

TRAIN DETECTING AND ALERT SYSTEM

Project ID - 23-302

Logbook

Amarasinghe C D
IT20187064

B.Sc. (Hons) Degree in Information Technology specializing in Cyber
Security

Sri Lanka Institute of Information Technology
Sri Lanka

November 2023

Table of Contents

1. Event Summary	3
2. Teams Meetings & Zoom Meetings	18
3. Communicating via WhatsApp	19
2. Component Codes	22
3. Github Screenshots	25
4. Acceptance Notifications.....	27
5. Gantt Chart	28

1. Event Summary

Week 01	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
10/11/2022	Brainstorming workshop conducted by RP team

Week 02	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
21/11/2022 – 27/11/2022	Reading research papers and finding research topics

Week 03	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
10/12/2022 – 15/12/2022	Searched for a member for the research group
16/12/2022	Found a member for the research group
16/12/2022	Created a WhatsApp group for the research with the group members

Week 04	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
19/12/2023 –	Requesting for supervisors

24/12/2023	
------------	--

Week 05	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
02/01/2023	Meeting with a supervisor to share the topic ideas of the research
02/01/2023	Supervisor acceptance of the request
02/01/2023	Finalizing the research topic with the supervisor
02/01/2023	Supervisor suggested more ideas to improve the scope of a research topic
02/01/2023	Supervisor introduced us a co-supervisor
02/01/2023	Shared the research topic idea with the co-supervisor

Week 06	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
09/01/2023-15/01/2023	Reading research papers related to the research topic

Week 07	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
20/01/2023	Discussing the scope of the research project and sharing the components with the team members via a WhatsApp call

Week 08	
----------------	--

Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
25/01/2023 – 27/01/2023	Completing the topic evaluation form
29/01/2023	Sharing the topic evaluation form to receive feedback from supervisor and co-supervisor

Week 09

Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
31/01/2023	Received feedback from co-supervisor for topic evaluation form
03/02/2023 – 05/02/2023	Updating the topic evaluation form based on the received feedback

Week 10

Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
12/02/2023	Submitted the topic evaluation form

Week 11

Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
02/03/2023	Physical meeting with the supervisor and the co-supervisor to update the current progress of the research project

Week 12

Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
13/03/2023 – 18/03/2023	Documenting proposal report

Week 13	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
23/03/2023	Meeting with the supervisor – to update progress and guidelines were given to prepare for proposal presentation
23/03/2023- 26/03/2023	Preparation for the proposal presentation

Week 14	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
27/03/2023	Sent the presentation slides to the co-supervisor
28/03/2023	Supervisor reviewed slides and provided comments on the presentation slides
28/03/2023	Preparation for proposal presentation (Group discussion)
29/03/2023	Proposal presentation

Week 15

Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
04/04/2023 – 08/04/2023	Worked on the Project Charter
09/04/2023	Project Charter Submission

Week 16	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
18/04/2023 – 20/04/2023	Collected the co-ordination data of railway crossings, roads, time schedules of trains
21/04/2023 – 24/04/2023	Developed the backend for the component
24/04/2023 – 26/04/2023	Bought the IoT devices for the research project

Week 17	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
28/04/2023 – 01/05/2023	Finalizing the proposal document
02/05/2023	Sharing the finalized proposal document too supervisor & co-supervisor
04/05/2023	Physical meeting with the co-supervisor. Received feedback from the co-supervisor about the finalized proposal document.
05/05/2023	Updating the proposal document based on feedback
05/05/2023	Submitting the final proposal document

Week 18	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
09/05/2023	Reading more research papers
10/05/2023 - 12/05/2023	Continued developed the OTP code

Week 19	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
15/05/2023 - 21/05/2023	Continued developed the OTP code
15/05/2023 - 21/05/2023	Testing the component and continued working on errors
18/05/2023	Physical meeting with the the co-supervisor to update the current progress of the research project

Week 20	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
22/05/2023	Group practicing sessions for PP1 Status Document 1 (Uploaded)
23/05/2023	Progress Presentation 1
25/05/2023	Physical meeting with the the co-supervisor to update about the progress presentation

Week 21	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
19/06/2023 – 25/06/2023	Writing the research paper

Week 22	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
28/06/2023	Sent the research paper to the co-supervisor
30/06/2023	Supervisor reviewed the research paper and provided comments

Week 23	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
03/07/2023	Meeting with the supervisor (Discussion on further improvements to be made on the research paper)
04/07/2023 – 09/07/2023	Continued working on the research paper as per the instructions received by the supervisor

Week 24	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
10/07/2023 – 15/07/2023	Completing and finalizing the research paper

13/07/2023	Updated the supervisor about the progress of the research.
16/07/2023	Submitted the research paper for supervisor for marking

