TRAIN DETECTING AND ALERT SYSTEM

Project ID - 23-302

Logbook

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B.Sc. (Hons) Degree in Information Technology specializing in Data Science

Sri Lanka Institute of Information Technology
Sri Lanka

November 2023

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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 backend for the component

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 backend for the component
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	Continued the backend implementation of the component

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 backend implementation

Week 27	
Date	**Details and notes of work carried out, problems encounter, solutions provided & research journey**
31/07/2023 – 06/08/2023	Continued the backend implementation and started developing the mobile application

Week 28	
Date	**Details and notes of work carried out, problems encounter, solutions provided & research journey**
08/08/2023 – 12/08/2023	Continued the backend implementation and continued developing the 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 backend implementation and continued developing the 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 backend implementation and continued developing the 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	Continued the backend implementation and continued developing the mobile application. Integrate
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

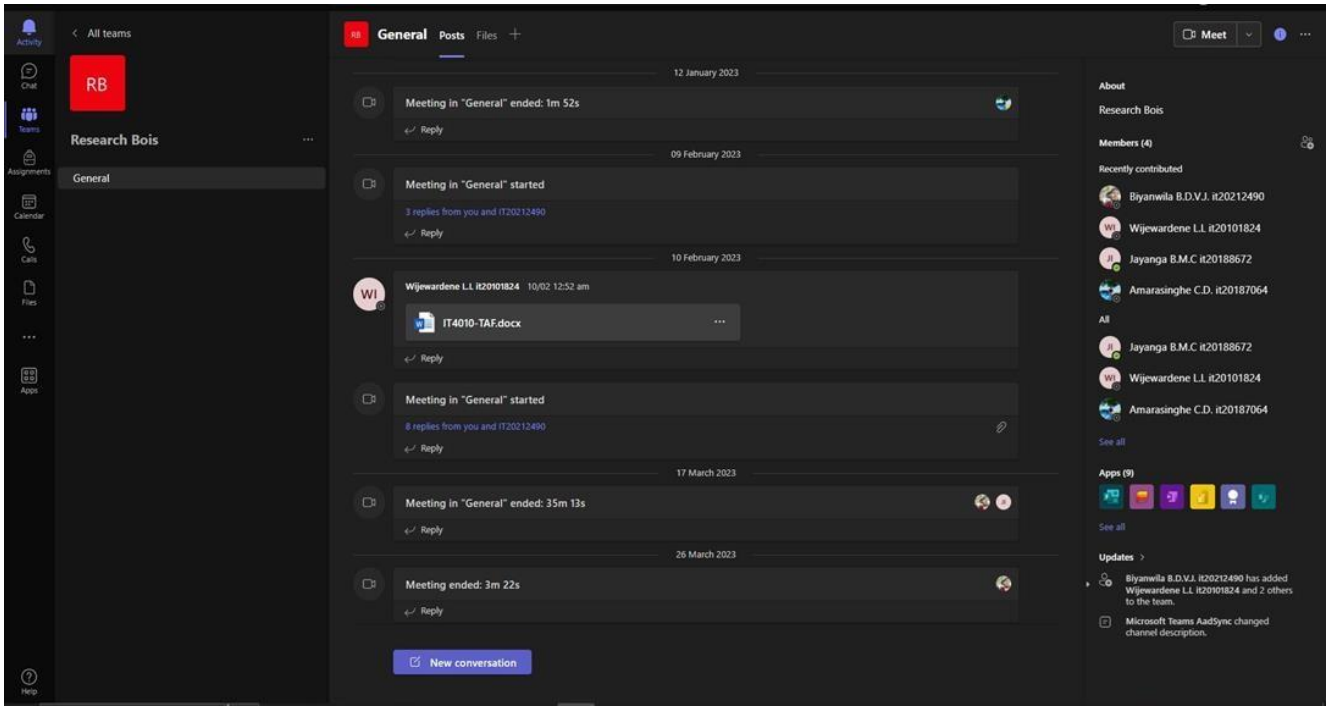
Date	Details and notes of work carried out, problems encounter, solutions provided & research journey
30/10/2023	Testing the final overall system & preparing the final presentation
31/10/2023	Final Presentation
01/11/2023	Updated the feedback about the final presentation by the panel to the co-supervisor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

