Automatic Railway Gate Control System Using Arduino

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Abstract - Train is one of the mass transportations that's famous in the whole world. But nowadays, accidents are still major concern in terms of safety of people. There are numerous railroads crossing which are unmanned because of bolt of labor expected to satisfy the requests. Consequently, numerous mishaps happen at such intersection since there is nobody to deal with the working of the railroad entryway when a prepare approaches the intersection. Up to date, there are several propositions to minimize the quantity of mischances and to diminish the labor work at railroad entryways. A large portion of the proposition utilized sensors as a pointer gadget to identify the landing of the prepare yet which needs upkeep price, isn't totally an automated technique. In this paper, our work proposed a method which is capable of controlling rail gate for level crossing which is totally automated. The aim of this study is to make an automated exchangeable railway track at junction crossing and centralized monitoring system to detect the exact position of the train for safety surveillance as our work will be efficient railway scheduling and changeable railway routes.

In this work, the proposed model is based on Arduino microcontroller to reduce complexity and execution cost. Infrared sensors have been employed to track down the position of the moving train. servo motor along with manually-made linear actuator has been used to control the switch gate movement. Total system can be monitored and visualized by a software that shows train position. There is also a scope for statistical data collection and implementation. This system can work both automatically from the control room. This model works for multi-junction railway tracks and one or more train moving along the track simultaneously in IOT (internet of things).

Keywords: *Arduino Microcontroller, Power Supply, ADC, GSM, IR Sensor, PIR Sensor.*

I. INTRODUCTION

India is one among the most developing country in the world in the fields of the economic and technology. It is the second populous country in the world. The population in India is increasing at the rapid growth. Thus, they require the different modes of transportation to move from one place to another. India is the country of most population lying below the poverty line therefore require the cheaper mode of transportation. Railway is the cheaper mode of the transportation. Mostly, people used to travel from place to other using railway. As India is the developing country in the field of technology, the communication is usually done manually. The station master gives the information about the arrival and the leaving of the train to the master at the near-by railway crossings in order to control the flow of the traffic and prevent the accidents. Sometimes there are the chances for train for delay or early due to any reasons or chances for the miss-communication due to the technical issues. In that situation, there is the more chances for the occurrence of the accidents and loss of many innocent people. To overcome this situation, a latest application based on IOT is introduced. This application is highly used at the remote areas and rural areas where the availability of the station masters are poor and without the presence of proper communication system.

II. LITERATURE SURVEY

Dr.Velayutham.R; Sangeethavani.T; Sundara lakshmi.K; developed a system with "Controlling Railway Gates Using Smart Phones by Tracking Trains with GPS"2017. This paper is designed to achieve control over the railway level crossing gate through smart phones by the engine driver. The place where track and highway/road intersect each other at the same level is known as "level crossing". There are mainly two types of level crossing they are manned level crossing and unmanned level crossing. Railways being the cheapest mode of transportation are preferred over all the other means. When our work goes through the daily newspapers, our work come across many railway accidents occurring at unmanned railway crossings obstacle on track system. This is mainly due to the careless in manual operations or lack of workers. The first level which avoids the man-power was done by the use of reflective type of sensors. These sensors intimate the arrival of trains to the railway gate. The railway gates are functioned to work based on the commands it receives from the reflective type sensors. These actions are not programmed to monitor by anyone. So, it has the probability of accidents. Our work need to monitor

that the sensors and railway gates are working correctly or not which increase the manpower like in the previous.