Week 25	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
17/07/2023	Group meeting with the group members
20/07/2023 - 21/07/2023	Connected with the database and did the implementations of the firebase database
21/07/2023 – 23/07/2023	Update to firebase in authentication methods

Week 26	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
26/07/2023	Completed the finalized research paper after making the changes suggested by the supervisor
27/07/2023 – 30/07/2023	Continued the authentication on firebase

Week 27	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
31/07/2023 – 06/08/2023	Continued the authentication on firebase

Week 28	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
08/08/2023 – 12/08/2023	Continued the secure of mobile application

Week 29	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
15/08/2023 – 19/08/2023	Continued the secure of mobile application
17/08/2023	Physical meeting with the the co-supervisor to update the current progress of the research project

Week 30	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
21/08/2023	Continued the secure of mobile application
22/08/2023	
23/08/2023	
24/08/2023	Submitted the finalized research paper for CDAP cloud

Week 31	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
28/08/2023	Started writing the final report
29/08/2023	Checked and tested the component functionalities developed up to now
30/08/2023 - 02/09/2023	Fixing the encountered issues in the tested the component functionalities
03/09/2023	Created the PP2 Presentation & Preparing the demo

Week 32	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
04/09/2023	Conducted a practice session for PP2 with all the member
05/09/2023	Progress Presentation 2 Met the supervisor & the co-supervisor and updated about the comments received by the panel
06/09/2023 – 10/09/2023	Continued writing the final report

Week 33	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
11/09/2023	Submitted the final report to CDAP cloud

Week 34	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
22/09/2023	Visited railway crossings to test the system functions

Week 35	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
02/10/2023	Status Document 2 Submission

Week 36	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
09/10/2023 - 13/10/2023	Finalized the secure of IOT device in network connection
14/10/2023	Checked and tested the component functionalities developed up to now
15/10/2023	Fixing the encountered issues in the tested the component functionalities

Week 37	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
16/10/2023 - 22/10/2023	Started integrating the overall system

Week 38	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
23/10/2023	Started creating the website

Week 39	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
23/10/2023 – 27/10/2023	Tested the overall system
29/10/2023	Submission of the research paper for IRJIET.
Week 40	
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
30/10/2023	Testing the final overall system & preparing the final presentation
31/10/2023	Final Presentation
01/11/2023	Updated the feedback about the final presentation by the panel to the co-supervisor
01/11/2023	Updated the research paper based on IRJIET Panel Comments

Member	Component	Task
Biyanwila B.D.V.J	To develop a system that utilizes GSM trackers on trains and IoT devices at railway crossings to predict and alert potential blind spots on the train.	<ul style="list-style-type: none"> • To develop a GSM tracker that can transmit its location to the IoT device on the railway crossing. • To enhance the safety measures at railway crossings by developing an IoT device that can detect approaching trains and send an alert to nearby devices. • To integrate the IoT device and GSM tracker to establish a communication link to send an alert when a train approaches the crossing. To investigate the feasibility and effectiveness of using manual training of datasets to predict the location of a lost GSM tracker signal in the railway industry. • To evaluate the performance of the integrated system and its impact on improving the safety measures at railway crossings.

