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AUTOMATIC RAILWAY GATE CONTROL SYSTEM

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ABSTRACT

The main aim of this project is to operate and control the unmanned railway gate in the proper manner in order to avoid the accidents in the unmanned railway crossing. In a country like ours where there are many unmanned railway crossings, accidents are increasing day by day. These train accidents are due to the absence of human power in the railway. In order to overcome the accidents due to the above problem we have planned to design the project. Automatic Railway Gate Control System with High Speed Alerting System is an innovative circuit which automatically controls the operation of railway gates detecting the arrival and departure of trains at the gate. It has detectors at the far away distance on the railway track which allows us to know the arrival and departure of the train. These detectors are given to microcontroller which activates the motors which open/close the railway gate correspondingly. If the train is near by the railway gate then the microcontroller automatically activates the alarm and this alerts the passengers.This can be implemented in manned level crossings also, as manual errors can be eliminated by automation.

INTRODUCTION

Railways being safest and cheapest modes of transportation are preferred over all the other means of transport. So, it is essential to maintain and improve the current level of safety. A safe railway is more efficient and also a more attractive transport choice, enabling society to address the environmental and economic challenges of the 21st century. Railway safety is a crucial aspect of rail operation over the world. When we go through newspapers, we come across many railway accidents occurring at different railway level crossings and many people are dying. The place where rail track and highway/road intersects each other at the same level is known as “level crossing”. Bangladesh Railway said at least 201 people were killed and 349 others injured in 264 accidents at different level crossings in last seven years till 2013[1]. This is mainly due to the carelessness in manual operations or lack of workers at level crossing. There is an inherent unreliability in the present manual system. Automatic railway gate control system is an arrangement of physical components which sense the arrival of the train and make

the gate pull up and pull down automatically. As a train approaches at the railway crossing from either side, the sensors placed at a certain distance from the gate detect the approaching train and accordingly controls the operation of the gate. To avoid the accidents, sensors placed at some distance from the gate detect the departure of the train. The signal about the departure is sent to the microcontroller, which in turn operates the motor and opens the gate. Thus, the time for which the gate is closed is less compared to the manually operated gates since the gate is closed depending upon the telephone call from the previous station. Also reliability is high, as it is not subjected to manual errors. For the railway, research on automatic gate controller systems has traditionally focused on two main areas:information transmission and gate controlling. Problems related to information transmission concern train detection and fast transmission of this information to the control unit. Problems those are related to the gate controlling very sophisticated and challenging. They comprise presence of train, immediate closing and opening of gates. The existing solutions have many complexities and require research for supporting railway

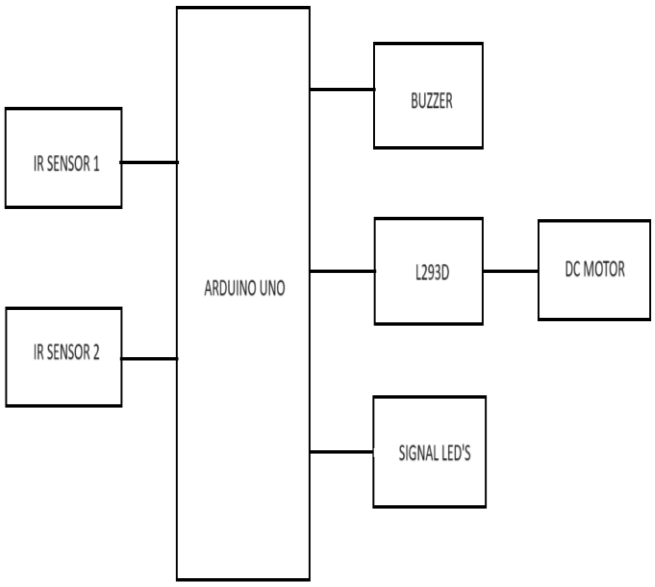

Figure.1 Block Diagram

LITERATURE SURVEY

Introduction to Railway Gate Control Systems:

Start by understanding the basics of railway gate control systems, including their importance in ensuring safety at railway crossings and preventing accidents.

Review introductory materials such as textbooks, review articles, and online resources to gain a foundational understanding of the topic.

Historical Evolution:

Investigate the historical development of railway gate control systems, including early manual gate operation methods and the evolution of automatic control systems.

Look for historical accounts, case studies, and research papers documenting the progression of railway gate control technologies over time.

Technical Components and Operation:

Explore the technical components and operation principles of automatic railway gate control systems.

Study the role of sensors, actuators, microcontrollers, communication protocols, and other key elements in detecting train movement and controlling gate operation.

Review technical specifications, system architectures, and control algorithms used in modern railway gate control systems.

