Project Synopsis

on

"IOT Based Smart System for Protection of Railway Workers "

Submitted in partial fulfillment of the requirement for the degree of Bachelors of Engineering by:

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Manali Jadhav
Reshama Gurav
Shruti Naik

Under the guidance of
Dr. Ravindra Duche

LOKMANYA TILAK COLLEGE OF ENGINEERING

Affiliated to

UNIVERSITY OF MUMBAI

Department of Electronics & Telecommunication Engineering

Academic Year – 2021-2022

LOKMANYA TILAK COLLEGE OF ENGINEERING

UNIVERSITY OF MUMBAI

2021 -22

Department of Electronics & Telecommunication Engineering

Synopsis

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2.Manali Jadhav.
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4.Shruti Naik.

Course: B.E.(Electronics & Telecommunication Engineering)

Title of project: IOT Based Smart System for Protection of Railway Workers

Project Guide: Dr. Ravindra Duche

Date:

"CERTIFICATE"

This to certify that **Jaitali Sathale, Manali Jadhav, Reshama Gurav, Shruti Naik**, have delivered seminar for Project Stage- I on **'IOT Based Smart System for Protection of Railway Workers '**on , 21st April 2022 and submitted a report in the , Lokmanya Tilak College of Engineering, Navi Mumbai for the partial fulfilment of the degree of B.E in " Electronics and Telecommunication Engineering" from University of Mumbai, for the year 2021-22.

Dr.Ravindra Duche **Dr.Vivek Sunnapawar**

(Project Guide/Head of Department) (Principal)

External Examiner

Place: Lokmanya Tilak College of Engineering

Date: 21/04/2022

“Project Report Approval for B.E.”

This project entitled **”IOT based Smart system for protection of railway worker”** by **Jaitali Sathale, Manali Jadhav, Reshama Gurav, Shruti Naik** is approved for the degree of **Bachelor of Engineering in Electronics and Telecommunication Engineering** for academic year 2021-22

External Examiner
1.
2.

Date:

Time:

“DECLARATION”

We declare that this written submission represents our ideas in our own words and where others’ ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

STUDENT NAME **SIGNATURE**

1.Jaitali Sathale.
2.Manali Jadhav.
3.Reshama Gurav.
4.Shruti Naik.

"ACKNOWLEDGEMENT"

We would like to acknowledge and extend our heartfelt gratitude to all those people who have been associated with this Project and have helped us with it thus making it a worthwhile experience.

Firstly we extend our thanks to various people which include our Project Guide **Dr.Ravindra Duche** who has shared her opinions and experiences through which we received the required information crucial for our project synopsis. I am also thankful to Head of Department **Dr.Ravindra Duche** and all the staff members of Electronics & Telecommunication Department for their highly co-operative and encouraging attitudes, which have always boosted us.

We also take this opportunity with great pleasure to thank our Principal **Dr.Vivek Sunnapawar** whose timely support and encouragement has helped us succeed in our venture.

Name of Candidate	**Signature**
1.Jaitali Sathale	
2.Manali Jadhav	
3.Reshama Gurav	
4.Shruti Naik	

“ABSTRACT”

Now a days lots of advanced medium of transports have been developed. One of the cheapest and major transport medium in India is Train. In India majority of the railway tracks have been improved with the latest technology. As we talk about the latest technology, IOT become more important in today’s generation. As we say about the Internet of Things it enables human-to-human, machine-to-machine, and human-to-machine interactions it can easily create information about the connected objects, analyze it, and make decisions, so one can tell that the Internet of Things is smarter than the Internet. Since, looking forward to the maintenance of track and track site infrastructure it is considered to be one of the most hazardous jobs in the rail industry. Thus rail workers are good at their job of keeping the railroads safe for freight and passenger trains through rail system inspections, maintenance, and repairs on the right of way but they also get worried about their safety. So it is necessary to provide them a safety device. After all observing the latest technology and coming on the main purpose we are designing an IOT based smart system for protection of railway workers, which consists Ultrasonic sensor which detect the train and after train is detected, by GSM 900A information is transferred and railway worker gets alert message. Thus, with the help of this system we can enhance the safety of railway workers.
Keywords: IOT, Ultrasonic sensor, GSM.

Contents

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Chapter 1

INTRODUCTION

Indian Railways is the largest railway network under a single management in the world. With such a massive utilization of assets, Safety is of paramount importance for operational efficiency. A very high priority is accorded to safety to enable Railways to achieve still greater heights of performance. Track workers working in the rail corridor are faced with the possible danger of trains and other track machinery moving through their worksite. The rail industry takes very strict safety measures to significantly reduce the risk at the track work site. However accidents and fatalities still occur at the worksites and there is a need to revise the existing safety measures and procedures to prevent such occurrences. Since, train accidents at work sites are on increase on Indian Railway. Several instruction have been issued detailing precautions to be taken for ensuring safety at work sites. However, it is seen that contractors are allowed to start the work without ensuring provisioning of barricading, or other safety alert device, etc. As our project is based on the safety of construction site workers in railway, so our main objective was to make a portable device which will warn the construction workers working on train tracks about approaching trains.

1.1 Trains are on the move into the future:

As looking forward regarding this condition of workers many other company has invent smart portable device as well. From improved on-board monitoring systems to trains equipped with IoT connected sensors and more, the coming years will usher in a new era of highly connected trains and railways. For rail operators, this means greater management over the day-to-day services that passengers rely on to reach their destinations on a regular basis. Network-level infrastructural changes are required for this to happen. GSMR, the legacy communications technology for railways, will be replaced by LTE and 5G. A new framework known as the Future Railway Mobile Communications System (FRMCS) is planned for deployment for about 200,000 kilometers of mainline railways. This framework will modernize train services and help keep railway operators on track for business success. Since, through this modern technology it will be helpful to the worker regarding their safety issue.

