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AUTOMATIC RAILWAY GATE CONTROL SYSTEM

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ABSTRACT

Making sure the unmanned railway gate is operated and controlled correctly to prevent accidents at the unmanned railway crossing is the primary goal of this project. There has been a steady rise in the number of accidents in our nation due to the high number of unmanned railway crossings. It is the lack of human strength on the railway that is responsible for these train accidents. We want to build the project in such a way that it eliminates mishaps caused by the aforementioned difficulty. This cutting-edge circuit detects when trains are approaching or leaving a railway gate and then operates the gates accordingly. It also includes a high-speed alerting system. We can tell when the train is coming and going thanks to detectors placed far out on the rail line. A microprocessor receives these detectors and uses them to drive the motors that open and shut the railway gate. The passengers will be notified if the train gets too close to the railway gate, as the microcontroller will trigger the alarm.Because automation can reduce human mistake, this can also be used to manned level crossings.

INTRODUCTION

The railways are chosen above all other forms of transportation because they are the safest and most affordable. Therefore, maintaining and even improving the existing level of safety is of the utmost importance. A more efficient and appealing mode of travel, a safe railway may help society face the economic and environmental problems of the modern day. Regardless of where you are in the globe, railway safety must be your first priority. We read in the news about several train incidents when individuals are killed at various railway level crossings. "Level crossing" is the term used to describe the location where a highway or road and rail track meet at the same level. According to Bangladesh Railway, 264 incidents occurred at various level crossings in the seven years leading up to 2013[1], resulting in at least 201 deaths and 349 injuries. The major causes of this are the absence of personnel at level crossings and the carelessness with which manual operations are carried out. The current manual method is inherently unreliable. A system of physical components that detects the approach of a train and automatically raises and lowers the gate is known as an automated railway gate control system. When a train comes up from either side of the railway crossing, sensors set at certain distances

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from the gate detect it and manage its functioning appropriately. In order to prevent accidents, sensors are installed at a distance from the gate to detect when the train departs. Upon receiving the departure signal, the microcontroller initiates the motor and opens the gate. Since the gate closes in response to a phone call from the prior station, the amount of time it remains closed is reduced in comparison to manually controlled gates. Because it is not dependent on human intervention, its dependability is also excellent. Two primary areas—information transmission and gate controlling—have historically dominated research on autonomous gate controller systems for the railway. Train identification and rapid transfer of this data to the control unit are issues with data transmission. There are complex and difficult problems with the gate controls. These include the timing of gate openings and closings, as well as the presence of trains. There is a need for research to assist railways since the current solutions are complicated and contain numerous moving parts.

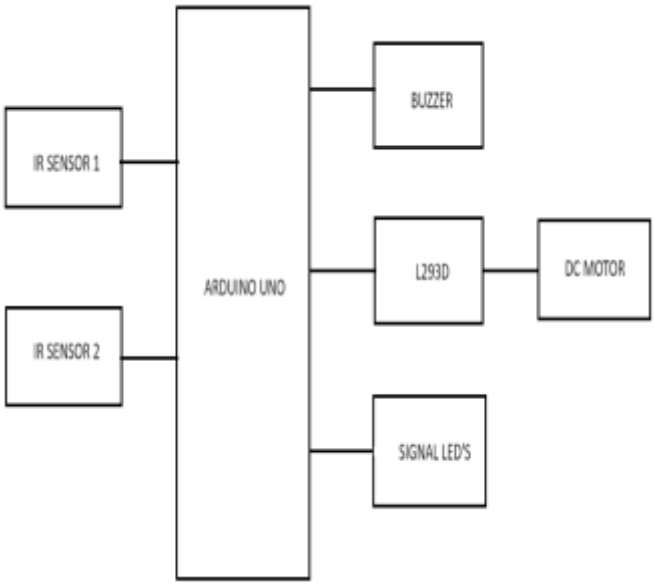

Figure.1 Block Diagram

LITERATURE SURVEY

Introduction to Railway Gate Control Systems:

Get a feel for how railway gate control systems work, and why they're essential for avoiding accidents at crossings.

To get a feel for the subject, it's a good idea to go over some basic materials including textbooks, review articles, and internet resources.

Past Development:

Learn about the evolution of automated control systems and how they differed from early manual gate operating techniques.

Seek for narratives, examples, and scholarly works that trace the development of railway gate control systems across time.

Technical Components and Operation:

Find out what makes up automated railway gate control systems and how they work. Investigate the components that are essential for sensing train motion and managing gate operation, including as sensors, actuators, microcontrollers, and communication protocols. Take a look at the architectural blueprints, control algorithms, and technical specs of today's railway gate control systems.

Sensor Technologies:

See what you can learn about the proximity, infrared, ultrasonic, and magnetic sensors used by railway gate control systems.