Sensor Technologies:

Investigate the various sensor technologies employed in railway gate control systems, such as proximity sensors, infrared sensors, ultrasonic sensors, and magnetic sensors.

Examine research papers, patents, and technical articles discussing the selection, placement, and performance of sensors in railway gate control applications.

Control Algorithms and Logic:

Explore the different control algorithms and logic used in automatic railway gate control systems.

Study approaches such as timer-based control, sensor-based control, feedback control loops, and advanced predictive algorithms for optimizing gate operation and minimizing delays.

Communication and Interfacing:

Investigate the communication protocols and interfacing techniques used in railway gate control systems to facilitate communication between gate controllers, sensors, railway signaling systems, and train control systems.

Review research papers, standards documents, and industry reports on communication protocols such as RS-485, Ethernet, CAN bus, and wireless protocols.

PROPOSED SYSTEM

This paper proposes the design and implementation issues of an automated railway gate controlling system. The system detects the train and stuck by analyzing the reflected waves, produces alarm, controls light signal and gate. When the whole train passes the level crossing

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then the gate is opened, alarm generator stopped and indicator light switched on green signal. If there is a stuck on the level crossing the stuck signal is switched on The lesser equipment, reduced cost, simpler design and high efficiency of the proposed system prove the effectiveness over existing work.