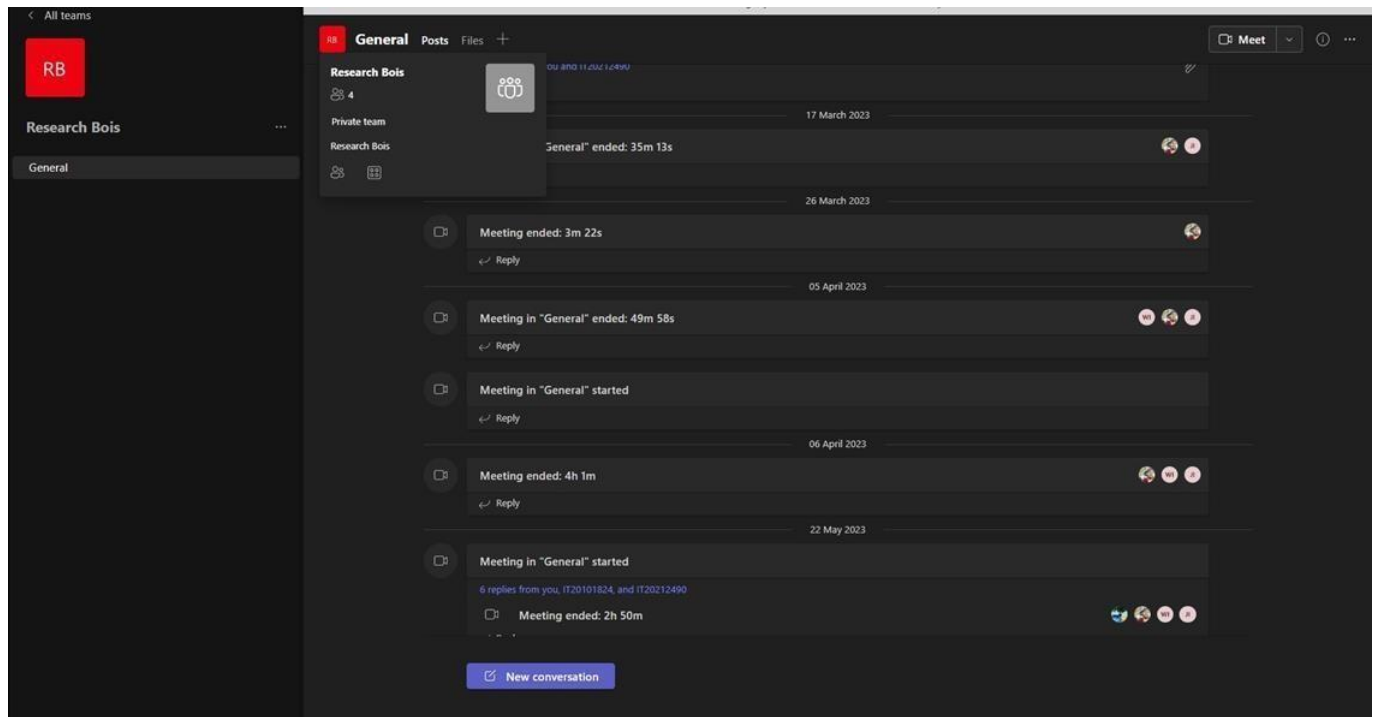
Jayanga B.M.C	Sending alerts to the users via the app and predicting the likelihood of crossing the railway-crossing on a given day.	<ul style="list-style-type: none"> • If only the mobile application user is moving towards the railway crossing, alert messages should be sent that the railway crossing is nearby. • Otherwise, if the mobile application user is not moving towards the railway crossing, alert messages should not be sent. • If the mobile application user crosses the railway crossing, the data should be collected to do the predictions. • Then should be predicted that vehicle is likely to cross the railway crossing or not.
Amarasinghe C.D	Security analysis for the Train Tracking System	<ul style="list-style-type: none"> • Gathering data required for the implementation of mobile security. This component needs dataset such as general mobile threats and problems occur due to lack of security in mobile applications. . • Using tools to ensure the safety of mobile applications such as penetration testing tools. • The mobile application uses personal information as the user needs to be a registered user. Encryption is used to

		<p>secure the password and the safety of the user data safety should be ensured within the mobile application.</p>
<p>Wijewardene L.L</p>	<p>Sending the flooded messages from the IOT device for the SIM users who are within a 1.5km radius</p>	<ul style="list-style-type: none"> • Gathering the data from the IOT Device • Provide accurate real-time alert for the user within the specific radius. • Flooding the alert among the users through the SIM. • Make the flooding alert fast as possible among all the user's within the radius.