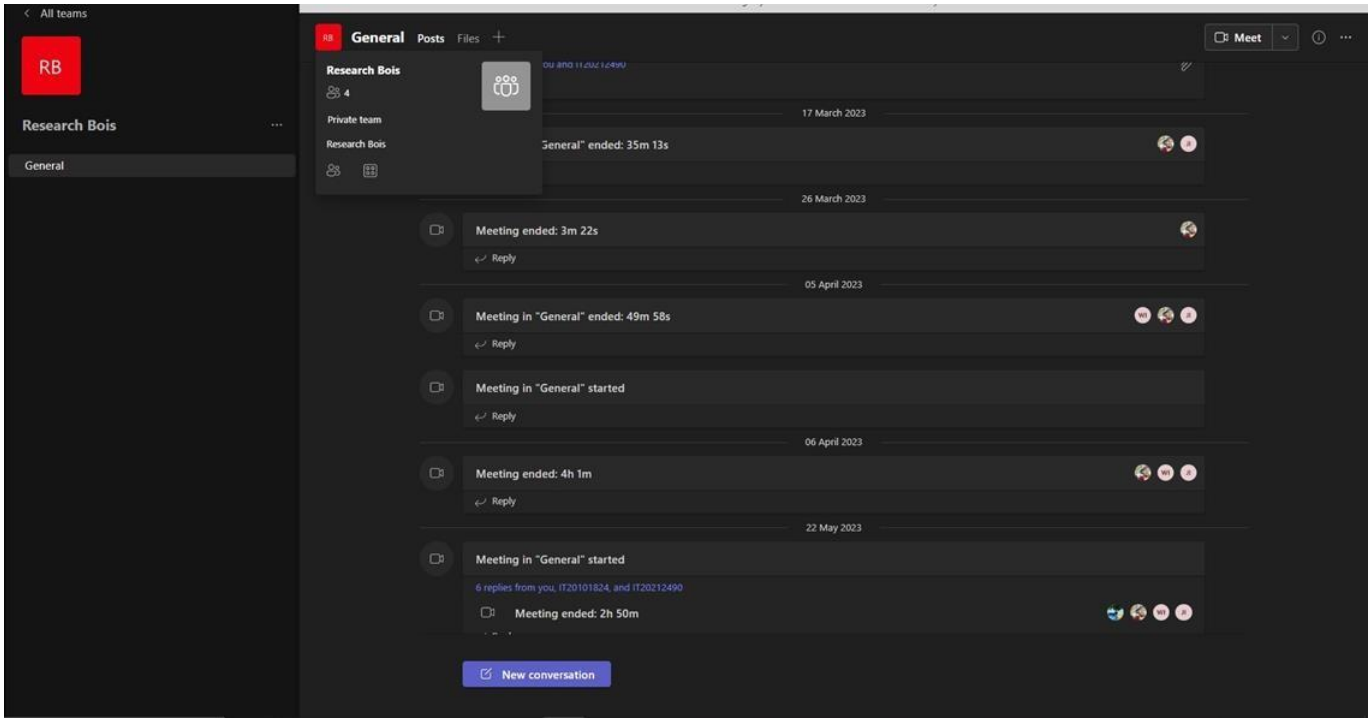
Member	Component	Task
Biyanwila B.D.V.J	To develop a system that utilizes GSM trackers on trains and IoT devices at railway crossings to predict and alert potential blind spots on the train.	• To develop a GSM tracker that can transmit its location to the IoT device on the railway crossing. • To enhance 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.	• 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	• 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

