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LIFE-SAVING SYSTEMS IN INDIAN RAILWAYS

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ABSTRACT: The lifeline of our country, INDIA, is railways. Every corner of our country is connected by the railways, daily tons of goods and millions of passengers reach their destinations properly without any trouble. But in some cases there are some major accidents and some minor accidents, which are caused due to technical problems or by human negligence.
According to a survey, yearly around 100 deaths are caused only at the railway crossings. To avoid these accidents; we have planned to implement the life-saving systems at the platforms and at the railway crossing gates. The system installed at the railway platform is interlinked with that of the system present in the locomotive. If any obstacle is detected on the railway tracks the signal is sent to the loco pilot to slow down or to completely stop the train, thus avoiding an accident.
By our project, we can save the lives and avoid damage which helps the INDIAN RAILWAYS in improving their services to the society.

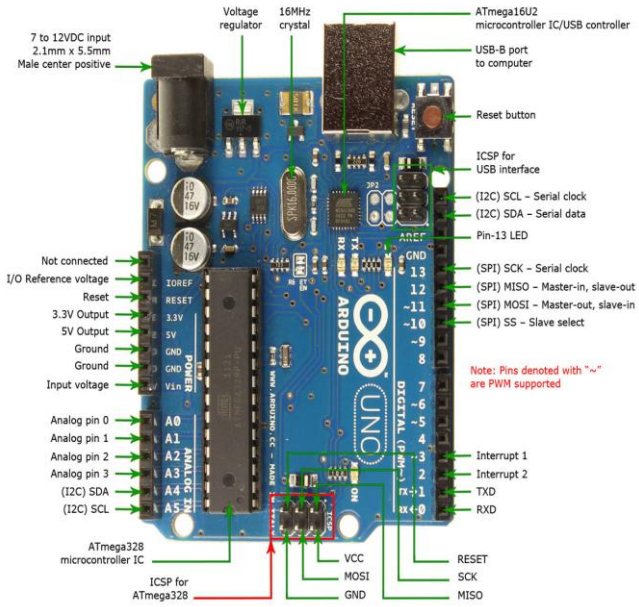
Keywords: *Life-saving, sensors, railways, Arduino, level-crossing gates.*

I. INTRODUCTION:

As said INDIAN RAILWAYS plays a crucial role in the transportation of the goods and passengers through the country. On any given day 12617 trains were running on INDIAN RAILWAY tracks and a total number of stations in INDIA is estimated to be between 8000 to 8500 and fourth largest employer in the world, employing over a million people.
Introduced by the British in our country, the signaling systems have been changed a lot after many accidents of the employees and the passengers. On board toilets have been installed after the 50years of the introduction of the railways, that has shown a lot of delay in the advancement of the system from the past, so large development is essential for greater satisfaction of the passengers and for the survival of the organization. At present managing the huge numbers in terms of passengers and the fright is not an easy task if we manage it manually. According to a survey yearly hundreds of deaths have been caused only due to Railway crossings and in recent years, a train was rammed into the school bus at unmanned crossings near Masaipet village in Medak district, killing over 20 students and the driver as train rammed bus up to 1km.This had caused a lot of distress in the society as there is no awareness about the crossing gates among the people, this story has motivated us to do something in order to avoid such dangerous catastrophes.

II. ABOUT THE PROJECT:

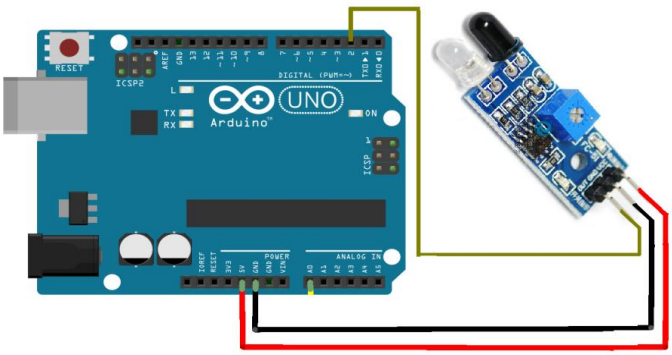
So, we have developed a system called "**LIFE-SAVING SYSTEMS IN RAILWAYS**" which would help in reduction of accidents and save the innocent lives. To say more about our project, it has been made with the help of Arduino UNO boards which is present at the railway's track and also at the locomotive. Arduino is an open source and computer hardware which designs single board microcontroller for building a large number of devices, mainly used for making of digital or analog projects. Uno has an 8-bit processor and also has 14 digital input/output pins which can be made input/output at a particular time by programming the board which can be done by downloading a programming software for free of cost from the Arduino's official website Arduino.cc.



It also has 6 analog inputs, a 16 MHz ceramic resonator, 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 an AC-to-DC adapter or battery to get started. Once the software has been downloaded we can start coding and the programs here are called as "sketches", Here the code is called as sketch because the Arduino programming language is entirely based upon processing as

the language borrows IDE for construction of the programs, once the sketch is compiled we can upload it into the respective Arduino board for which it has been written.