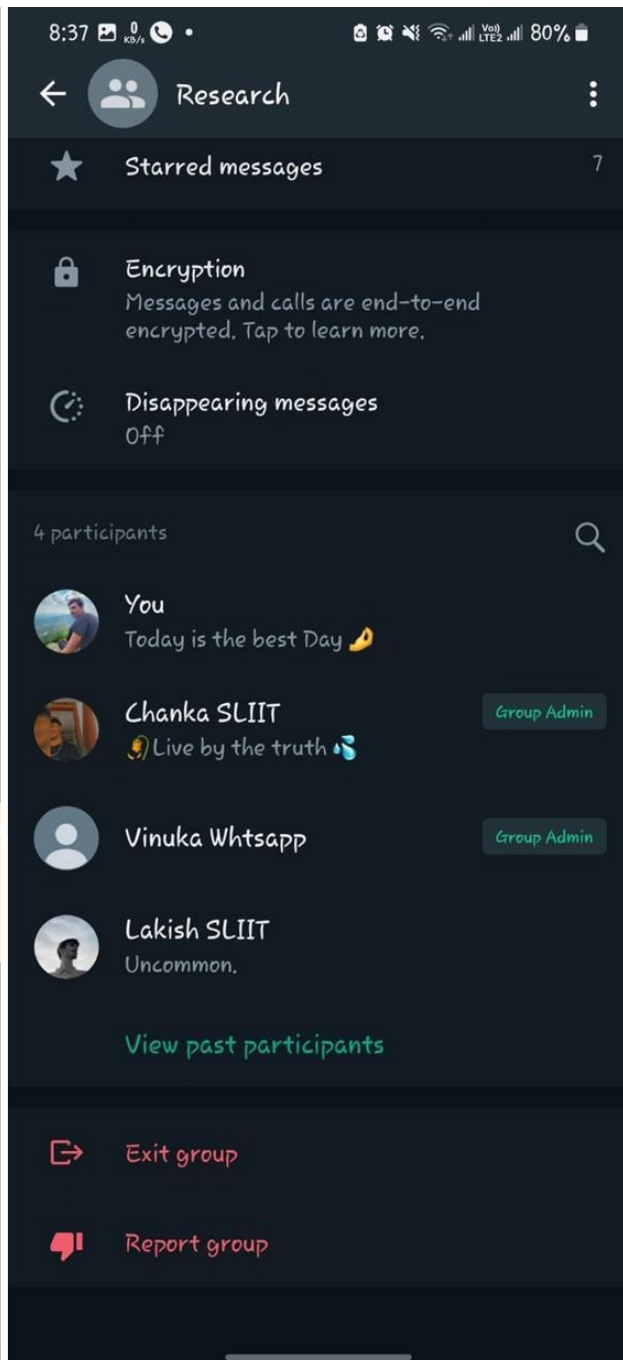
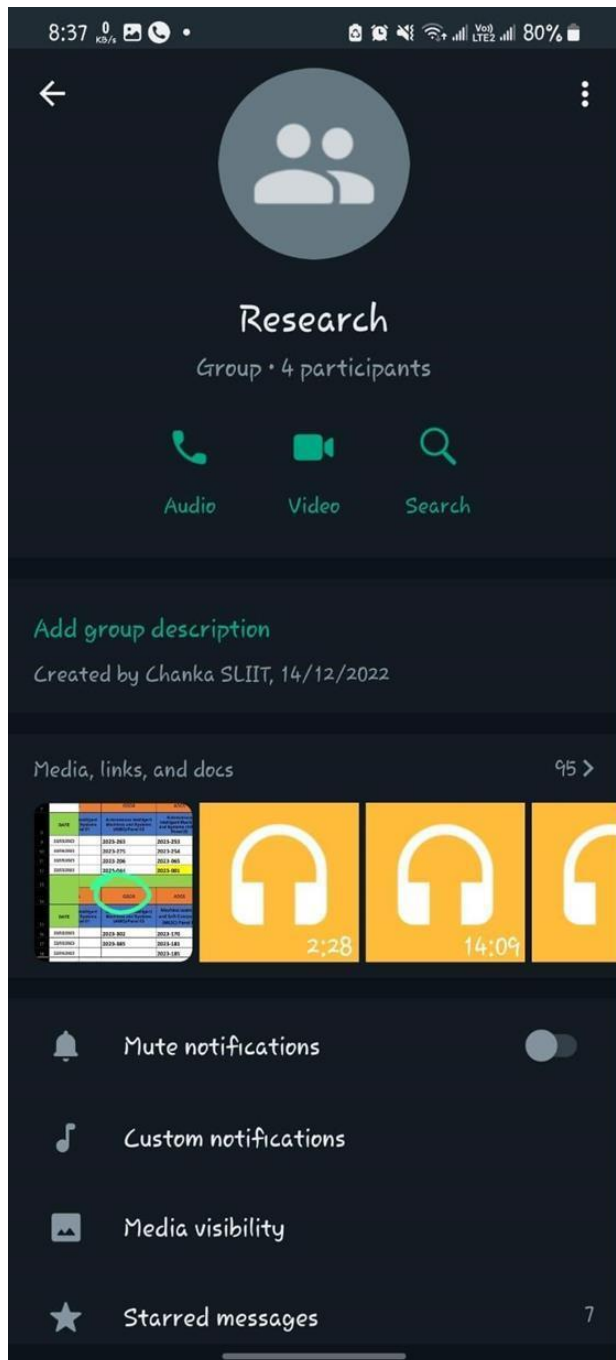
2. Teams Meetings & Zoom Meetings