Chapter 2

SCOPE OF PROJECT

2.1 Project Overview

As our project is based on this current situation of the worker safety, hope this situation will not come again if it then our device is ready to tackle this kind of situation. Our main vision is to build a product which ensures the proper safety of railway track workers by notifying them about approaching train. The same idea can also be implemented at unmanned crossings that could prevent numerous accidents. In this project we are using ultrasonic sensor, ardiuno, GSM module for initialize it.

Chapter 3

LITERATURE SURVEY

3.1 Referred Paper 1

- **Three SCR workers killed as train engine knocks them down:**

Abstract: In a tragic incident, three South Central Railways employees were killed on the spot on Wednesday near Vikarabad, after a train engine rammed them while they were working on a railway bridge. The trio had travelled to Vikarabad to execute the work assigned to them. They purportedly did not inform the local stations of their presence in the area. The engine driver did not know about them working there. For the workers, the engine suddenly appeared and hit them. All the three persons died on the spot. Apart from them, there are no casualties and nobody has suffered injuries. This paper review the literature of lack of safety device available at that situation. Since, the last research domain studies how it is necessary need of the safety devices and problem over the content provided.

3.2 Referred Paper 2

- **Track Repair Workers To Get Safety Device To Warn Of Incoming Trains.**

Abstract: Concerned over cases of maintenance workers being run over by trains while patrolling the tracks. As the large number of run-over cases of track men that occur during discharge of their duty on track. "However, since the system is still in infancy stage, deployment on entire rail network may not be feasible right now. The board, taking cognisance of the recommendations made by a committee of general managers appointed to suggest ways to improve the working condition of track men including their uniform and tool kit, said that the device adopted by SCR has been found useful. But whether it's the night shift, long hours or just a lack of sleep, fatigue on a construction site often results in accidents. We're all human and mistakes can happen, but when they cost lives and are preventable, it's time to look at equipment and best practices. Railway unions which have pushed for such protection for the track men for years say that around 400 track men die annually after being run over by trains. Indian Railways, which maintains 115,000 km of track around the country, is manned by around 2 lakhs track-men. This paper review the literature on keeping in view the committee is also trying to make this situation stable.

3.3 Referred Paper 3

- **Personal Workforce Protection**

Abstract: Railway tract workers are in imminent danger of being hit by trains. Infrastructure construction and maintenance companies reduce this risk with human and technological efforts. Drawbacks of this approach include overhead costs for additional employees as well as complexity in handling the technology. Despite all these efforts, there are many 10 up to several 100 track worker accidents every year caused by being hit by a train in some regions of the world. Thus it is highly recommended that track workers will also be fitted with a personal version of our protection technology, minimizing the likelihood of collisions with approaching trains. This can be as simple as using our track worker protection app on the track worker's smartphone. Due to the potentially long braking distances of approaching trains it is of at least equal importance to warm the human worker of the approaching trains as the human can de-escalate a potential threat situation usually much faster. The purpose of this review is to establish a baseline for the researcher interested in the area. The paper concludes with a call for further research into the more innovative possibilities of improving the safety device system.

Chapter 4

METHODOLOGY

4.1 Gathering Information

When we first got the project, we were researching on several articles, news article related to such problem and various applications and the system which were connected to similar idea. we have discovered various sensors such as hall senssor,IR sensor, RF transmitter and receiver and other components. Next step was to digitize the signal that is converting the analog signal to digital signal with the help of arduino or raspberry pi. In our project we find it arduino more suitable that raspberry pi. For the hardware part we researched on arduino official web site so we can get the knowledge of how to cover-up hardware part of our project. After researching we added several components that can be efficient to use to the user and so informative to the user.

4.2 Proper Planning

• After researching on lots of articles and various idea related to them we slot them and get 3,4 main reference which get closer idea to our project.
• After getting proper planed we get idea of the components which we required and through which system we should go.
• Then after gathering all the components we will be assembling the components according to the idea of our project.
• Components consists 'GSM900A' for sending the SMS 'Ultrasonic sensor' to detect the train,'Arduino Nano' to connect these components and the functional purpose,'SIM900A' to connect the device with your personal device i.e mobile,next is 'Buzzer' for the output and finally we have used Arduino IDE for coding part and for simulation we are using proteus software.