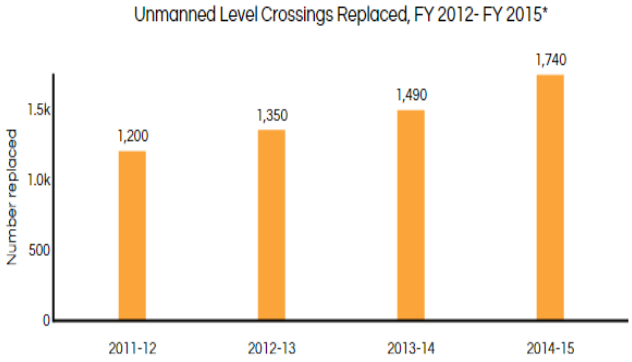
To sense any obstacle at the railway track, one has to observe for any sign of danger continuously until the train arrives. It can be done with the help of a sensor called "IR Proximity Sensor" to know more about this sensor, it is a low cost and uses less power to operate and it just detects any presence of objects or obstacles without any physical contacts. It can be also found in our mobile phones, it is the main reason why the screens of the phones become off while we are in any call. This is done to avoid any unwanted touches to the screen and also to use the power efficiently as a screen of mobile consume high power and produces more heat if it is ON for a long time. The principle behind this detection without any interfacing is the proximity sensors always emits a beam of electromagnetic radiation, here we are using IR(Infrared) so it emits IR beam onto the object and looks back for the return signal from the object. In our project, IR sensor will detect the obstacle on the railway track. The IR sensor which we are using has 3 pins named as VCC, GND and out pins. VCC is used for powering the circuit which 5 volts of voltage, GND is used for grounding the circuit where Out pin is used for transferring the output of the respective connected device. If the sensor detects any object the out pin will be HIGH and if the output is LOW, it means that there is no object present in front of the sensor. It also has IR transmitter and IR receiver LED's along with Distance adjuster. IR transmitter will emit IR light upon the object. When the object comes closer, the IR light which is being emitted on the object will reflect back to the proximity sensor, where the reflected light is observed by the IR receiver. The distance adjuster will play a key role in adjusting the length of IR light between the transmitter and the object. This IR sensor is connected to the Arduino as shown below



Now the other Arduino is present in the locomotive inside the train if the first Arduino which is present at the railway track along with the proximity sensor senses any obstacle, then it gives the signal to the other Arduino. This type of communication can be done with the help of HC-12 transceiver module which is connected to each Arduino boards. HC-12 is a half-duplex wireless communication module. It operates between 433-473 MHz of frequency and can transmit or receive the data over 1km of range. Combined with other components, like the Si4463 and STM8S003 create the HC-12 transceiver, which provides a 4-pin interface (VCC, GND, TX, RX), with a 5th pin that is used to enter "command" mode for changing the module's configuration. It is satisfactory for most hobby and industrial applications. It is an important alternative to the very inexpensive, low-power, but short-range, the range of the module can be increased by attaching an antenna to each module so that we can get a longer range.

To sum up everything, the Arduino board connected to IR proximity sensor which is present at the railway track will give a warning signal to other Arduino board connected to the speaker which is present in the locomotive whenever it detects any obstacle on the railway track when a train is about to pass. And the at the location of the crossing gates there is hooter connected and when the train is approaching the system gets a signal from the train though the train is very far away, and the signal is given to the hooters which make the sound. As the train approaches loudness of the sound from the hooter keeps on increasing and the people at the track get alerted and can make a way to the safer place.

III. STATISTICS:



IV. ADVANTAGES:

- Accidents will decrease.
- Can be implemented using very low power.
- Can be easily installed.
- Low maintenance.
- High durability.
- Can be used in any weather or temperature conditions if maintained properly.
- As we are using Arduino, more systems can be attached in the future.

V. DISADVANTAGES:

- Each train has a different radio frequency, so we need to have different frequencies to communicate with different trains.

- Time taken for detection of an obstacle is high.
- The range of detection by a single sensor is low; in order to make it be effective, we need more sensors.
- Though the train has detected the obstacle it takes much time to stop. So an immediate stopping system is very necessary.

VI. ACKNOWLEDGMENT:

To the entire Department of Electronics especially, Mr. T.V.L.N.H. Prasad Sir, Mrs. M.Prasanna Ma'am and Mrs. M.Amitha Ma'am of Computer Science department thank you for spending time and sharing your knowledge with us, this wouldn't have been completed without your guidance.

To Mrs. K. Padma Priya faculty Department of Computer Science, thank you a lot for encouraging us.

VII. REFERENCES:

[1] arduino.cc
[2] www.wikipedia.com/indian railways/
[3] www.googleimages.com