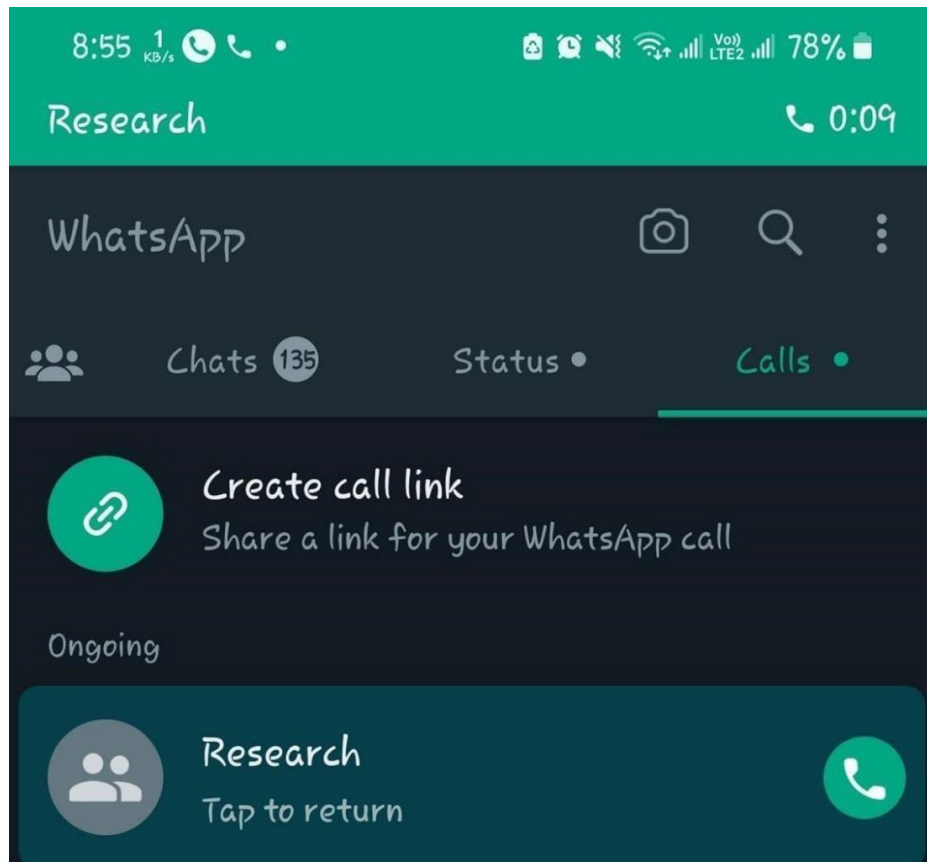
The screenshot shows a Zoom meeting window. The main content area displays the ICAC 2023 website. The website has a dark blue header with the ICAC 2023 logo and navigation links: HOME, FOR AUTHORS, WORKSHOPS, KEYNOTE SPEAKERS, COMMITTEE, EVENTS, PAST CONFERENCES, and PAPER. The main body of the website is divided into two columns. The left column has a green background and contains the text: "Researchers to showcase research output, network, and initiate collaborations. In addition, this year's conference is especially focused on how research in the field of computer science and information technology could strengthen economic sustainability in both local and global contexts." Below this is a section titled "Important Dates" with a list of events: Paper Submission (open) 1st June 2023, Paper Submission (close) 15th Aug 2023, Acceptance Notification 01st Oct 2023, Registration (open) 15th Oct 2023, Camera Ready Deadline 01st Nov 2023, and Registration (close) 01st Nov 2023. The right column has a white background and contains three sections: "Distributed and Parallel Computing" (Distributed algorithms, Distributed applications, High performance computing, Parallel computing, Distributed routing, Distributed processing), "Information Systems" (IS in Practice, Technology Infrastructures and Organizational Processes, Design and Development Methodologies and Frameworks, Risk Management, Innovation and Knowledge Management), and "Human Computer Interaction" (Haptics and multisensory applications, Augmented / Mixed Reality, User interface engineering, Interaction paradigms, Human-centred). At the bottom of the website is a colorful illustration of a city skyline with a Buddha statue in the foreground. The Zoom meeting interface is visible at the bottom, showing a toolbar with buttons for Unmute, Start Video, Participants, Chat, Share Screen, Record, Reactions, Apps, Whiteboards, and a Leave button. On the right side of the Zoom window, there is a list of participants: Chashira Jayanga, Lochana Rajamanthri, Dr. Shanta Rajapaksha Yapa, IT 20212490, pranavan Theiv..., pranavan Theivendran, and IT20162764 - L...

