Automatic Railway Gate Control System

Project Report

Submitted in the partial fulfillment of the requirements for the

Course Title: Project Based Learning I

Course code: 21IE2046N submitted

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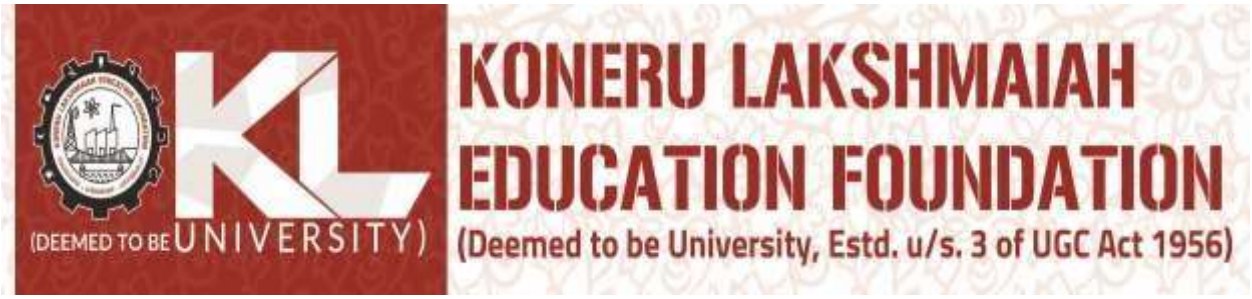

Declaration

The Project Report entitled " Automatic Railway Gate Control System " is a record of bonafide work of 2100040069, 2100040079 , 2100040100 submitted in partial fulfillment for the subject titled Project Based Learning-I(21IE2046N) in Dept of ECE, KL University. The results embodied in this report have not been copied from any other departments/University/ Institute.

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Certification

This is to certify that the Project Report entitled " Automatic Railway Gate Control System" is being submitted by 2100040069, 2100040079 , 2100040100 in partial fulfillment for the subject titled Project Based Learning-I(21IE2046N) in Dept of ECE, KL University is a record of bonafide work carried out under our guidance and supervision. The results embodied in this report have not been copied from any other departments/ University/ Institute.

Signature of Examiner **Signature of Supervisor**

Acknowledgement

It is great pleasure for me to express my gratitude to our honorable President Sri.KoneruSatyanarayana, for giving the opportunity and platform with facilities in accomplishing the project based laboratory report.

I express the sincere gratitude to our principal Dr. T Rama Krishna for his administration towards our academic growth.

I record it as my privilege to deeply thank our pioneer DR. M Suman, HOD-ECE for providing us the efficient faculty and facilities to make our ideas into reality.

I express my sincere thanks to our project supervisor **Dr.Santhosh** for his/her novel association of ideas, encouragement, appreciation and intellectual zeal which motivated us to venture this project successfully.

Finally, it is pleased to acknowledge the indebtedness to all those who devoted themselves directly or indirectly to make this project report success.

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ABSTRACT

The present work attempts to automate the opening and closing of gates at a railway level crossing. In general, level crossing gates are operated manually by a gate keeper. The gate keeper receives the information about the train arrival from a near station. When the train starts to leave the station, the station incharge delivers this information to the closest gatekeeper to get ready. This human intervention can be avoided by automating the process. In situations where the train is late due to some reason, the gates remain closed for long durations causing dense traffic jam near the gates. This too can be prevented by automation. The proposed system uses infrared sensors to detect the arrival and departure of trains at the railway level crossing and Arduino to control the opening/closing of gates. The system uses two IR sensors to detect the arrival of the train and a third IR sensor to detect the departure of the train. When the arrival of the train is sensed, signals are provided to the traffic indicating the arrival of the train on the track. When the second sensor detects the train then the signal turns red and the motor operates to close the gate. The gate remains closed until the train completely moves away from the level cross. When the departure of the train is detected by the third sensor, the traffic signal turns green and the motor operates to open the gate. Thus automation of the gate operations at the railway level cross is achieved using sensors.