Jan Sramota, Amund Skavhaug proposed a paper "RailCheck: A WSN-Based System for Condition Monitoring of Railway Infrastructure" 2018. Contemporary tools used to monitor railway points and crossings are ineffective. Routine inspections of these critical parts are still being performed manually by specially trained inspectors. This creates higher expenditure and makes infrastructure difficult to maintain. With the expected further expansion of the railway network, this exerts increased pressure on infrastructure managers to ensure safe and predictable traffic. Hence there is a need for inexpensive and reliable condition-based maintenance systems. This paper describes an autonomous, near-real-time system built to this effect. It is based on acceleration measurements of train-track interaction, when the train is present. Using a wireless sensor network (WSN), data are aggregated over the Internet of Things (IOT) low-power wide area network (LPWAN) structure into the Internet, where the big-data post-processing is performed. The performance and suitability of this system were evaluated on tracks in real traffic conditions and were found to be potentially beneficial for this sector. The system was built over a three-year period as part of the Destination RAIL H2020 EU-project.

Mst. Shamima Hossain, Md. Junaed Al-Hossain, Sk. Hasibul Alam proposed a concept "Automated Railway Track Changing Model with Real-Time Centralized Monitoring Interface"2020. In summary, our work have designed a prototype system capable of changing tracks automatically based on direction and position of the train and also can be controlled manually from a central office. Our system also includes a real-time computer interface that can continuously monitor the position and movement of the trains that move along the tracks. Our system also has a proper data management process that can store and display a train's scheduled holding and destination stations. Our design is hoped to render a concept, proper execution of which may bring about a great change in the present railway system increasing efficiency, increasing profit and most of all rendering people a low-cost, time-efficient railway transport system.

III. EXISTING SYSTEM

Mishaps at level crossings are the biggest killer in Indian railways**.** Accounting for 40% of train accidents and 66% of fatalities. India has more than 30,000 level crossings at which vehicles can cross the railway tracks. Of these, more than 11,000 are unmanned crossings.

This is where most of the accidents occur**.** Railway gate accidents are not unique to India. On average, each year around 400 people in the European union and over 300 in the United States are killed in level crossing accidents. Collisions can occur with vehicles as well as pedestrians. Pedestrian collisions are more likely to result in a fatality. The most important part of the automatic level crossing system is the train detection scheme. To be able to perform its function, the system must be able to detect the arrival and departure of a train from the track reliably. Many different components are used in crossings all over the world including track circuit, axle counter, wheel sensors and optical position sensors. While track circuits and axle counters require reconstruction of the track as they have to be embedded, wheel sensors and optical position sensors are more modern systems that is based on magnetic inductive principle and optical theories. These systems are very sophisticated and are quite expensive to install Gate closing system is done manually, so 24*7 gate keeper need to awake for the train status to close the gate before it reaches to the level crossing. This system was Oral communication through telephonic conversations. IR sensors are also used to identify the cracks in the railway. Announcement of train arrival will be updated through Manually in the railway station, passengers didn't get the instant status of the train.

IV. PROPOSED SYSTEM

The proposed system is practically experimented as a working model of the real world level cross. 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. Automation of the closing and opening of the railway gate using the switch circuit reduces the accidents to a greater extend.

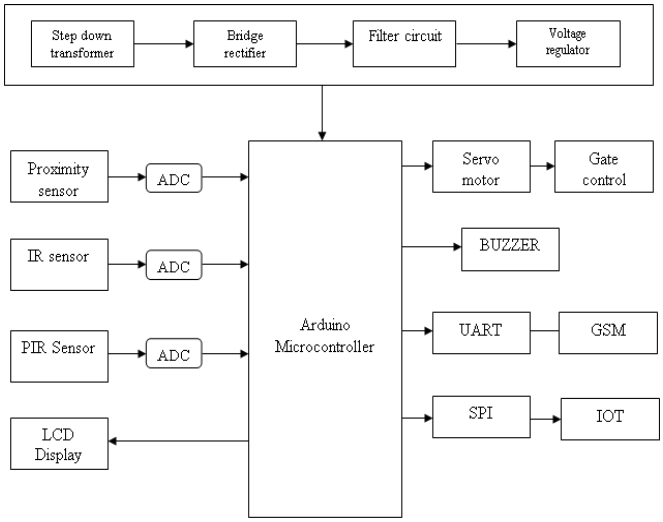
ADVANTAGES

- Low Cost maintenance.
- Reduces Accidents in Level Crossing.
- Don't need to depend on main power for closing the gate.