4.3 Block Diagram

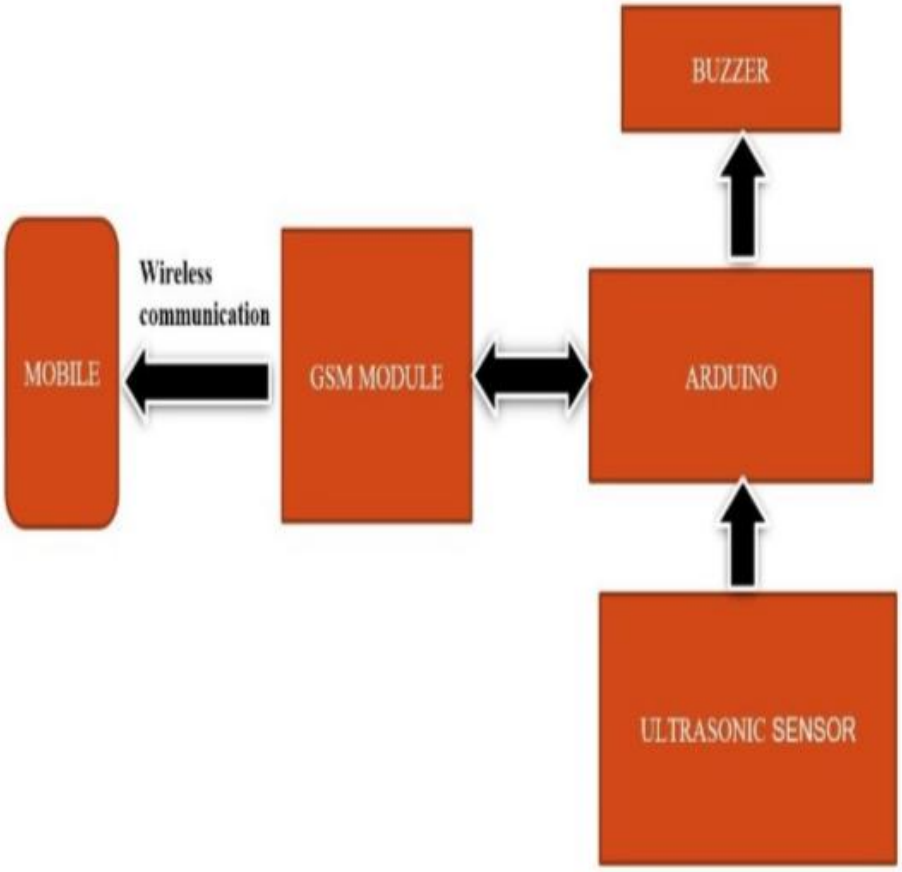

Figure 4.1: Design of worker safety device

Chapter 5

Design and Implementation

5.1 Software Implementation

5.1.1 Step 1

First we analyze the block diagram and list suitable component according to our requirement. After that we rearrange the component as per block diagram and do it in online simulation software.

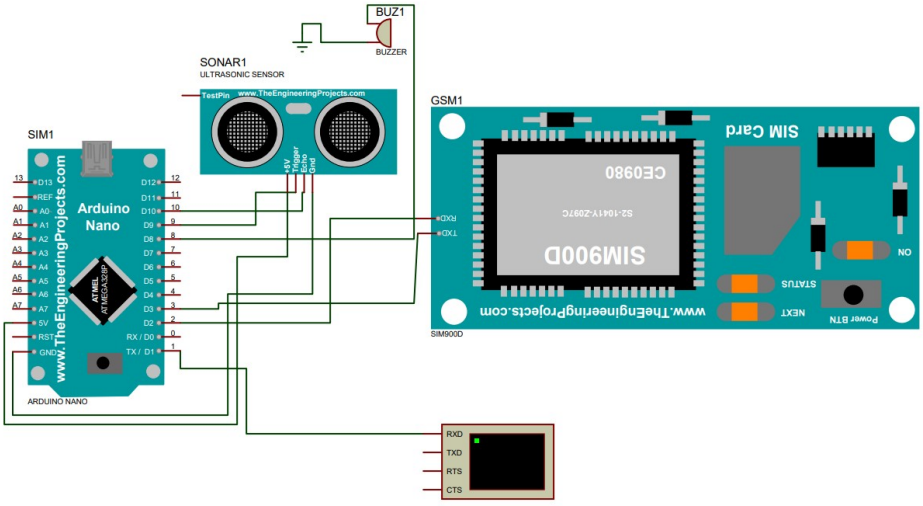

Figure 5.1: Circuit diagram of worker safety device

5.1.2 Step 2

After making online simulation on Proteus simulation software we go through software part that is coding on Arduino IDE for making connection between the software and hardware part.

5.1.3 Step 3

Successfully code executed on online simulation verifying it on real manner

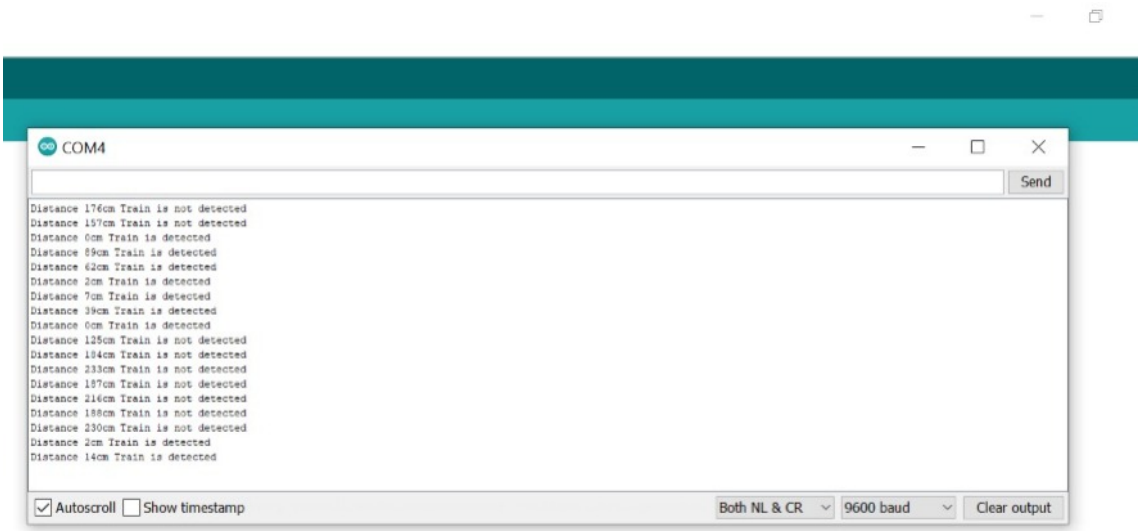

Figure 5.2: Output on Serial Monitor

5.2 Hardware Implementation

5.2.1 Step 1

After online simulation and verification of code running properly or not then we go through the implementation of the components on the breadboard.