CHAPTER 1: INTRODUCTION

1. Introduction

The railway system is the most commonly used transportation mode in India. It is also one of those modes of transport that faces a lot of challenges due to human errors such as level cross accidents, collisions, etc. A level cross, an intersection of a road and a railway line, requires human coordination, the lack of which leads to accidents. Level crosses are controlled by manually operated gates. In order to avoid the human errors that could occur during the operation of gates, the proposed paper introduces the concept of railway gate automation. Level crossings are managed by the gatekeeper and the gatekeeper is instructed my the means of telephone at most of the level cross from the control room. But the rate of manual error that could occur at these level crosses are high because they are unsafe to perform without actual knowledge about the train time table. Delay in the opening and closing of the gate could lead to railway accidents. The present work attempts to develop a system which automates gate operations (opening and closing) at the level cross using micro- controllers detect collisions at the level cross using Ultra sonic sensor

The human errors such as delay in informing the gatekeeper about the arrival of the train, delay in the gate operation by the gate keeper, obstacle stuck in the level cross etc. leads to the increasing rate of accidents at the level cross. Thus the railway gate automation system aims to deal with two things. It reduces the total time taken for the gate operation at the level cross and also ensures the safety of the passengers at the level cross during when the train passes.

CHAPTER 2:LITERATURE SURVEY

i. Based on Railway Gate M. Duraishanmugapriyan et al [1] introduce an Automatic technique for Railway Gate Monitoring and Controlling System, it use microcontroller ATmega328P along with sensors. The system uses IR sensors mainly to find arrival and departure timings of the train in station. For the transmission of sensor output information to controller at remote areas RF transmitter and receiver are used. Microcontroller main unit of system, it plays a vital role by receiving input signal from the all sensors and sends the information to the gate motor driver for opening and closing the gate. The output signal Arduino will active LCD display and alarm. Dhanashree Anant Umbarkar et al [2] Presented PLC Based system which is fully automated technique in railways [2]. Technique includes self-acting PLC system which gives information about train collision at crosses. KarthikKrishnamurthi et al [3] developed the concept of automatic control of railroad using sensors. Infra-red sensors are used to find arrival and departure timings of trains at the railway level crossing. Opening and closing of gates are controlled by Arduino at level. Acy M. Kottalil et al [4] developed the method of Automatic Gate Controlling System in Railways [4].This paper uses ATmega 16A microcontroller and IR Transceiver. This type of system decreases the time needed for closing gates. ii. Based on Track switching System Based on Collision System Based on Protocols used for communication Khizir Mahmud Md. Reya Shad Azim, et al [5] implemented the concept of Automatic Switching of train track System using computerized organization. The system was designed to control railway track including railway switches and signals within a given area from a single point. The track switching system implemented with microcontroller, sensor, visual basic, serial communication, and low power DC motor. Photodiode is used for detecting IR radiation which ensures a reliable detection of train‟s entrance.

Chapter 3: Requirements

Components that we used in this project are:

1. Arduino UNO
2. Ultrasonic Sensor (HC-SR04)
3. Servo Motor

SOFTWARE USED:

1. Arduino IDE

HARDWARES USED:

1.Arduino UNO:

The **Arduino Uno** is an open source microcontroller based on the Microchip Atmega328P microcontroller and developed by Arduino CC and initially released in 2010. The board is equipped with sets of digital and analog (I/O) pins that may be interfaced to various Expansion Boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9- volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino NANO and Leonardo. The hardware reference design is distributed under a Creative commons Attribution ShareAlike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

2.Ultrasonic Sensor (HC-SR04):

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

3.Servo Motor:

Servo motors or “servos”, as they are known, are electronic devices and rotary or linear actuators that rotate and push parts of a machine with precision. Servos are mainly used on angular or linear position and for specific velocity, and acceleration.

Companies heavily use servo motors because of how compact and potent it is. Despite its size, it generates quite the amount of power and is known to be incredibly energy-efficient.

Most of the companies that use servos are manufacturing companies that need it to position control surfaces and rotate objects at precise angles and distances. Most of the companies that use servo motors are manufacturing companies that use machines with servo motors.

