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Automatic Gate at Railway Platform using Embedded System

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Abstract: *Ensuring passenger safety and optimizing operational efficiency are paramount concerns for railway systems worldwide. the deployment of an automatic gate system at railway platforms emerges as a pivotal solution. This paper proposes the design and implementation of an innovative automatic gate system tailored to railway platforms, aimed at enhancing safety protocols and streamlining passenger flow. The automatic gate system integrates cutting-edge technologies such as sensors, actuators, and machine learning algorithms to detect and respond to passenger movements in real-time. By employing infrared sensors and computer vision techniques, the system accurately identifies individuals approaching the platform edge, thus mitigating the risk of accidents and unauthorized access to restricted areas. The efficiency and safety of railway platforms are paramount for the smooth functioning of any railway system. With the burgeoning urban population and increasing passenger traffic, the need for automated gate systems has become imperative. The proposed AGS integrates cutting-edge technology to enhance passenger experience and streamline platform operations. Utilizing sensors, actuators, and a central control unit, the system facilitates seamless entry and exit of passengers while ensuring safety and security.*

Keywords: AGS

I. INTRODUCTION

An automatic gate system designed to streamline passenger flow, enhance security, and ensure a seamless travel experience. Automatic railway gate control system is a simple but very useful project, which help is automatically opening and closing the railway gate upon detecting arrival or departure of the train, in general, railway gates are opened or closed manually by a gate keeper. The information about arrival of the train for opening or closing ofdoor is received from nearby station. But some railway crossings are totally unmanned and many railway accidents occur at these unmanned level crossings.

1.1 PROPOSED SYSTEM

Proposed system where 4 sensors, an unnamable gate crossing, and the movement of the locomotive, a ststion and control station are depicted. when the train crosses sensor 1, it sends a notification to two places. Sensor 2 and the control center. Sensor2 gets prepared and takes the necessary steps needed to close the gates. Now after using crossing sensor 2, it sends a notification to the crossing and the gates to automatically drop, while updating the control center. After crossing the gate. Sensor3 is ready to receive and send notification to open the gate. All these actions occur automatically.

Meanwhile, if an official need to know the live location of the train on the track, we have used a point which shows a general vicinity of the train by the moving train image. Although GPS could have been used, sensors 1 and 4 are used to keep the system simpleand implement an alternative to GPS. After crossing these points, it sends a notification to the nearest up ahead station and the control center. So, there will be updates to all the designated points and the authority will know if the train will arrive on time or not, and can let the passengers know before they arrive at the station and wait.

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II. SOFTWARE AND HARDWARE USED

2.1 SOFTWARE COMPONENTS

Ardunio IDE

The Arduino Integrated Development Environment (IDE) is a software platform used for writing, compiling, and uploading code to Arduino-compatible microcontroller boards. It providesa user-friendly interface that simplifies the process of creating and uploading programs for variousprojects, ranging from simple blinking LED experiments to complex robotics and IoT applications.

proteus

Proteus is a software package primarily used for electronic design automation (EDA), including schematic capture, simulation, and printed circuit board (PCB) layout design. It's widelyused by engineers and students for designing and testing electronic circuits before prototyping or manufacturing them in the real world.

Hardware Components

- Arduino UNO
- Ultrasonic Sensor
- 16x2LCD
- Buzzer
- L29Motor driver
- Relay
- DC Motor

III. HARDWARE COMPONENTS

Arduino Microcontroller

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14digital input/output pins(of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

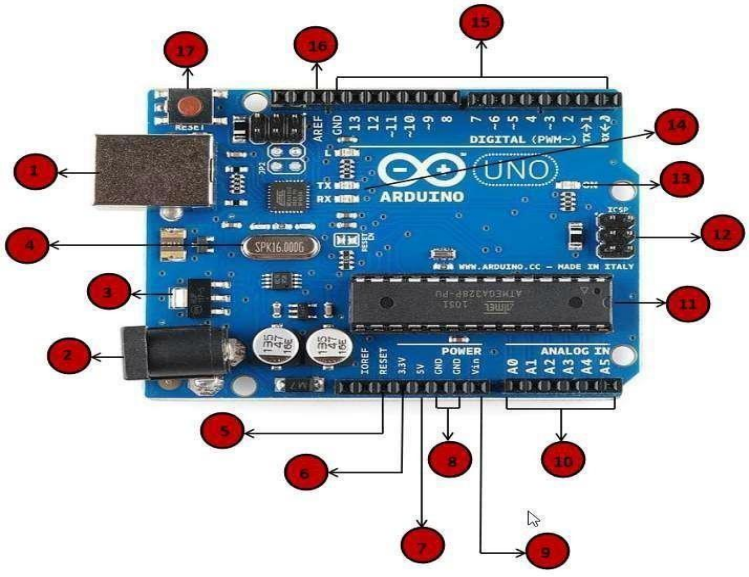

FIG 3.1: Arduino UNO

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Ultrasonic Sensor

Fig 3.2 : Ultrasonic Sensor

Technical Specifications

- Power Supply − +5V DC
- Quiescent Current−<2mA
- Working Current − 15mA
- Effectual Angle − <15°
- Ranging Distance−2cm–400 cm/1″–13ft

16*2 LCD

The Liquid Crystal Display (LCD) is a low power device (micro watts). Now a days in most applications LCD's are using rather using of LED displays because of its specifications like low power consumption, ability to display numbers and special characters which are difficult to display with other displaying circuits and easy to program. An LCD requires an external orinternal light source. Temperature range of LCD is 0ºC to 60ºC and lifetime is an area of concern, because LCD's can chemically degrade these are manufactured with liquid crystal material (normally organic for LCD's) that will flow like a liquid but whose molecular structure has some properties normally associated with solids.

Buzzer

A buzzer is an electronic signaling device that produces a buzzing or beeping sound. commonly used to alert or notify users about specific events, conditions, or alarms. Buzzers can be found in a wide range of applications, from household appliances to industrial equipment

Fig 3.4 : Buzzer

L29 motor driver

The L29 motor driver is a popular integrated circuit (IC) used for driving DC motors. More commonly known as the L293D or L298N, these motor driver ICs provide a convenient solution for controlling the speed and direction of DC motors in various applications such as robotics, automation, and hobby projects.

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Relay

A relay is an electrically controllable switch widely used in industrial controls, automobiles and appliances. The relay allows the isolation of two separate sections of a system with two different voltage sources i.e., a small amount of voltage/current on one side can handle a large amount of voltage/current on the otherside but there is no chance that these two voltage mix up.

DC motor

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homo polar motor (which is uncommon), and the ball bear in motor, whichis (so far) a novelty. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source - so they are not purely DC machines in a strict sense.

IV. CONCLUSION

An automatic rail gate control system along with real time monitoring and automatic train- stop due to obstacle was presented. A hardware prototype was made and tested successfully. Wireless monitoring of real-time train position and obstacle detection was also tested. It consists of gates that create a barrier between the platform and the track, and open or close automatically according to the arrival or departure of the train. This system prevents accidents, unauthorized access, and overcrowding on the platform, and enhances the passenger experience and the overall performance of the transportation system. Automatic gate system at railway platform is widely adopted in railway and metro stations around the world, and is continuously evolving with sensor- based technologies and automation.

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