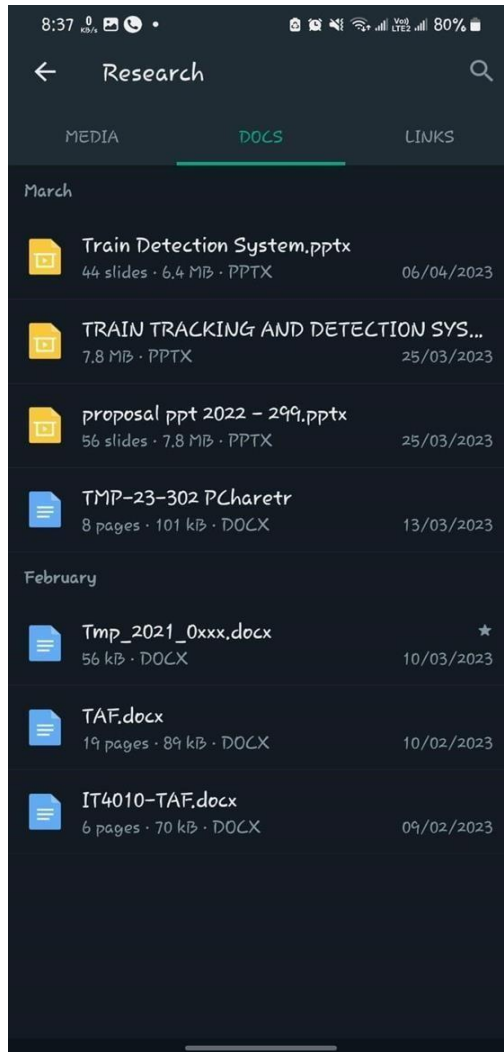
The screenshot shows a Microsoft Teams chat window. The left sidebar contains navigation icons for Activity, Chat, Teams, Assignments, Calendar, Calls, Files, and Apps. The main area displays a conversation in the 'General' channel. The conversation history shows several messages: a meeting in 'General' ended at 1m 52s on 12 January 2023; a meeting in 'General' started on 09 February 2023 with 3 replies; a message from Wijewardene L.L. #20101824 on 10 February 2023 at 10:02:12:52 am with a file attachment 'IT4010-TAF.docx'; a meeting in 'General' started on 10 February 2023 with 8 replies; a meeting in 'General' ended at 35m 13s on 17 March 2023; and a meeting ended at 3m 22s on 26 March 2023. At the bottom of the chat area is a 'New conversation' button. The right sidebar shows the 'About' section for the 'Research Bois' team, including a list of members (4) and recently contributed members: Biyanwila B.D.V.J. #20212490, Wijewardene L.L. #20101824, Jayanga B.M.C. #20188672, and Amarasinghe C.D. #20187064. Below the members list is a section for 'Apps (9)' and 'Updates'.



3. Communicating via WhatsApp







2. Component Codes

```

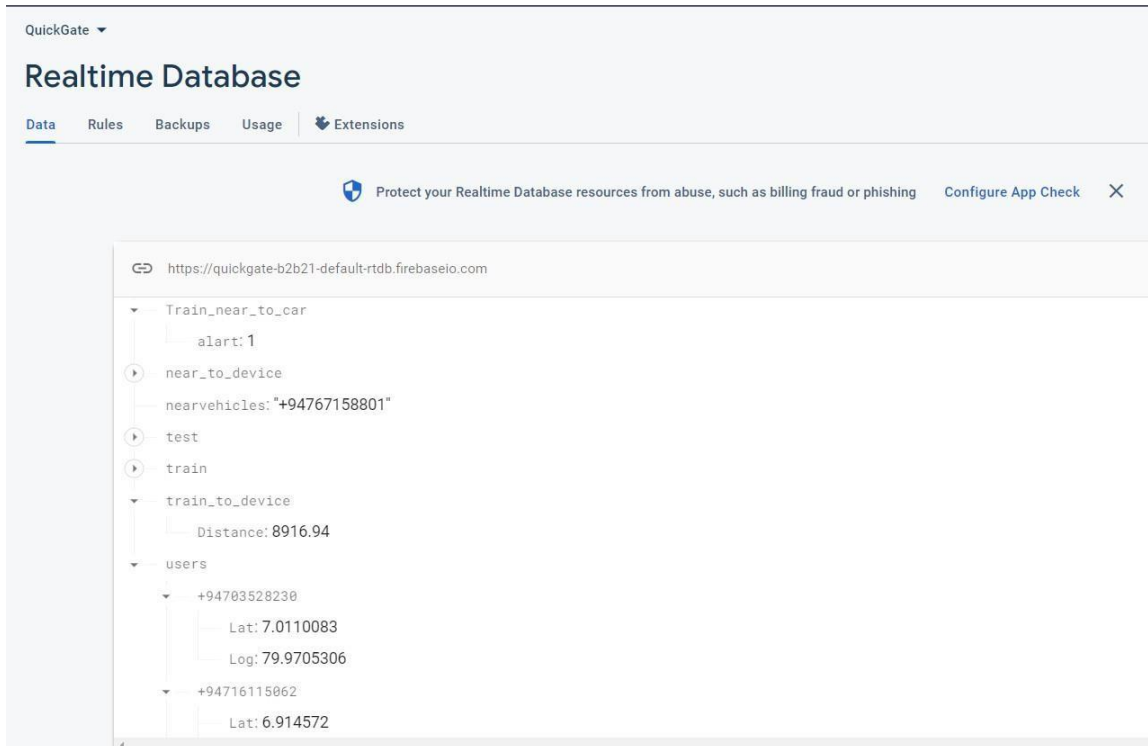
83 def is_user_within_range(user_location, center, radius_km=2):
84     return distance.distance(center, user_location).km <= radius_km
85
86 def is_user_within_range_500(user_location, center, radius_km=1):
87     return distance.distance(center, user_location).km <= radius_km
88
89 def check_user_distance(lat,lon,vid):
90
91     user_point = Point(lat, lon)
92
93     if is_user_within_range(user_point, center):
94         if is_user_passing_road(user_point, roads):
95             db.child("Train_near_to_car").child("alarm").set(1)
96             db.child("nearvehicles").set(vid)
97             print(f"User at {user_point} is passing the road point")
98         else:
99             print(f"User at {user_point} is not passing the road point")
100
101         mg = "WARNING : A railway crossing is nearby within 1km"
102         return mg
103     elif is_user_within_range_500(user_point, center):
104         if is_user_passing_road(user_point, roads):
105             db.child("Train_near_to_car").child("alarm").set(1)
106             db.child("nearvehicles").set(vid)
107             print(f"User at {user_point} is passing the road point")
108         else:
109             print(f"User at {user_point} is not passing the road point")
110
111         mg = "WARNING : A railway crossing is nearby within 500 m"
112         return mg
113     else:
114         mg = "User is outside the 2km range"
115         return mg
116
117 def timeCheck():
118     # Get the current time
119     current_time = datetime.datetime.now()
120     current_hour = current_time.hour
121
122     # Define your criteria for morning, evening, and night
123     morning_start = 6 # 6:00 AM
124     evening_start = 18 # 6:00 PM
125     night_start = 0 # 12:00 AM (midnight)
126
127     if morning_start <= current_hour < evening_start:
128         time_of_day = "morning"
129     elif evening_start <= current_hour < night_start:
130         time_of_day = "evening"
131     else:
132         time_of_day = "night"
133
134     return time_of_day