Hardware requirements

- Arduino Microcontroller
- BUZZER
- Power Supply
- ADC
- UART
- GSM
- Proximity Sensor

- IR Sensor
- PIR Sensor
- LCD Display
- Servo Motor
- Gate Controller



Software requirements

- Arduino IDE
- Embedded C
- BYLNK Application
- Proteus Professional
- HTML basic

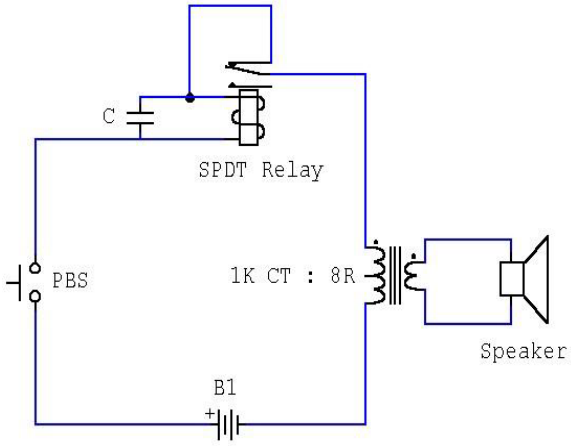
V. HARDWARE DESCRIPTION

Arduino Microcontroller:

It is the Arduino Microcontroller Unit, which controls the whole system. All the sensors are interfaced using this controller. Single board microcontroller intended to make the application of interactive objects or environment more accessible. Sense the environment by receiving input from variety of sensor. They are controlling joystick

BUZZER

A buzzer or beeper is a signaling device, the word "buzzer" comes from the rasping noise that buzzers made when they our worker electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep



Power Supply

The Power supply is a reference to a source of electrical POW. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Power supplies for electronic devices can be broadly divided into linear and switching power supplies. The linear supply is a relatively simple design that becomes increasingly bulky and heavy for high current devices; voltage regulation in a linear supply can result in low efficiency. A switched-mode supply of the same rating as a linear supply will be smaller, is usually more efficient, but will be more complex.

ADC

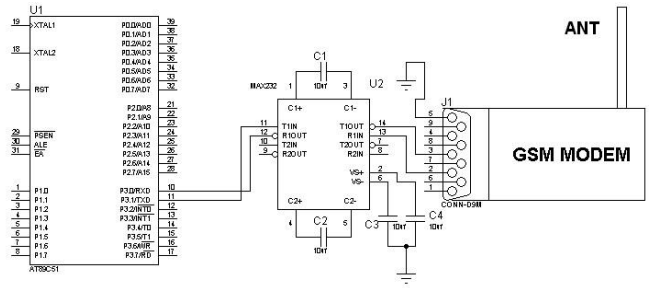
The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals. The device eliminates the need for external zero and full-scale adjustments. Easy interfacing to microprocessors is provided by the latched and decoded multiplexer address inputs and latched TTL TRI-STATE outputs.

UART

A universal asynchronous receiver/ transmitter, (UART), is a computer hardware device that translates data between parallel and serial forms. UARTs are commonly used in conjunction with communication standards such as TIA (formerly EIA) RS-232, RS422 or RS-485. The universal designation indicates that the data format and transmission speeds are configurable. The electric signaling levels and methods (such as differential signaling etc.) are handled by a driver circuit external to the UART.

GSM

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means attention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon.



GSM Circuit

Software requirements

Ardino IDE

The Arduino Software (IDE) permits you to compose programs and transfer them to your board. In the Arduino Software page you will discover two choices:

In the event that you have a dependable Internet association, you should utilize the online IDE (Arduino Web Editor). It will permit you to save your portrayals in the cloud, having them accessible from any gadget and supported up. You will consistently have the most exceptional rendition of the IDE without the need to introduce updates or local area created libraries.