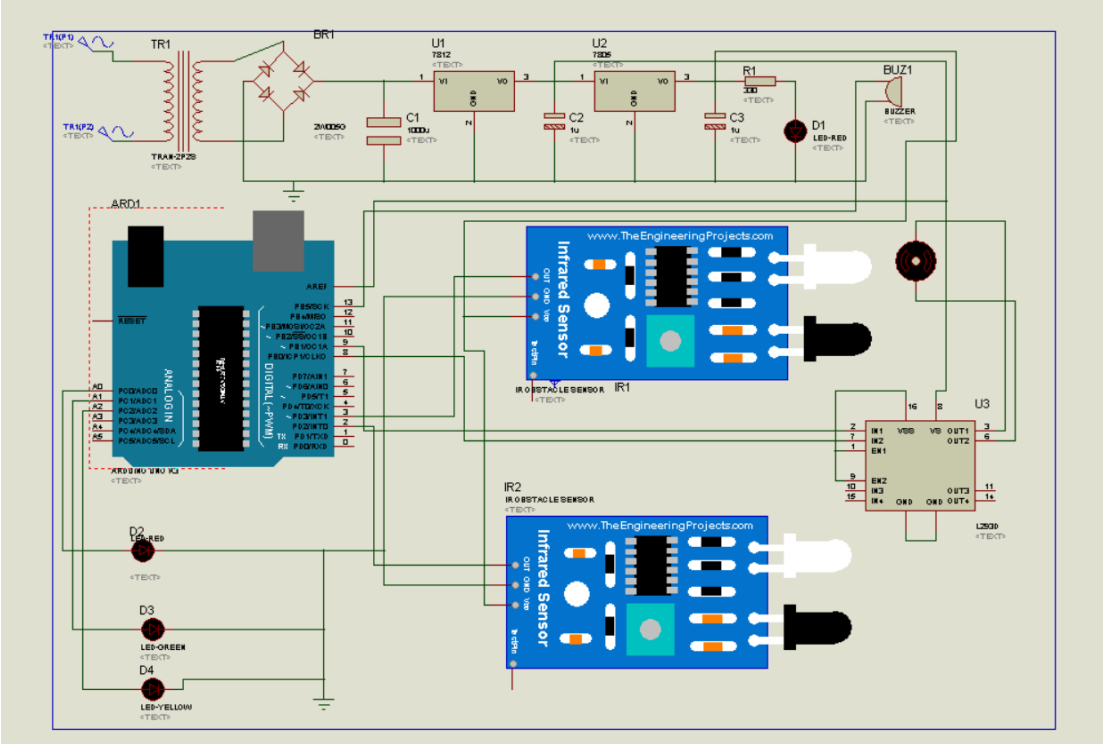

Figure.2 Schematic Diagram

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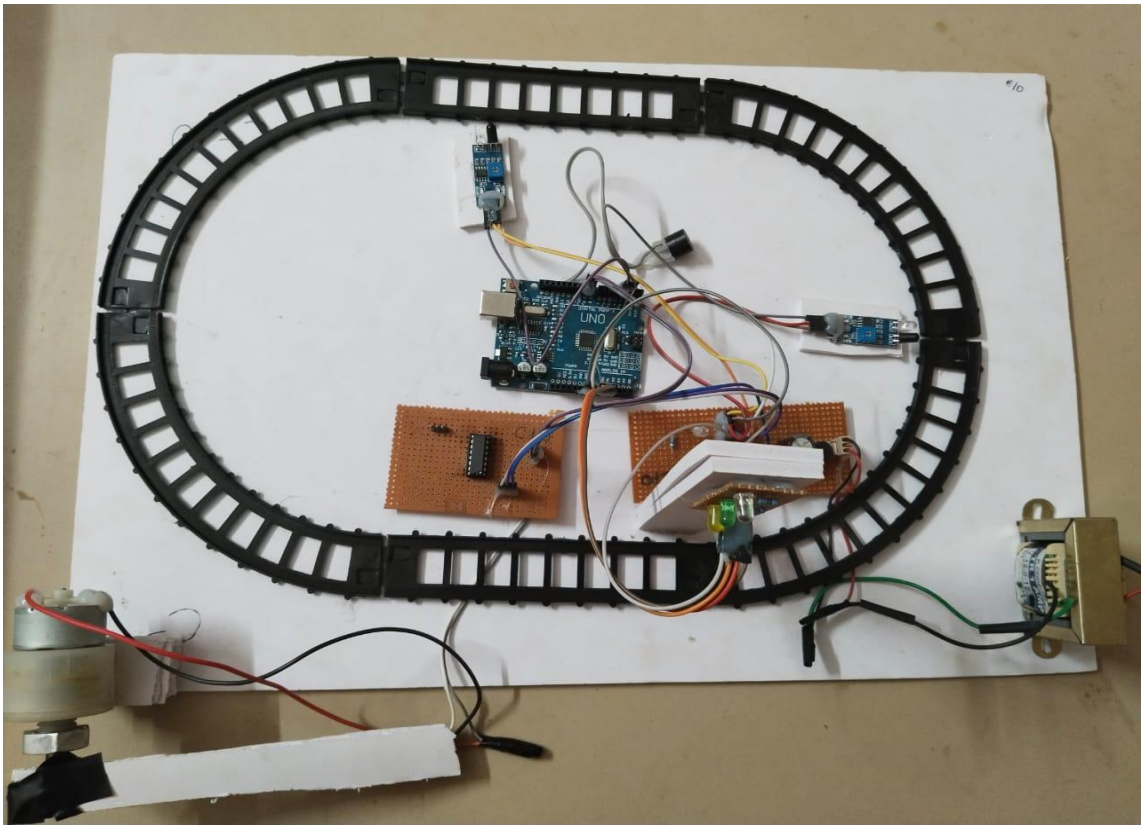