Look over technical publications, patents, and research papers that talk about how to regulate railway gates using sensors.

Control Algorithms and Logic:

Learn about the various logic and algorithms utilised by autonomous railway gate control systems.

Investigations into methods for improving gate functioning and reducing delays should focus on timer-based control, sensor-based control, feedback control loops, and sophisticated predictive algorithms.

Communication and Interfacing:

Learn more about the protocols and interfaces used by railway gate control systems to connect railway signalling systems, train control systems, sensors, and gate controllers. Read up on communication protocols including RS-485, Ethernet, CAN bus, and wireless protocols in academic journals, industry publications, and standard documentation.

PROPOSED SYSTEM

The study suggests problems with the design and implementation of a system to operate automated railway gates. An alert is triggered, the light signal and gate are controlled, and the

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system is able to detect trains and trapped objects by analysing the reflected waves. The gate will be opened, the alarm generator will be turned off, and the indication lights will turn green as soon as the whole train crosses the level crossing. The stuck signal is activated in the event of a level crossing stalled. The suggested method is superior to the current state of affairs due to its low equipment requirements, low cost, straightforward design, and high efficiency.

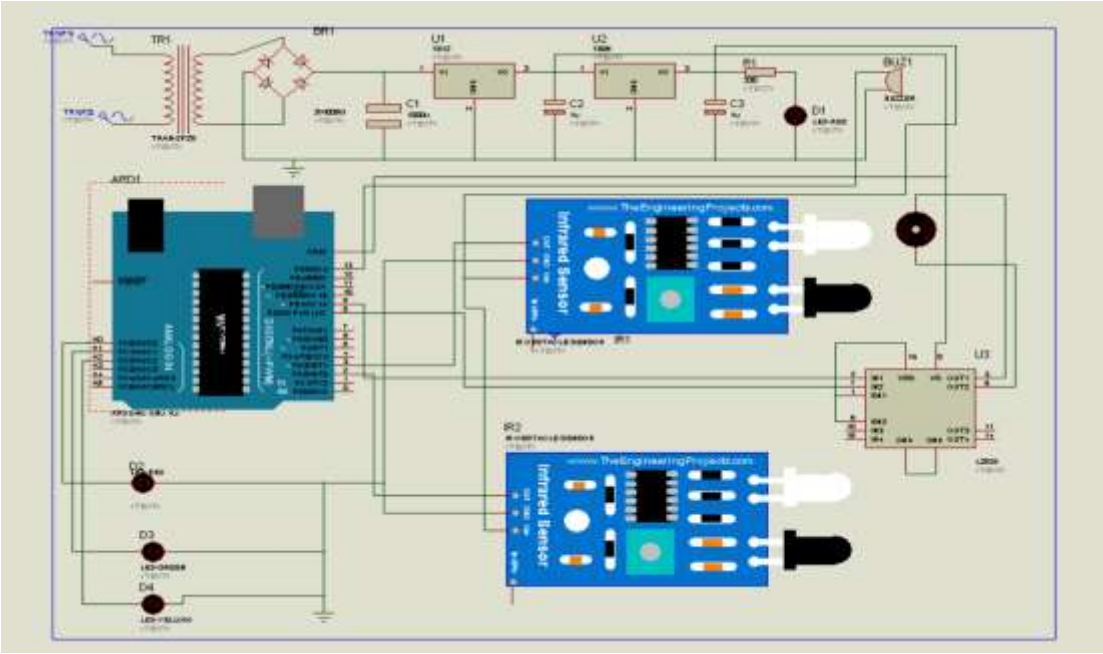

Figure.2 Schematic Diagram

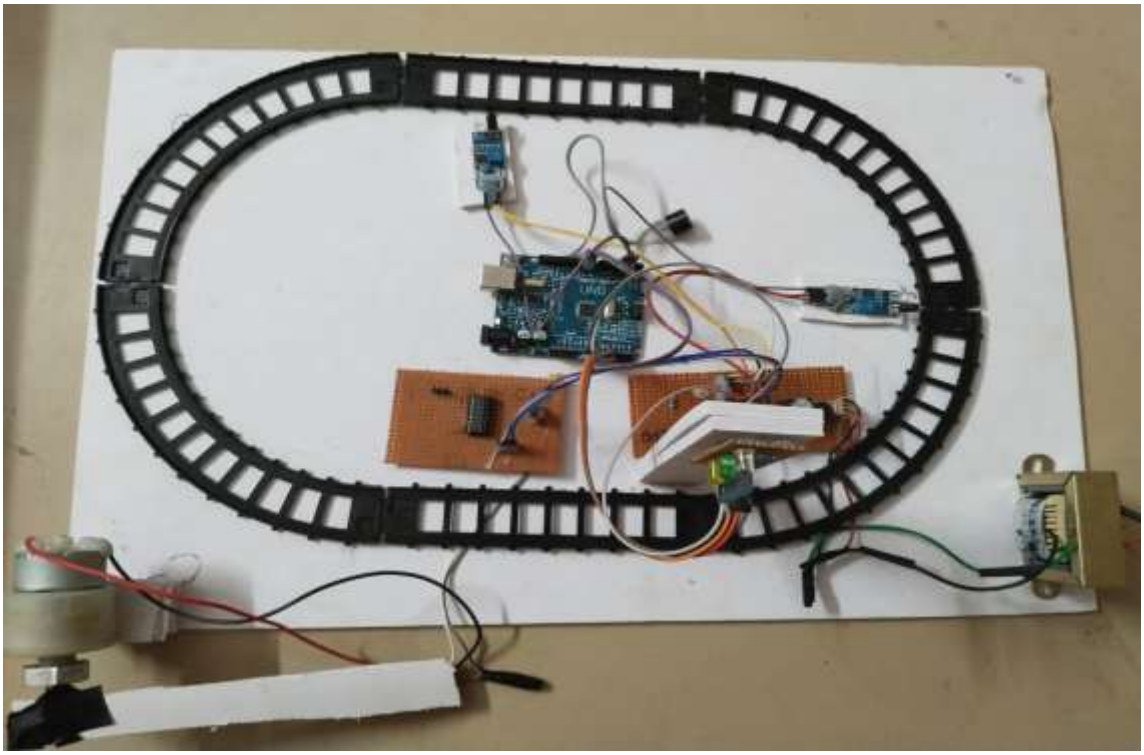

Figure.3 Working Kit

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RESULTS

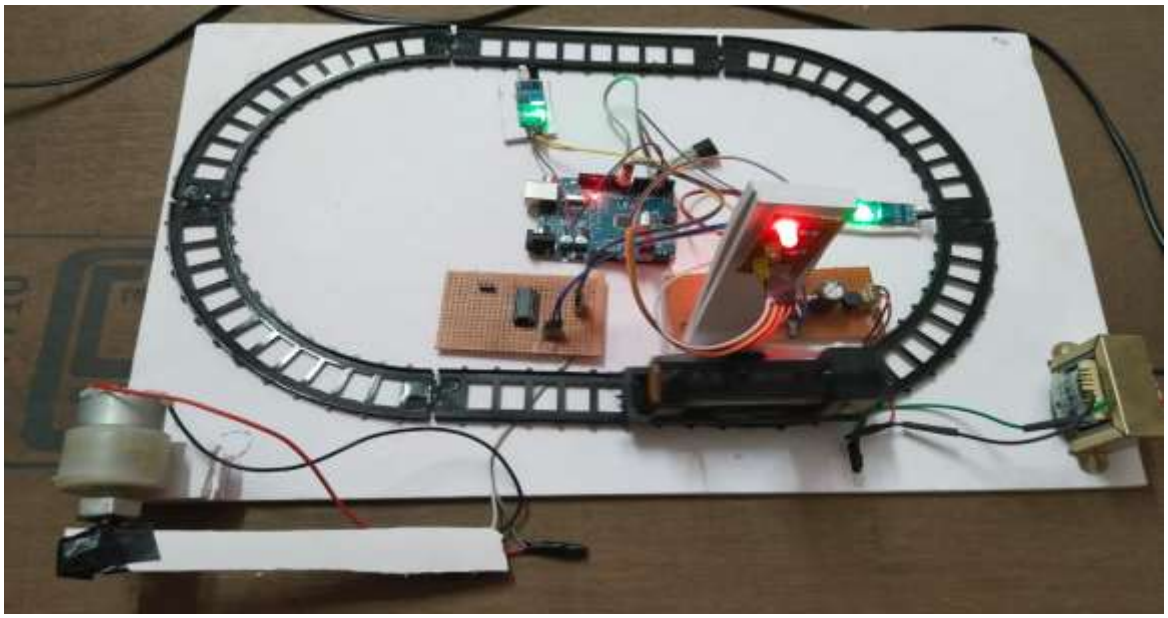

Figure.4 Testing

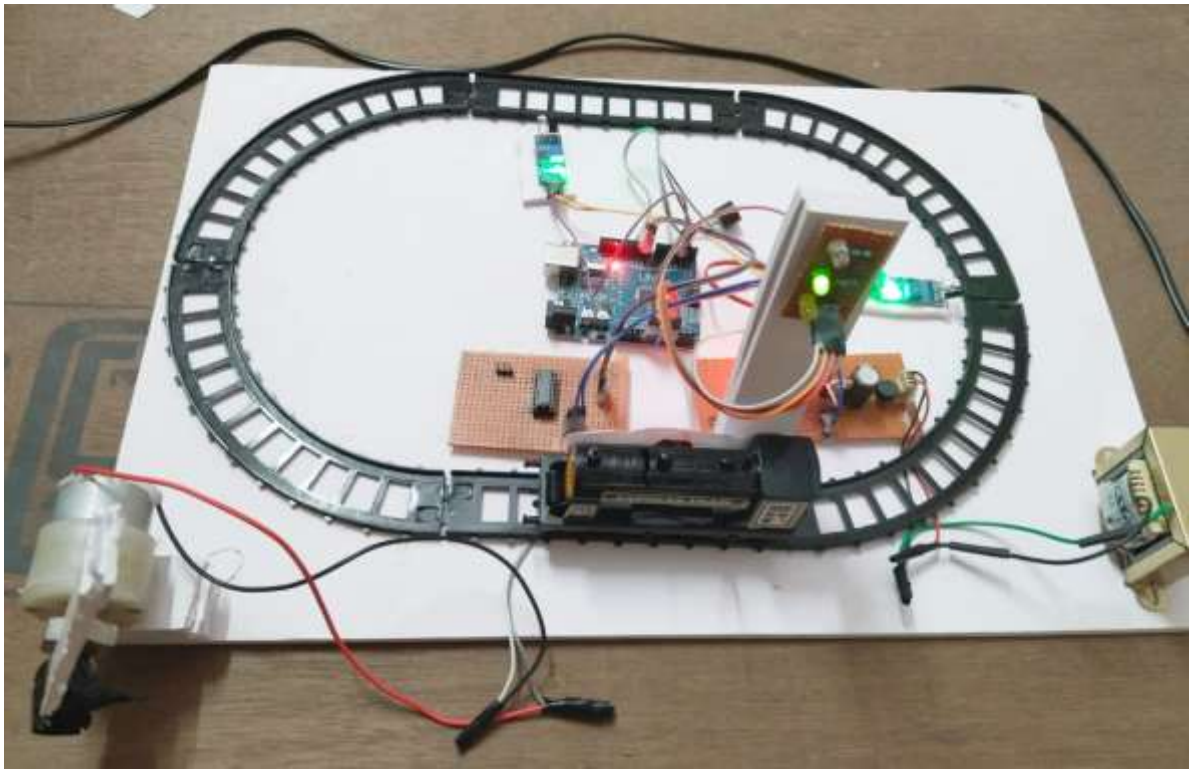

Figure. 5 Gate is open

ADVANTAGES

Using simple hardware and user-friendly controls, an automated railway gate control system is set up.

This initiative aims to eliminate the need for human intervention at level crossings, hence reducing the number of railway level crossing incidents.

- Not much expensive.
- Extensible
- Easy learning curve

CONCLUSION

The primary goal of an automated railway gate control system is to minimise the need for human intervention in the opening and shutting of the railway gate, which permits and prohibits the crossing of railway lines by both people and automobiles. Many people have died or been injured because of the railway gate. As a result, a ring of certainty may be achieved in managing the gates by automating them. Because humans are fallible, automating this procedure will lessen the likelihood of gate failures. The installed obstacle detection system lessens the frequency of incidents that occur when the railway tracks go through woods. The majority of the time, animals crossing the rails inflict more damage. Using infrared sensors is a constraint