Chapter 4: Methodology

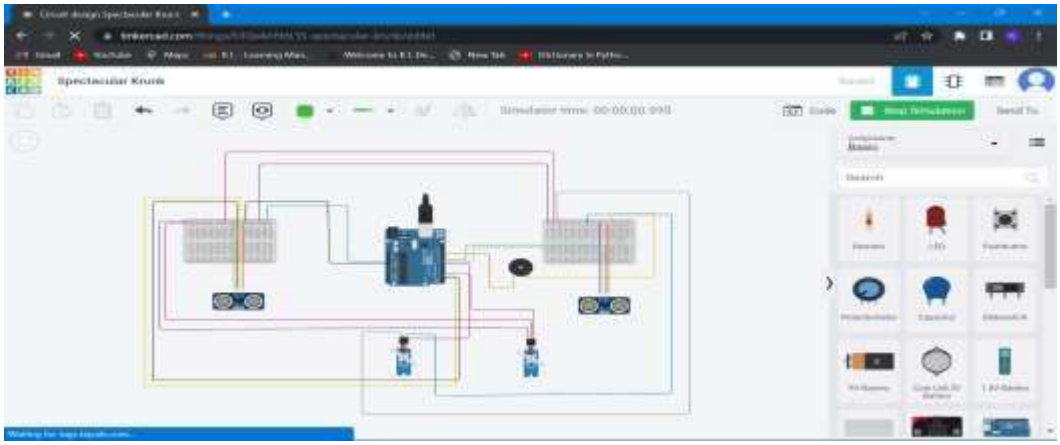
a. Railway gate controlling system Railway safety is the most important concern in railways. Railways transportation considers being more comfortable with cheapest fair. Most of the accidents are due to carelessness and manual operations of the systems. Hence there is a need of automatic railway crossing controller. b. an automatic railway gate controlling system In general, Gate keeper manually operates the railway gates at level crossing. When the train starts to leave the station, the station in-charge delivers this information to the closest gatekeeper to get ready. In situations where the train gets delayed, the gates remain closed for long durations causing dense traffic jam at the level crossings. The rate of manual error that could occur at these level crossings are high because they are unsafe to perform without actual knowledge about the train time table. These human interventions can be avoided by automating the process and it doesn‟t degrade the existing safety level

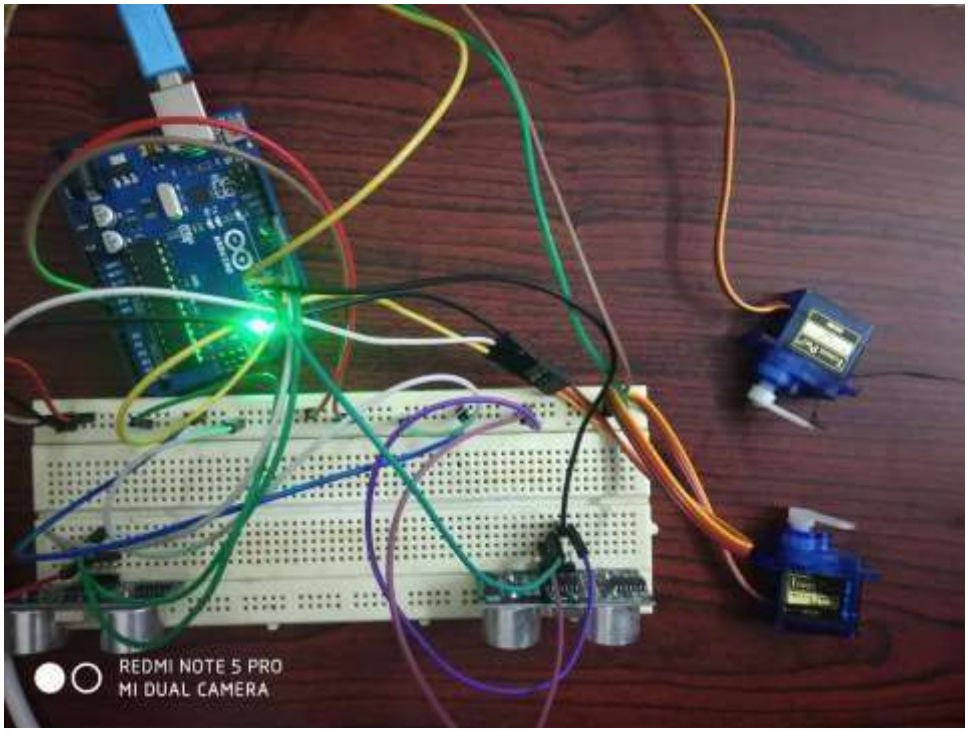
Chapter 5: Theoretical Analysis

a. Working of an automatic railway gate controlling system The ultrasonic sensors are used on sides of gate at about 4km from crossing. As soon as train arrival is detected, the detected signal is sent to microcontroller. Based on that signal, the microcontroller will turn on buzzer for warning, the road user knows the train arrival and sends the actuation information for closing the gate to the servo motors. After closing gate, the nRF24L01 transceiver broadcast the message of „Gate closed‟ to the near control room and to the locopilot in the train. But there may be a chance that during this automation process, a vehicle may be locked between the crossing gates. At this situation, the obstacle between the crossing gates could be detected with the help of ultrasonic sensor and it will be intimated to the loco-