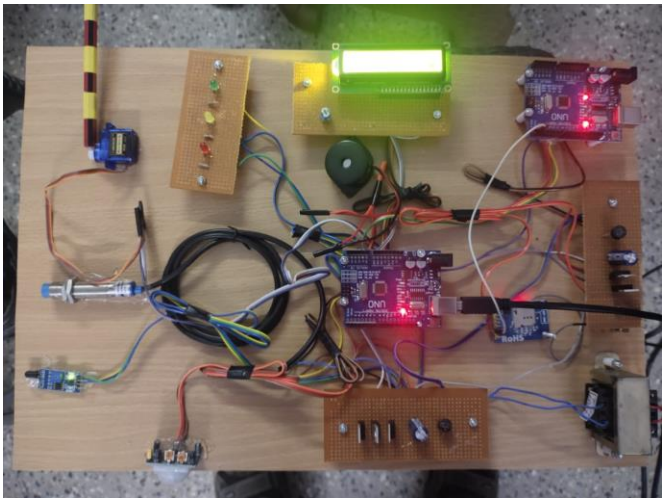
On the off chance that you would prefer to work disconnected, you should utilize the most recent form of the work area IDE.

Embedded C

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as, fixed-point arithmetic, named address spaces, and basic I/O hardware addressing.

VI. FUTURE SCOPE

In future work our proposed work uses a advanced sensor network in the train to detect the cracks and abnormal vibrations in the railroads to avoid train accidents. Also in future work abnormal event detection in Railway station and train compartments (eg: theft, harassment, murder, etc) by using MATLAB image processing technology.



VII. CONCLUSION

In this proposition, unmanned gate control system utilizing IOT is a propelled technique to lessen the event of such a large number of railroad mischances which will be a completely automated system. Automating the gate can achieve a ring of surety for controlling the gates. Humans may commit mistakes or errors so computerizing this procedure will lessen the odds of gate failures. This system contributes a great deal of advantages to the street clients and railroad administration. There are numerous favorable circumstances with the proposed system. The favorable position incorporates less cost, high precision, low power utilization, less

examination time, unlimited safety, reliable one. Our work are expecting our work will be the best work and also an effective one for people especially for the ones living in the remote regions with unmanned railroad entryways.

VIII. REFERENCES

[1] Prioletti et al.A, "Part-based pedestrian detection and feature-based tracking fordriver assistance: Real-time, robust algorithms, and evaluation," IEEE Trans. Intell. Transp. Syst., vol. 14, no. 3, (2013), pp. 72–74.

[2] K.V.Govardhan Rao, Ch.Srinivas, "Automatic Railway Gate Control System Using Microcontroller", International Journal of Innovative Research in Sciences, Engineering and Technology (IJIRSET), ISSN: 2319-8753, Volume 7, Issue 5, May 2018, pp.4942-4949.

[3] Vikash Kumar1, Prajit Paul2, Nishant kumar1, Pratik kumar Sinha1, Sumant Kumar Mahato, "Automatic Railway Gate Controller with High Speed Alerting System", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE), ISSN: 2278-8875, Vol. 4, Issue 5, May 2015, pp. 4527- 4531.

[4] Sushmitha M K, Yashodha A S, Shruthi S P, Nethra M S, Amar Narayan, "FPGA Implementation of Automatic Railway Train Control System", International Journal of Engineering, Basic sciences, Management & Social studies (IJEBMS), ISSN: 978-93-8469833-1, Volume 1, Issue 1, May 2017, pp.554-559.

[5] Manikandan T., Aathilakshmi S., "Smart Railway Track Change with Coach Link Cut Detection System", International Journal of Engineering Science and Computing (IJESC), ISSN:2348-9510, Volume 8 Issue No.10, October 2018, pp. 19066-19069.

[6] M. Duraishanmugapriyan, "Automatic Railway Gate Controlling System", International Journal of Electrical and Electronics Engineers (IJEEE), ISSN:2321-2055, Volume No. 9, Issue No.1, June 2017, pp. 1648-1654.