```

```

137 def stream_handler(message):
138     print(message["event"]) # put
139     if message["event"] == "put":
140         try:
141             pathtype = message["path"]
142             parts = pathtype.split('/')
143             variable1 = parts[1]
144             variable2 = parts[2]
145             if variable2 == "Lat":
146                 datauser = db.child("users").child(variable1).get().val()
147                 print(datauser["Lat"])
148                 print(datauser["Log"])
149                 msg = check_user_distance(datauser["Lat"],datauser["Log"],variable1)
150                 datauser = db.child("users").child(variable1).child("distance").set(msg)
151             if variable2 == "Log":
152                 datauser = db.child("users").child(variable1).get().val()
153                 print(datauser["Lat"])
154                 print(datauser["Log"])
155                 msg = check_user_distance(datauser["Lat"],datauser["Log"],variable1)
156                 datauser = db.child("users").child(variable1).child("distance").set(msg)
157             if "chek" == message["data"]:
158                 tod = timeCheck();
159                 vehicle_prediction_endpoint(variable1,tod)
160         except:
161             print("")
162         # xy = message["data"]
163     vehicle_prediction_model = joblib.load('vehicle_prediction_model.pkl')
164     loaded_encoder = joblib.load("label_encoder.pkl")
165
166 def vehicle_prediction_endpoint(Id: int,tod : str):
167     ID = Id
168     time_of_day =tod
169
170     new_data = {'ID': [ID], 'Time of Day': [time_of_day]}
171
172     new_df = pd.DataFrame(new_data)
173
174     new_df['Time of Day'] = loaded_encoder.transform(new_df['Time of Day'])
175
176     prediction = vehicle_prediction_model.predict(new_df[['ID', 'Time of Day']])
177
178     return {"Prediction": prediction[0]}
179
180 my_stream = db.child("users").stream(stream_handler)

```

3. Github Screenshots



[Projects](#)
[Groups](#)
[More](#)

TRAIN DETECTION AND ALERT SYSTEM

[Project overview](#)
[Details](#)
[Activity](#)
[Releases](#)

[Repository](#)
[Issues](#)
[Merge Requests](#)
[CI / CD](#)
[Operations](#)
[Analytics](#)
[Wiki](#)
[Snippets](#)
[Members](#)