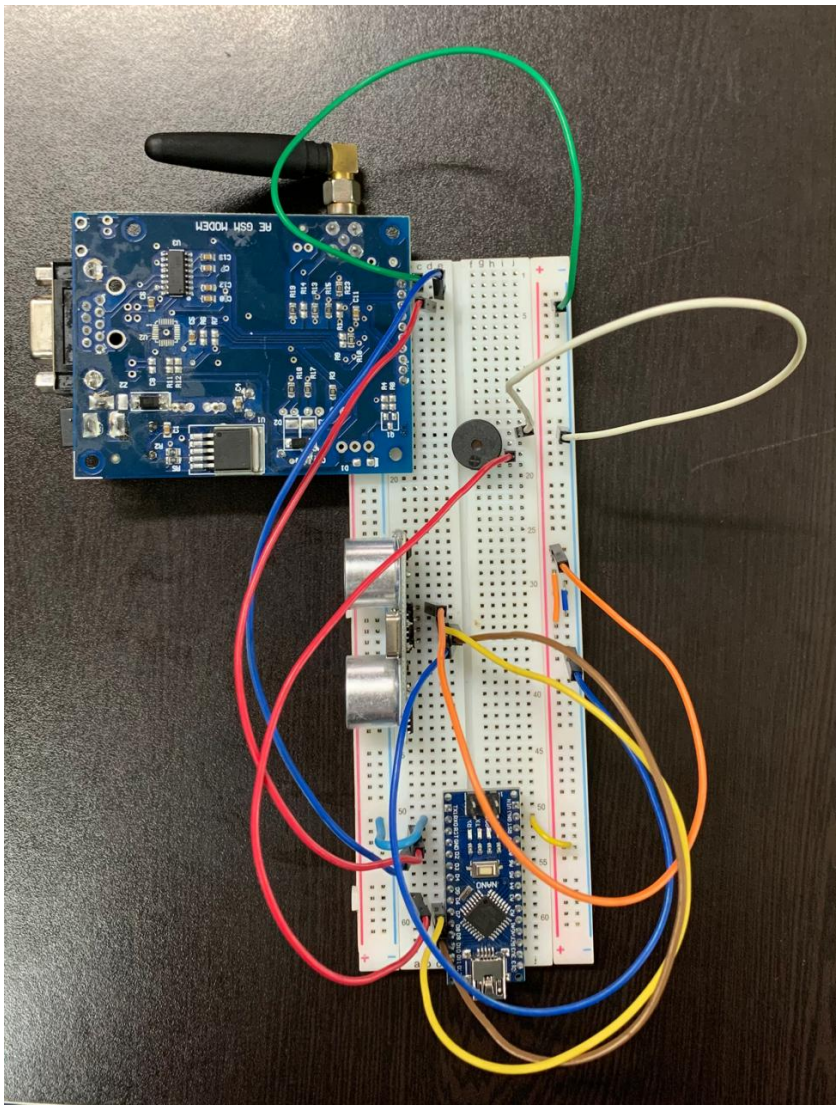

Figure 5.3: Implementation on Breadboard

5.2.2 Step 2

After proper arranging the components we check the running status of our model. After getting some errors and getting more knowledge about that we fix the errors.