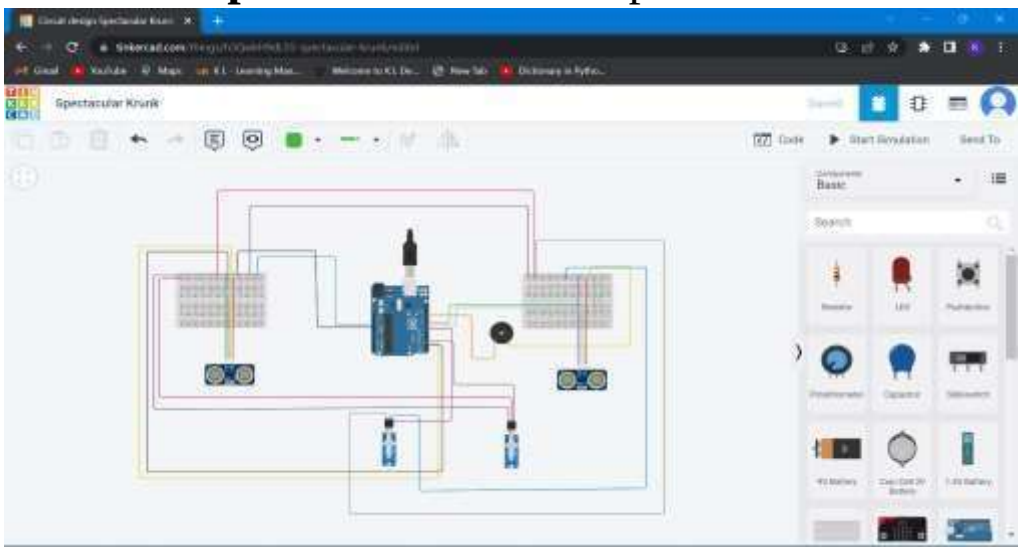
pilot in the train as well as nearest control room through transceiver earlier than the train arrives 3km from the railway gate.
Thus, the man power could be reduced and at the same time accidents at level crossings can be avoided into maximum extent. If no obstacle is sensed between the crossing gates

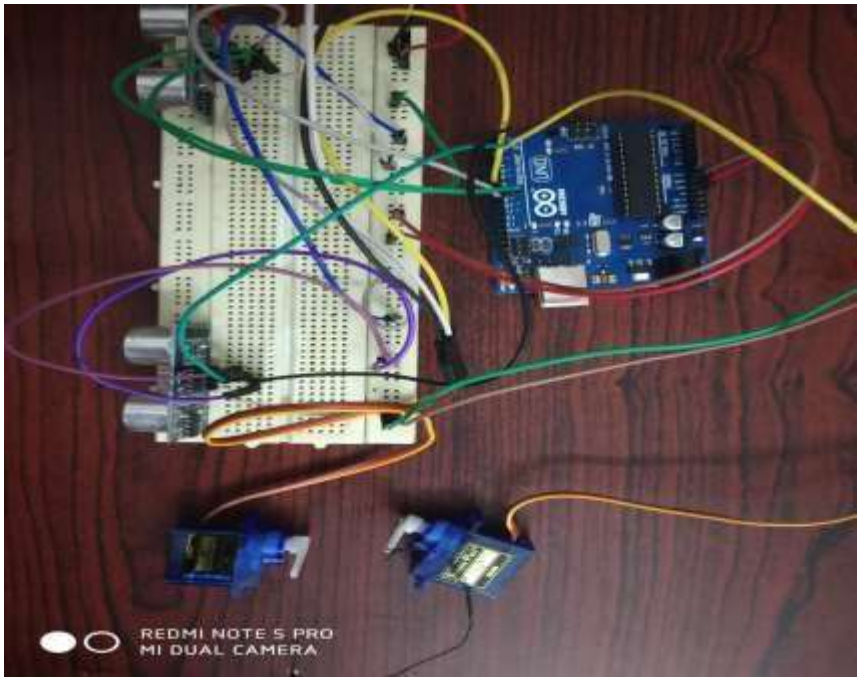
Chapter 6: Simulation and Results





Chapter 7: Hardware implementation





Chapter 8: Conclusion and Future scope

This method is capable of controlling the railway gates exactly. The circuit has been test in both direction and worked perfectly. By making use of ATMEGA 16 controller can achieve a fast response compare to existing. The implementations of this kind of systems are necessary for today‟s railway crossings more numbers of accidents. Automatic gate control system always provides an effective way to reduce railway accidents. This work contributes a benefit to railway department and to road users. Design was completely automated even can used in remote villages where there cannot keep station master or line man is present. Two sides of gate are equipped with sensors. About arrival and departure information of the train can be obtained by this sensor. This system makes use of the servo motor to open and close the gates automatically; it is rotated clockwise or anticlockwise direction.

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