TRAIN DETECTION AND ALERT SYSTEM

23 332

TRAIN DETECTION AND ALERT SYSTEM

Details

TRAIN DETECTION AND ALERT SYSTEM

Project ID: 2157

2 Commits
5 Branches
0 Tags
123 KB Files

Develop an IOT Device to alert when train come near to the Railway crossing. (Development of an IoT Device and GSM Tracker System for Enhancing Safety Measures at Railway Crossings and Predicting the Location of a Lost Signal)

master

train-detection-and-alert-system

History

Find file

Web IDE

Clone

Update README.md

Viruka Jayarathen authored 1 week ago

README

No license. All rights reserved

Auto DevOps enabled

Name	Last commit	Last update
README.md	Update README.md	1 week ago

TRAIN DETECTION AND ALERT SYSTEM

Main Objective is to PROVIDE AN IT-BASED SOLUTION (MOBILE APPLICATION) TO ADDRESS THE SAFETY OF THE CITIZEN IN SRI LANKA FROM THE RAILWAY — CROSSINGS COLLISIONS.

Main Research Question Citizens have to face collisions at the railway-crossings due to many reasons, unfortunately.

Individual research questions are,

Biyaniwila B.D.V.L - Lack of accurate and efficient to determine the impact of real-time alerts on passenger safety and satisfaction.

Jayanga B.M.C. - So many collisions because lack of applications to alert citizens who cross railway crossings.

Amarasinghe C.D. - There are many problems which occur in railways as there are no proper system implemented for the railways in Sri Lanka.

Wijewardene L.L - So many collisions because of lack of real-time flooding alerting systems near railway crossings.

Individual Objectives are,

Biyaniwila B.D.V.L - To develop a system that utilizes GSM trackers on trains and IoT devices at railway crossings to predict and alert potential blind spots on the train.

Jayanga B.M.C. - Analyse the past patterns of vehicles and predict if they are likely to cross the railway crossing on a given day.

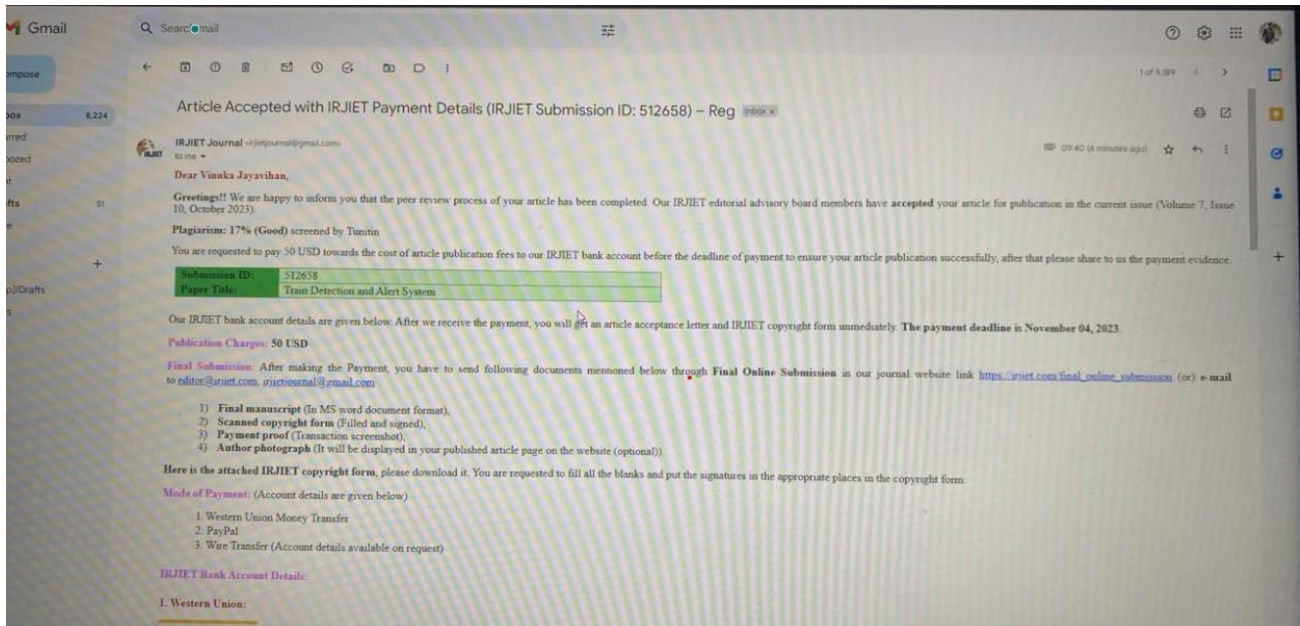
Amarasinghe C.D. - To develop a system to provide the security for the mobile application.

Wijewardene L.L - Sending the flooded messages from the IoT device for the SIM users who are within a 1.5km radius.

26

4. Acceptance Notifications

➤ IRJIET – 9 H index



5. Gantt Chart