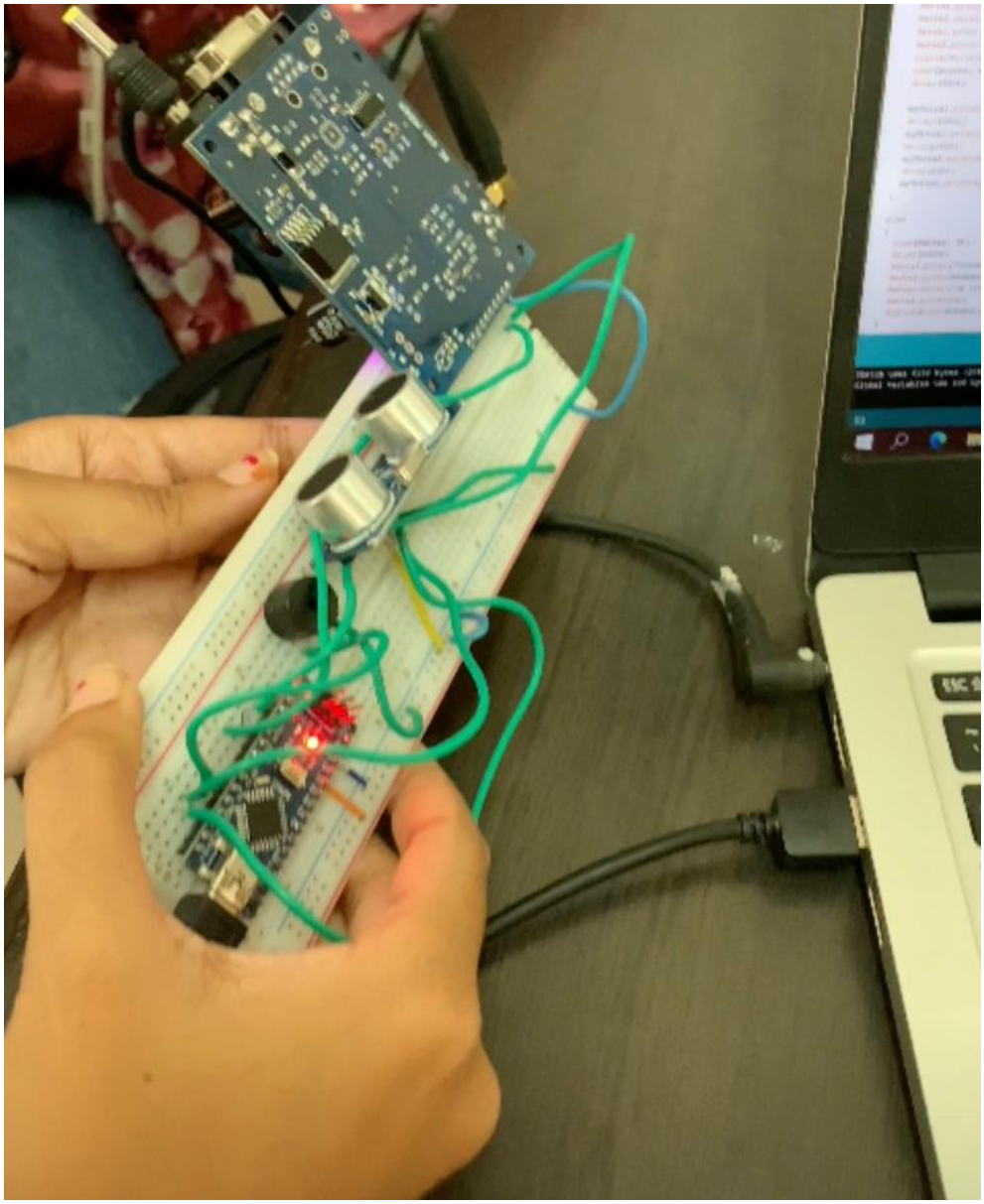

Figure 5.4: Working successfully on breadboard

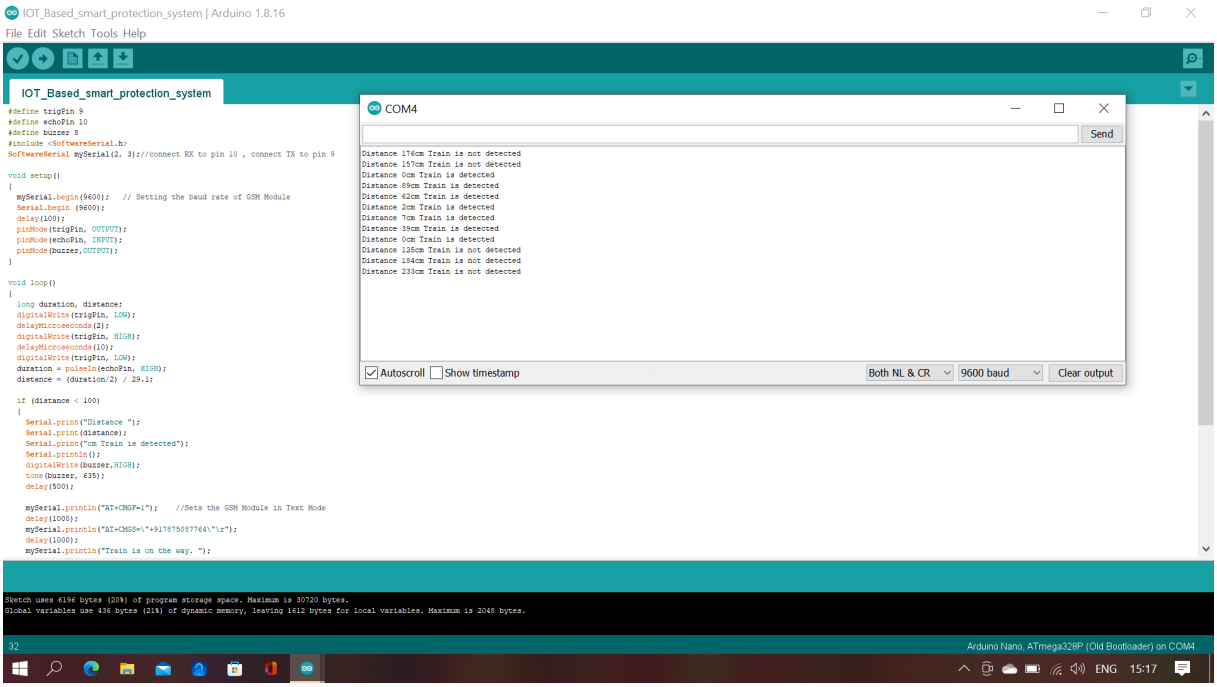

Figure 5.5: Running status

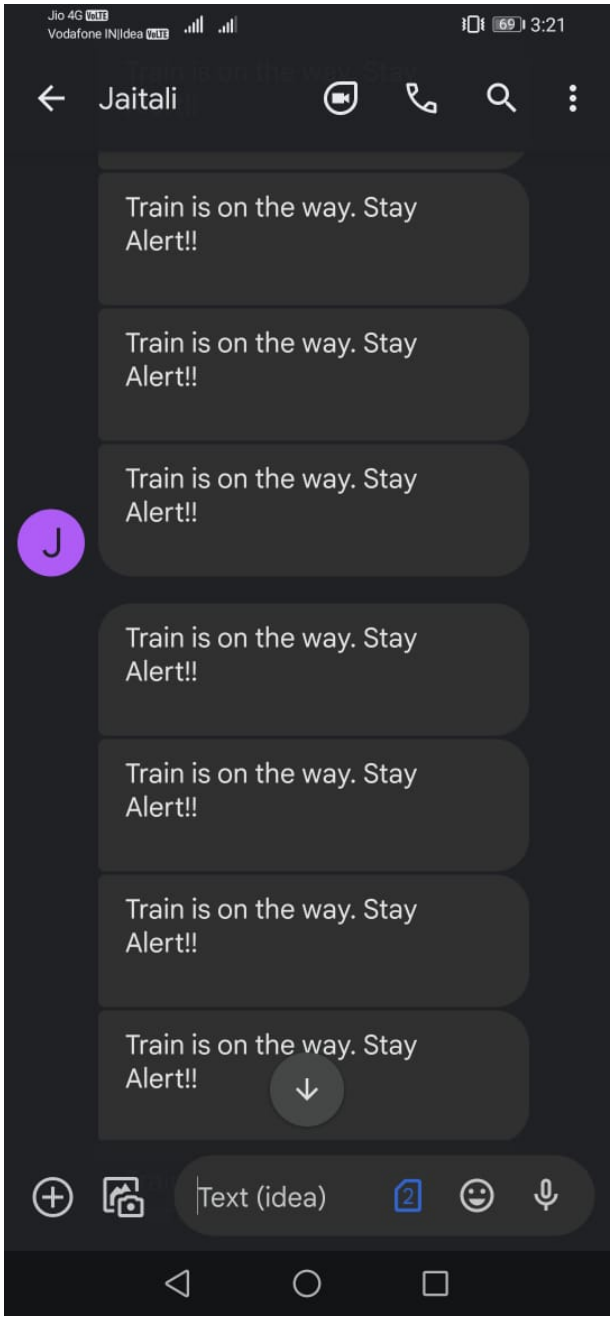

Figure 5.6: Message alert on registered phone number

5.2.3 Step 3