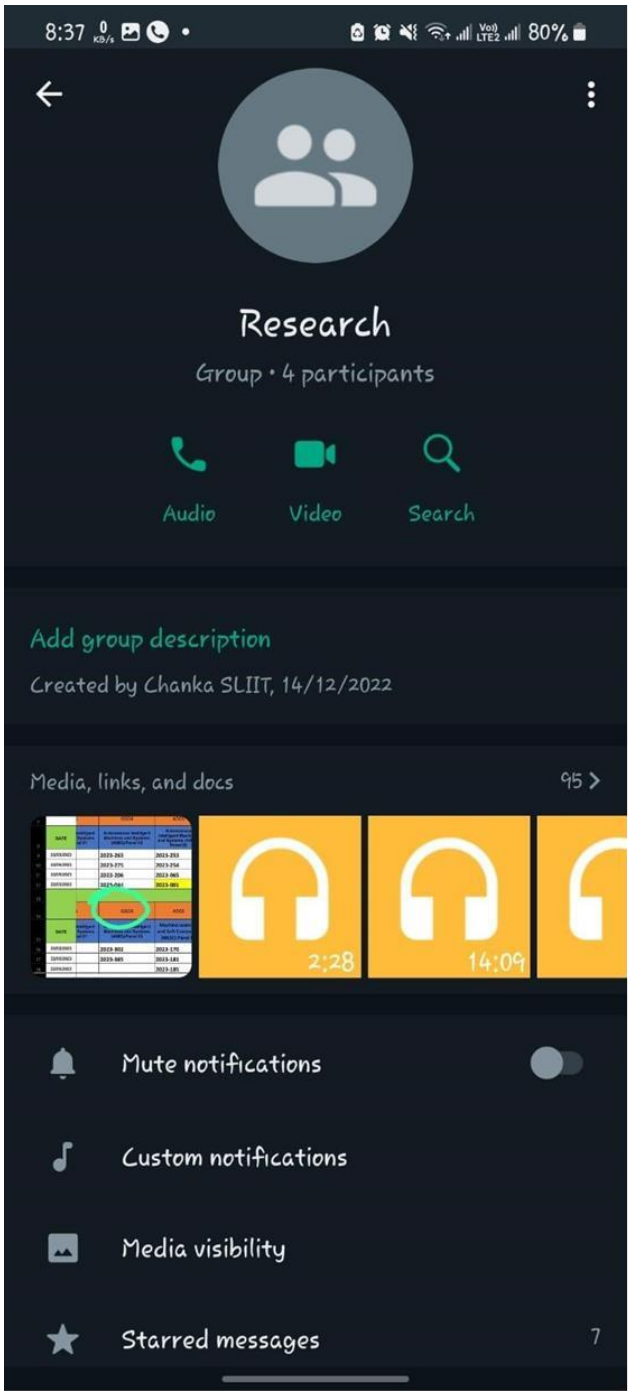
		secure the password and the safety of the user data safety should be ensured within the mobile application.
Wijewardene L.L	Sending the flooded messages from the IOT device for the SIM users who are within a 1.5km radius	• Gathering the data from the IOT Device • Provide accurate real-time alert for 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.

