognize trains and operate gates. We'll also try to make it easier for operators to observe the entire operation. There is another ambitious plan of us to provide feedback to train driver and operators of whether any recognizable size of objects (except train) is on the track and make the trains velocity increase or decrease based on that to avoid suicide or any fatal accident.