Prepare a layout of the circuit for designing on PCB. Make sure that the design is correct with proper placement of the components.

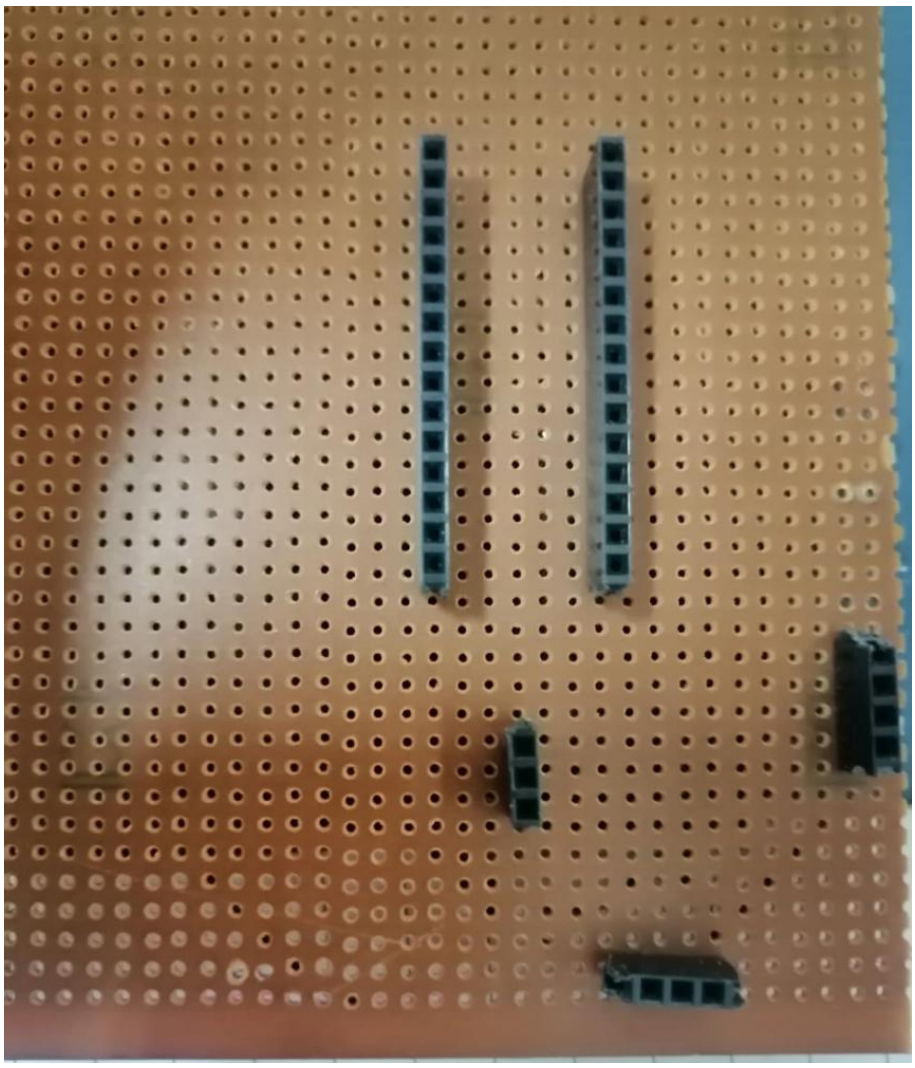

Figure 5.7: Layout on PCB

5.2.4 Step 4

After soldering the components on PCB board check the connections of hardware part and software part is working properly .