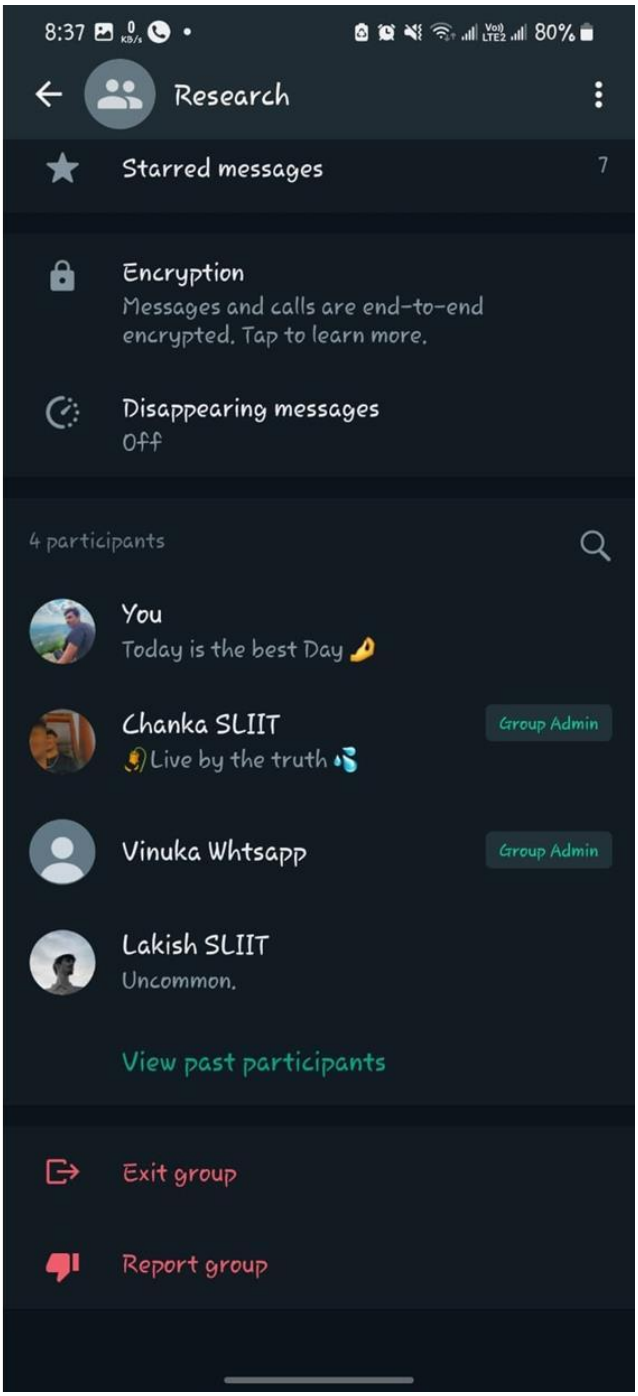
2. Teams Meetings & Zoom Meetings

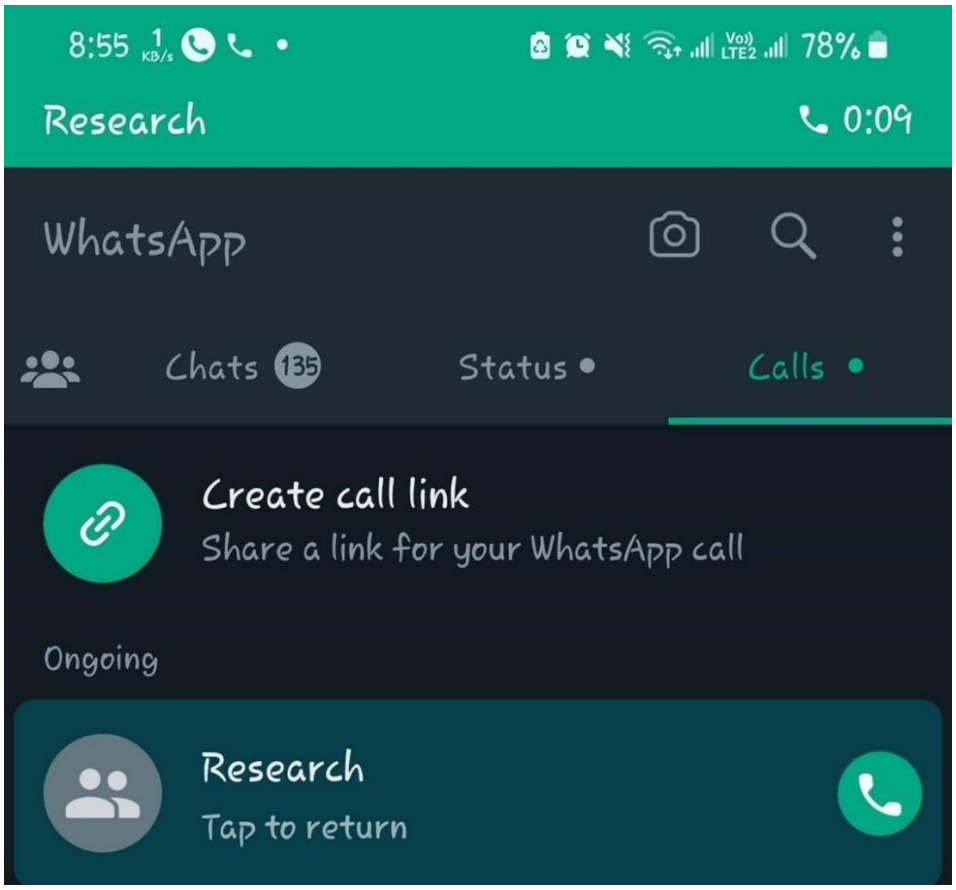


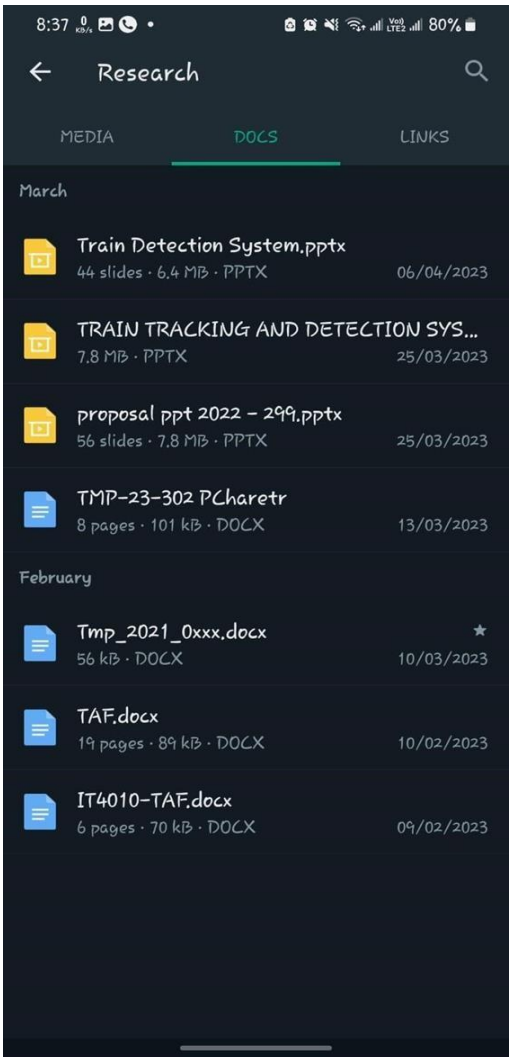


3. Communicating via WhatsApp


8:37
80%
Research
Group • 4 participants
Audio
Video
Search
Add group description
Created by Chanka SLIIT, 14/12/2022
Media, links, and docs
95
2:28
14:09
Mute notifications
Custom notifications
Media visibility
Starred messages
7


8:37
80%
Research
Starred messages
7
Encryption
Messages and calls are end-to-end encrypted. Tap to learn more.
Disappearing messages
Off
4 participants
You
Today is the best Day
Chanka SLIIT
Group Admin
Live by the truth
Vinuka Whtsapp
Group Admin
Lakish SLIIT
Uncommon.
View past participants
Exit group
Report group