Figure.3 Working Kit

RESULTS

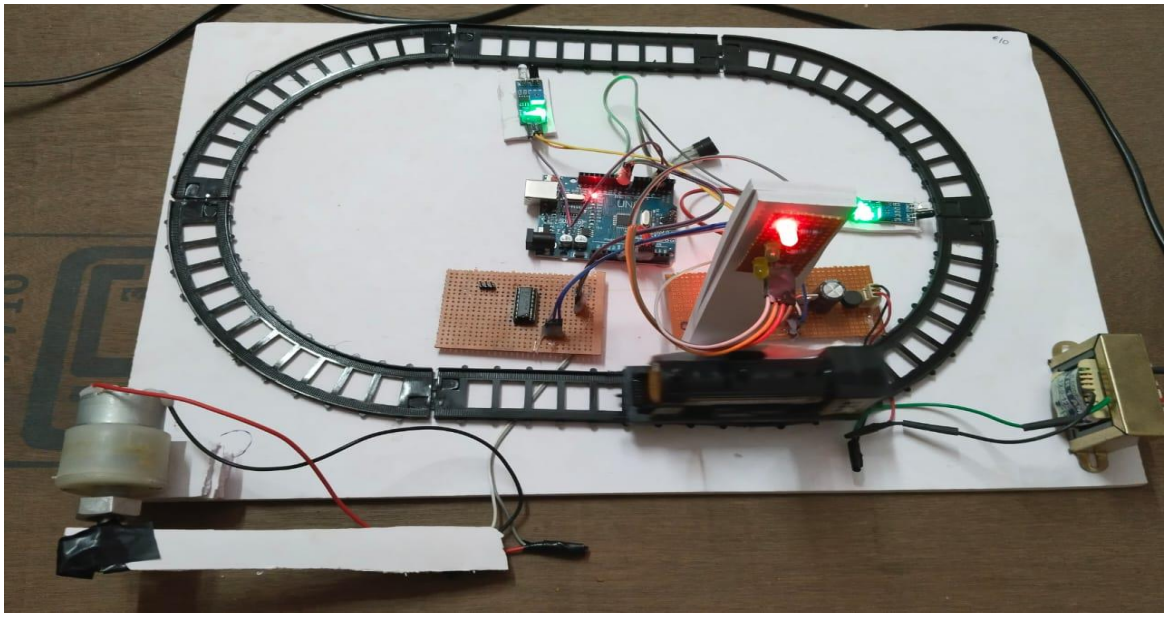

Figure.4 Testing

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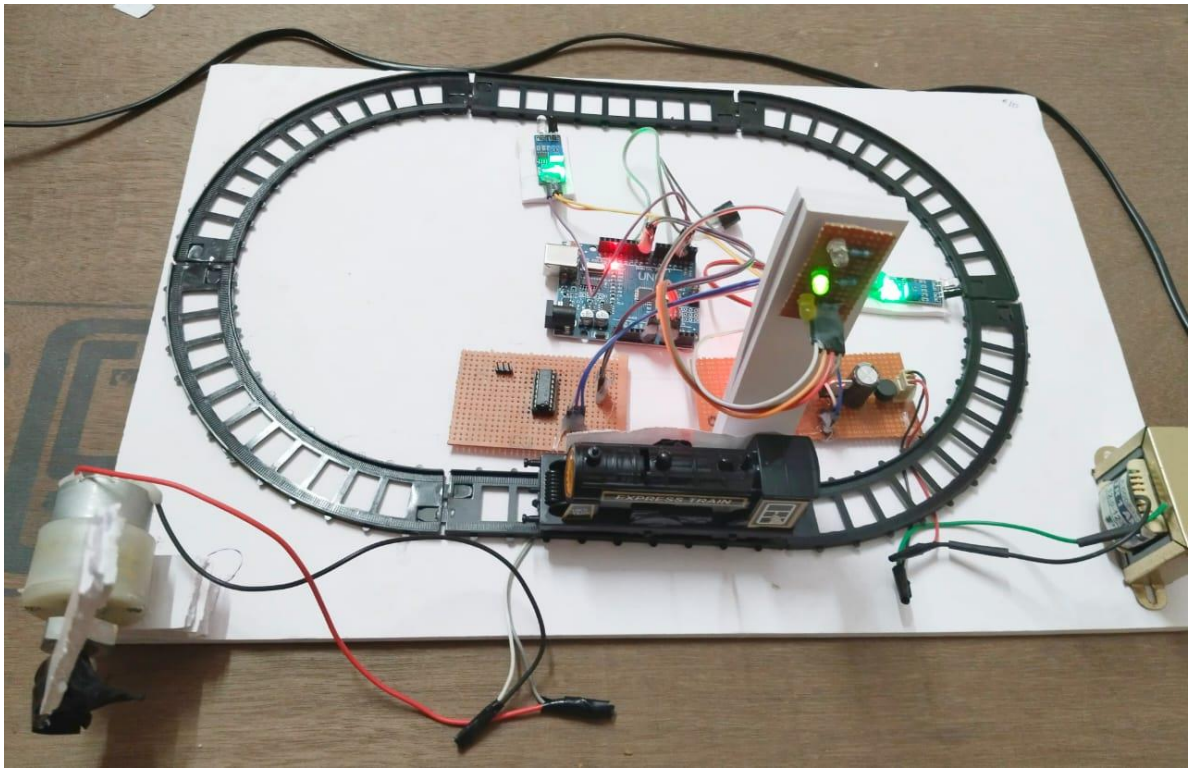

Figure. 5 Gate is open

ADVANTAGES

An Automatic Railway Gate Control is implemented with very simple hardware and easy control.

Human intervention at level crossings can be removed with the help of this project and many railway level crossing accidents can be prevented

- Not much expensive.
- Extensible
- Easy learning curve

CONCLUSION

Automatic railway gate control system is centered on the idea of reducing human involvement for closing and opening the railway gate which allows and prevents cars and humans from crossing railway tracks. The railway gate is a cause of many deaths and accidents. Hence, automating the gate can bring about a ring of surety to controlling the gates. Human may make errors or mistakes so automating this process will reduce the chances of gate failures. The obstacle detection system implemented reduces the accidents which are usually caused when the railway line passes through the forest. Most of the times greater loss has been caused when animals cross the tracks. The limitation of this project is the use of IR sensors. Hence, any

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obstacle in the way of the sensor will be detected. Another important limitation is that this project does indeed close and open the gate but it cannot control the crossing of cars and vehicles. It only controls the gate. To combat this problem pressure sensors can be used as extension to the present work. We are using IR sensors but it is better to use load sensors. We have not used load sensors because it was not economically feasible. As a future scope of work, our system can be implemented in real time by fixing the current limitations using new technologies.

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