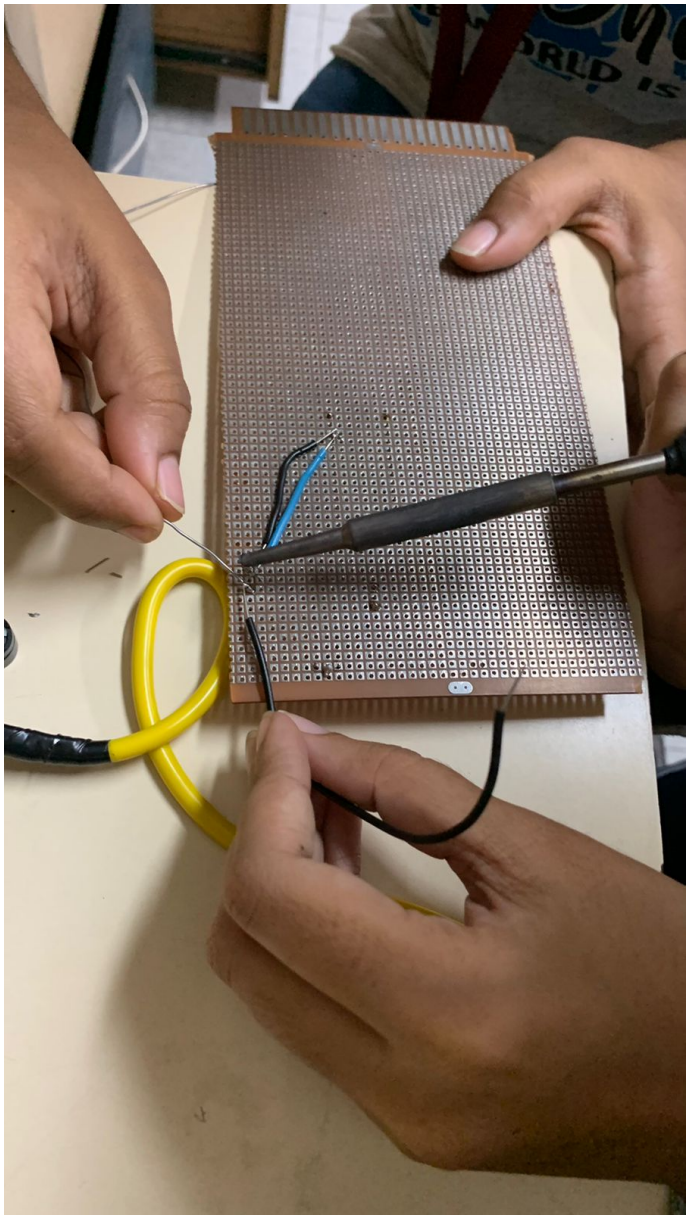

Figure 5.8: Soldering on PCB

5.2.5 Step 5

Taking the result part to be noted down making it in proper design model.

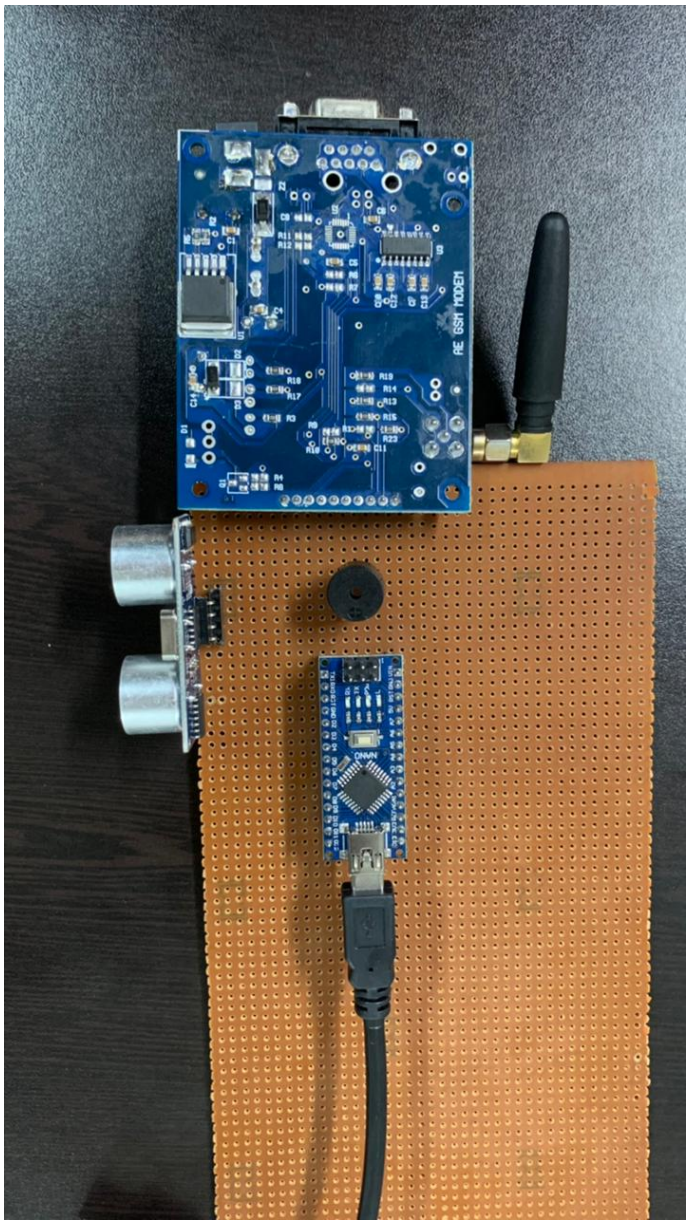

Figure 5.9: Final Layout

Chapter 6

RESULTS AND DISCUSSION

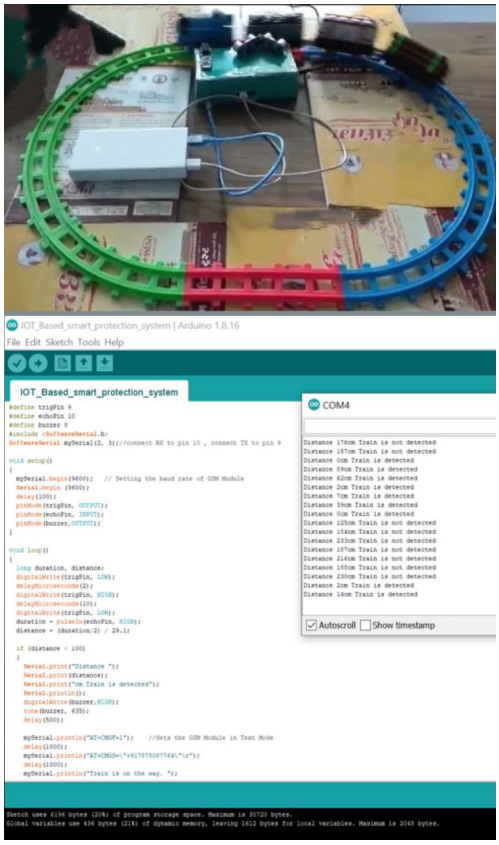

Figure 6.1: Final model of IOT based Smart Protection System

Discussion

Our IOT based smart protection system successfully executed with the help of Arduino IDE as a software and the physical components which we have used i.e. ultrasonic sensor, GSM module 900A, buzzer, Arduino Nano. So the system which we have designed is for the workers working on the track. In this we are placing the module on the pole beside the track which is 4-5m away from the track and we have placed the device at the similar height of train. While working on the hardware first we have done on breadboard and then after executing we have received the required results then we have done connections on PCB board and obtained the output.