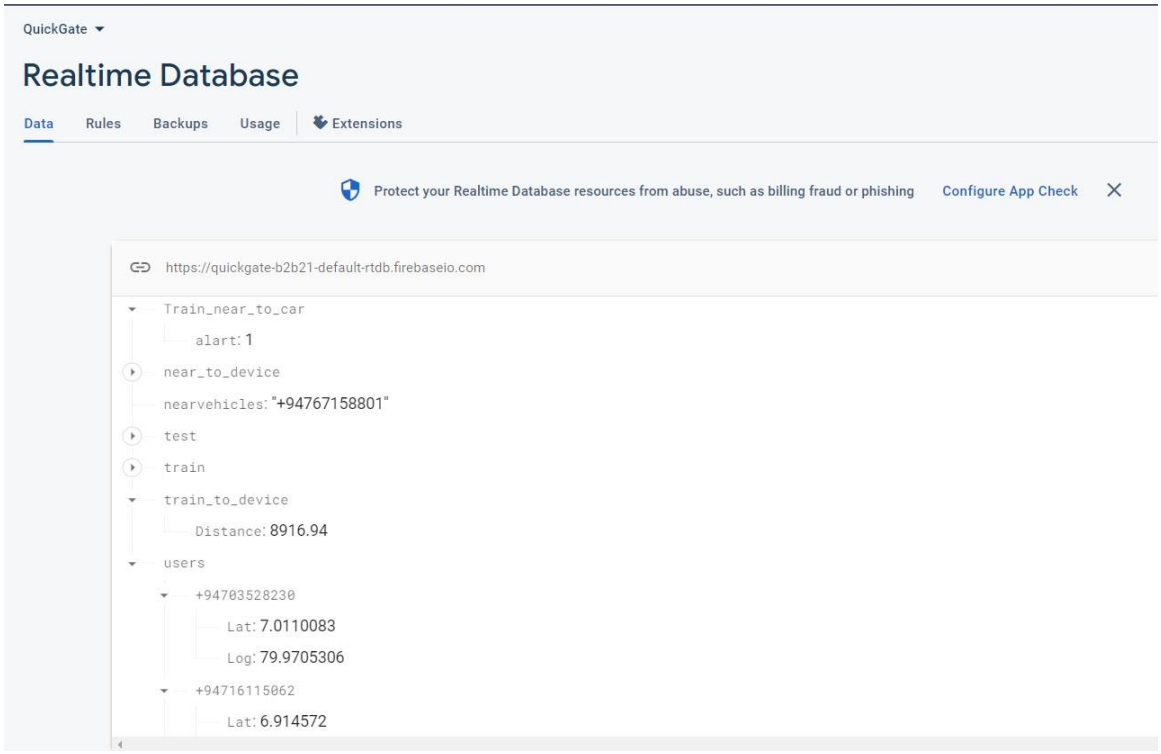

8:55
78%
Research
0:09
WhatsApp
Chats 135
Status
Calls
Create call link
Share a link for your WhatsApp call
Ongoing
Research
Tap to return



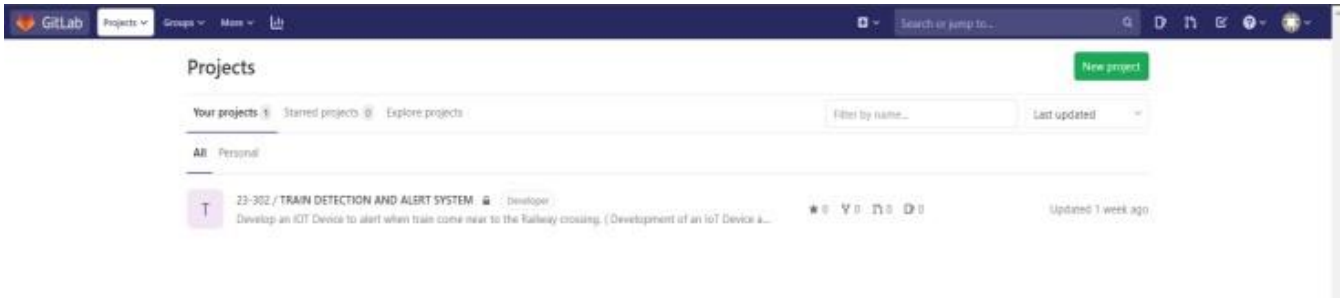
2. Component Codes

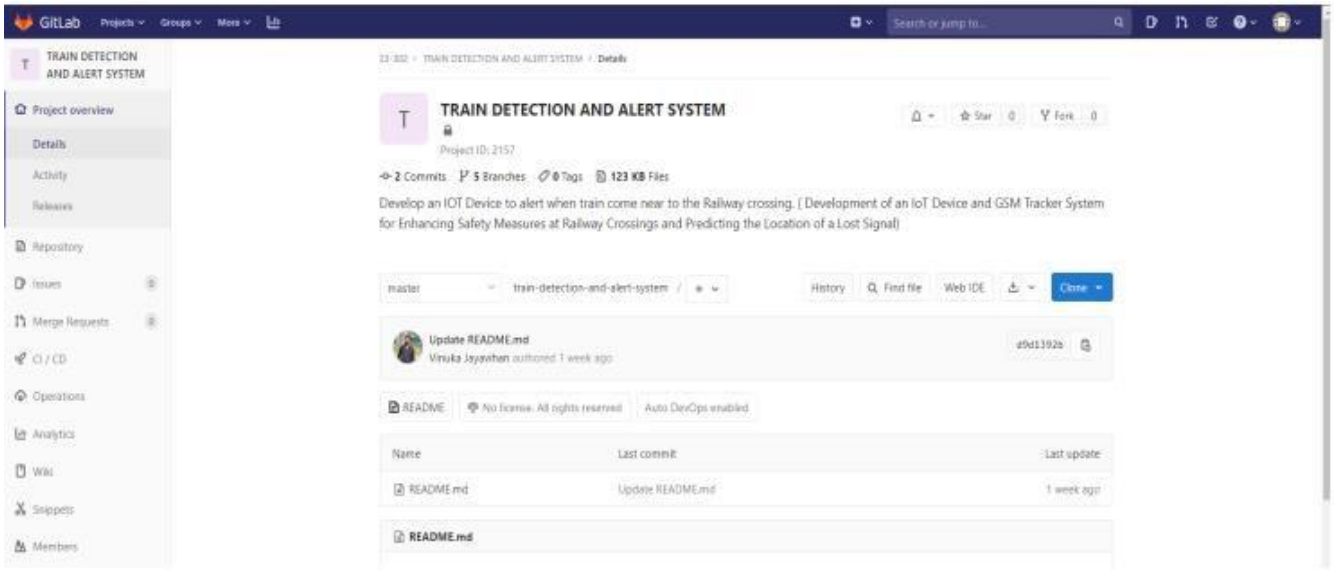
```python
def is_user_within_range(user_location, center, radius_km=2):
    return distance.distance(center, user_location).km <= radius_km

def is_user_within_range_500(user_location, center, radius_km=1):
    return distance.distance(center, user_location).km <= radius_km

def check_user_distance(lat,lon,vid):

    user_point = Point(lat, lon)

    if is_user_within_range(user_point, center):
        if is_user_passing_road(user_point, roads):
            db.child("Train_near_to_car").child("alart").set(1)
            db.child("nearvehicles").set(vid)
            print(f"User at {user_point} is passing the road point")
        else:
            print(f"User at {user_point} is not passing the road point")

        mg = "WARNING : A railway crossing is nearby within 1km"
        return mg
    elif is_user_within_range_500(user_point, center):
        if is_user_passing_road(user_point, roads):
            db.child("Train_near_to_car").child("alart").set(1)
            db.child("nearvehicles").set(vid)
            print(f"User at {user_point} is passing the road point")
        else:
            print(f"User at {user_point} is not passing the road point")

        mg = "WARNING : A railway crossing is nearby within 500 m"
        return mg
    else:
        mg = "User  is outside the 2km range"
        return mg

def timeCheck():
    # Get the current time
    current_time = datetime.datetime.now()
    current_hour = current_time.hour

    # Define your criteria for morning, evening, and night
    morning_start = 6  # 6:00 AM
    evening_start = 18  # 6:00 PM
    night_start = 0  # 12:00 AM (midnight)

    if morning_start <= current_hour < evening_start:
        time_of_day = "morning"
    elif evening_start <= current_hour < night_start:
        time_of_day = "evening"
    else:
        time_of_day = "night"

    return time_of_day
```