of this project. Therefore, the sensor will be able to detect any obstruction. This device can open and shut the gate, but it can't regulate the passage of automobiles and trucks, which is another major drawback. The gate is its only control. One possible extension of the current effort to address this issue is the use of pressure sensors. We should switch to load sensors from our current IR sensors. It was not cost-effective for us to employ load sensors. Implementing our system in real time by addressing present restrictions with new technology is a future area of effort.

REFERENCES

1. Pradeep Raj,□Increasing accidents in the unmanned level crossing of the railways ″,2012.

2. R. Gopinathan and B. Sivashankar,□PLC based railway level crossing gate control″,International Journal of Emerging Technology in Computer Science and Electronics (IJETCSE). ISSN: 0976-1353 Volume 8 Issue 1 April 2014.

3. Karthik, Krishnamurthy, Monica Bobby, Vidya V, □Sensor based automatic control of railway gates″,International Journal of Advanced Research in Computer Engineering and Technology.

4. Sangita N. Guja, Jagruti R.Panchal, Lalita K.Wani,□Improving safety with obstacle detection and track following car using sensor, GPS and GSM″,International Journal of Research in Engineering and Technology.

5. Jeong Y., Choon-Sung Nam, Hee-Jin Jeong, and Dong Shin,□Train Auto Control System based on OSGI″,International Conference on Advanced Communication Technology, pp.276-279, 2008.