Chapter 7

CONCLUSION

Safety is accorded the highest priority by Indian Railways and all possible steps are undertaken on a continual basis to prevent accidents and to enhance safety of all. This report has investigated the track worker protection technology characteristics and practices as demo and analysed these technologies for performance in demo as well as virtual manner. Differences in the track infrastructure, track working rules and procedures, plus geographic and environmental conditions are all factors for consideration in selecting a suitable type of technology for a specific rail network. The track worker protection technology analysis for the express railway.
In this project, our aim is to protect the railway worker which are working in the rail-track. For that we have referred various papers, articles and gone through different techniques. By using IOT based smart device for railway worker protection, it will have a great impact in the railway system as it will be good for the worker safety. This will greatly help to the worker to work without any fear about their safety.

Chapter 8

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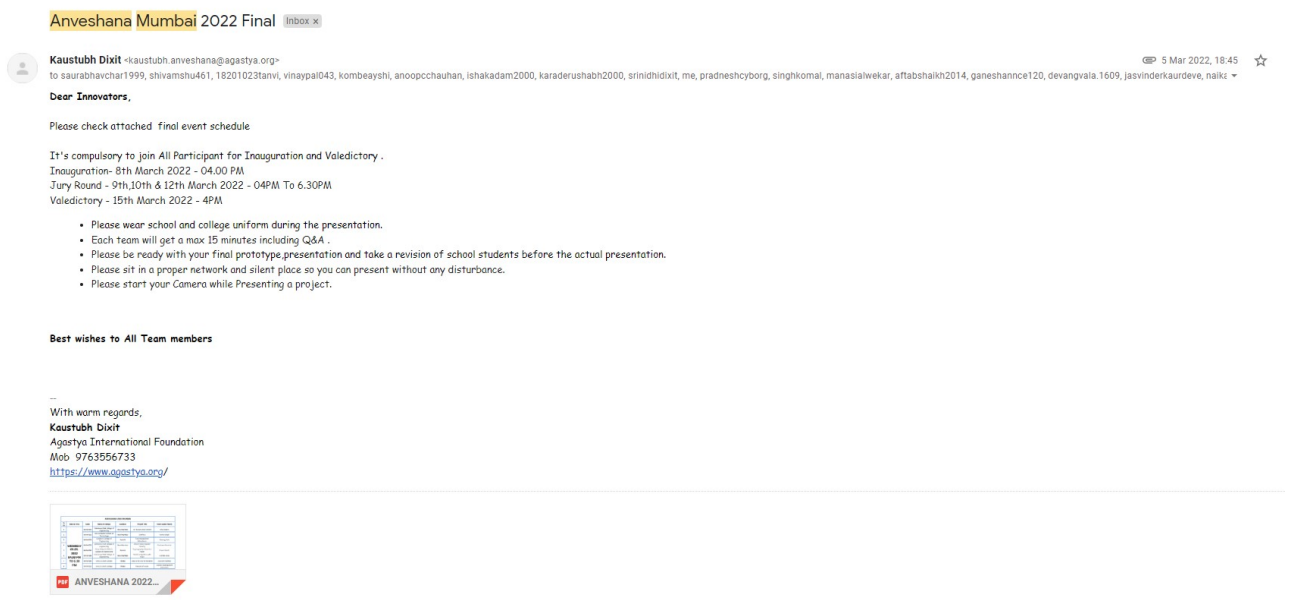
Chapter 9

CERTIFICATES

9.1 Anveshana Project Competition



Anveshana Mumbai 2022 Final Inbox x

Kaustubh Dixit <kaustubh.anveshana@agastya.org> 5 Mar 2022, 18:45

to saurabhavchar1999, shivamshu461, 18201023tanvi, vinaypal043, kombeayshi, anoopcchauhan, ishakadam2000, karaderushabh2000, srinidhidixit, me, pradneshcyborg, singhkomal, manasialwekar, aftabshaikh2014, ganeshannce120, devangvala.1609, jasvinderkaurdeve, naikz

Dear Innovators,

Please check attached final event schedule

It's compulsory to join All Participant for Inauguration and Valedictory .
Inauguration- 8th March 2022 - 04.00 PM
Jury Round - 9th,10th & 12th March 2022 - 04PM To 6.30PM
Valedictory - 15th March 2022 - 4PM

- Please wear school and college uniform during the presentation.
- Each team will get a max 15 minutes including Q&A .
- Please be ready with your final prototype,presentation and take a revision of school students before the actual presentation.
- Please sit in a proper network and silent place so you can present without any disturbance.
- Please start your Camera while Presenting a project.

Best wishes to All Team members

--
With warm regards,
Kaustubh Dixit
Agastya International Foundation
Mob 9763556733
https://www.agastya.org/

ANVESHANA 2022...

Figure 9.1: Anveshana Project Competition

9.2 Smart India Hackathon Project Competition

Figure 9.2: Smart India Hackathon Project Competition