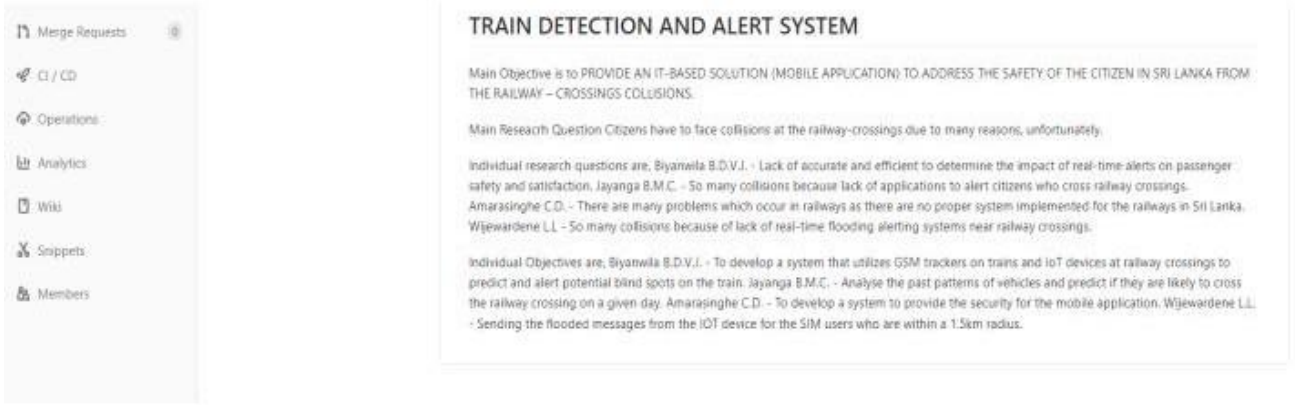
```python
def stream_handler(message):
    print(message["event"]) # put
    if message["event"] == "put":
        try:
            pathtype = message["path"]
            parts = pathtype.split('/')
            variable1 = parts[1]
            variable2 = parts[2]
            if variable2 == "Lat":
                datauser = db.child("users").child(variable1).get().val()
                print(datauser["Lat"])
                print(datauser["Log"])
                msg = check_user_distance(datauser["Lat"],datauser["Log"],variable1)
                datauser = db.child("users").child(variable1).child("distance").set(msg)
            if variable2 == "Log":
                datauser = db.child("users").child(variable1).get().val()
                print(datauser["Lat"])
                print(datauser["Log"])
                msg = check_user_distance(datauser["Lat"],datauser["Log"],variable1)
                datauser = db.child("users").child(variable1).child("distance").set(msg)
            if "chek" ==  message["data"]:
                tod = timeCheck();
                vehicle_prediction_endpoint(variable1,tod)
        except:
            print("")
    # xy = message["data"]
vehicle_prediction_model = joblib.load('vehicle_prediction_model.pkl')
loaded_encoder = joblib.load("label_encoder.pkl")

def vehicle_prediction_endpoint(Id: int,tod : str):
    ID = Id
    time_of_day =tod

    new_data = {'ID': [ID], 'Time of Day': [time_of_day]}

    new_df = pd.DataFrame(new_data)

    new_df['Time of Day'] = loaded_encoder.transform(new_df['Time of Day'])

    prediction = vehicle_prediction_model.predict(new_df[['ID', 'Time of Day']])

    return {"Prediction": prediction[0]}

my_stream = db.child("users").stream(stream_handler)
```



3. Github Screenshots




GitLab
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
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
Vinuka Jayawhan 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
README.md


Merge Requests
CI / CD
Operations
Analytics
Wiki
Snippets
Members
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, Biyanwila B.D.V.J. - 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, 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. 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.

4. Acceptance Notifications

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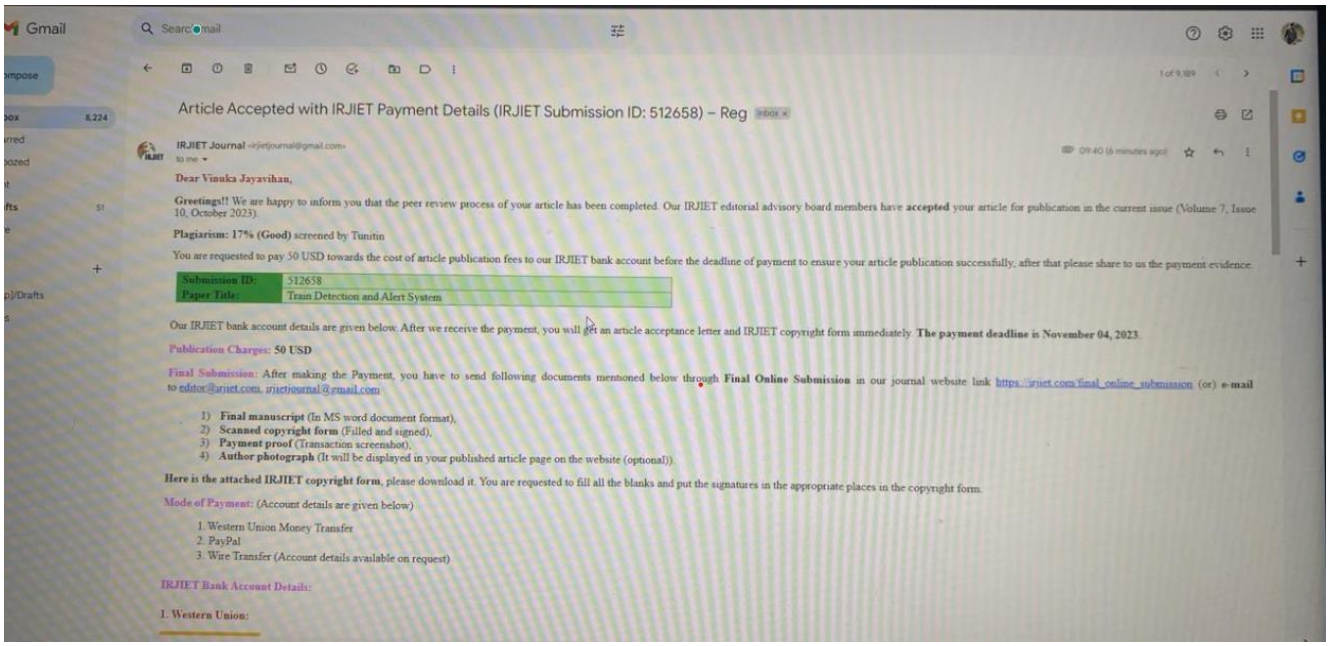

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