AI-Powered Solutions for Breakdown Challenges with Electric Vehicles

CONVERSATIONAL CHATBOT FOR EV ASSISTANCE

Project Id: 2023-24-117

IT20096434 – PERERA B.N.H.

Status Document II

BSc (Hons) in Information Technology Specializing in Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology Sri Lanka

Table of Contents

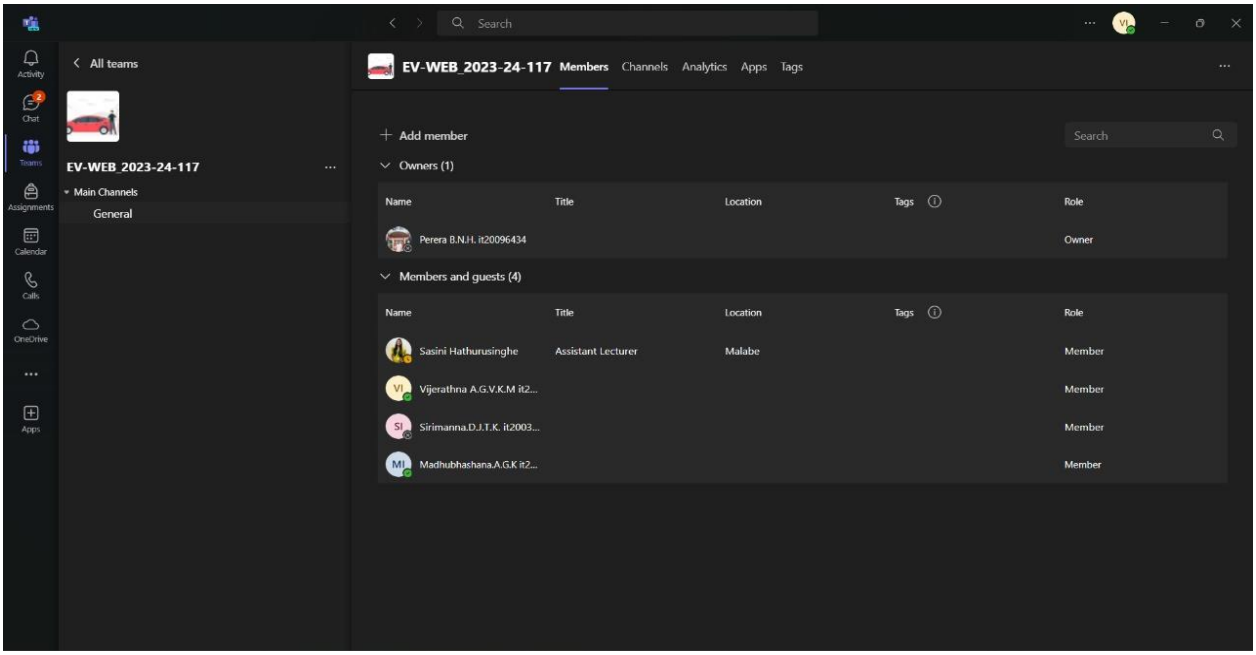
1. Group Gatherings

1.1 Meetings with Supervisor

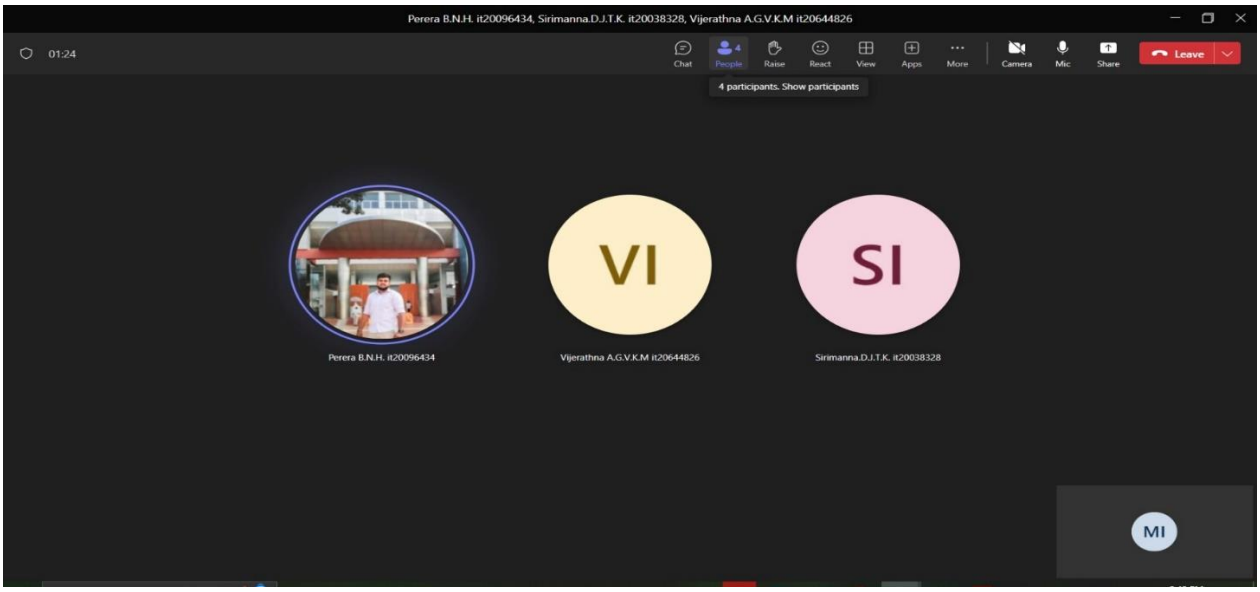
1.2 Group Members

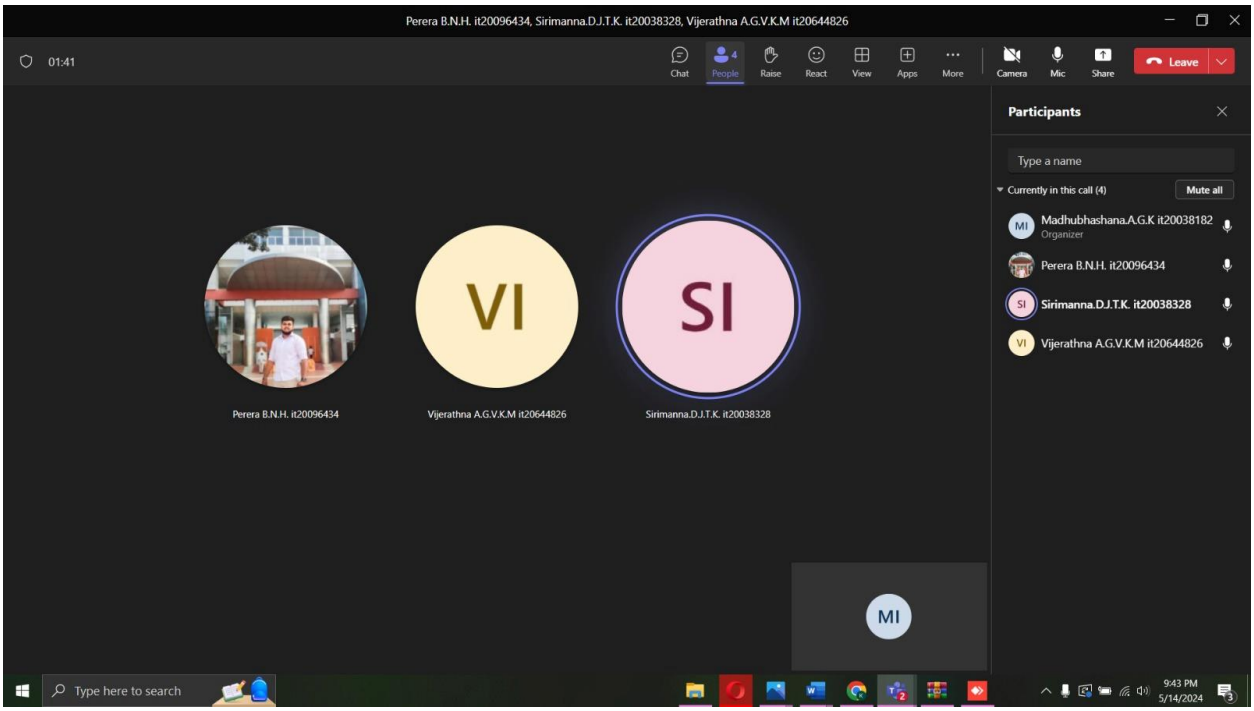
2. MS Teams Details

2.1 Team and Team Members

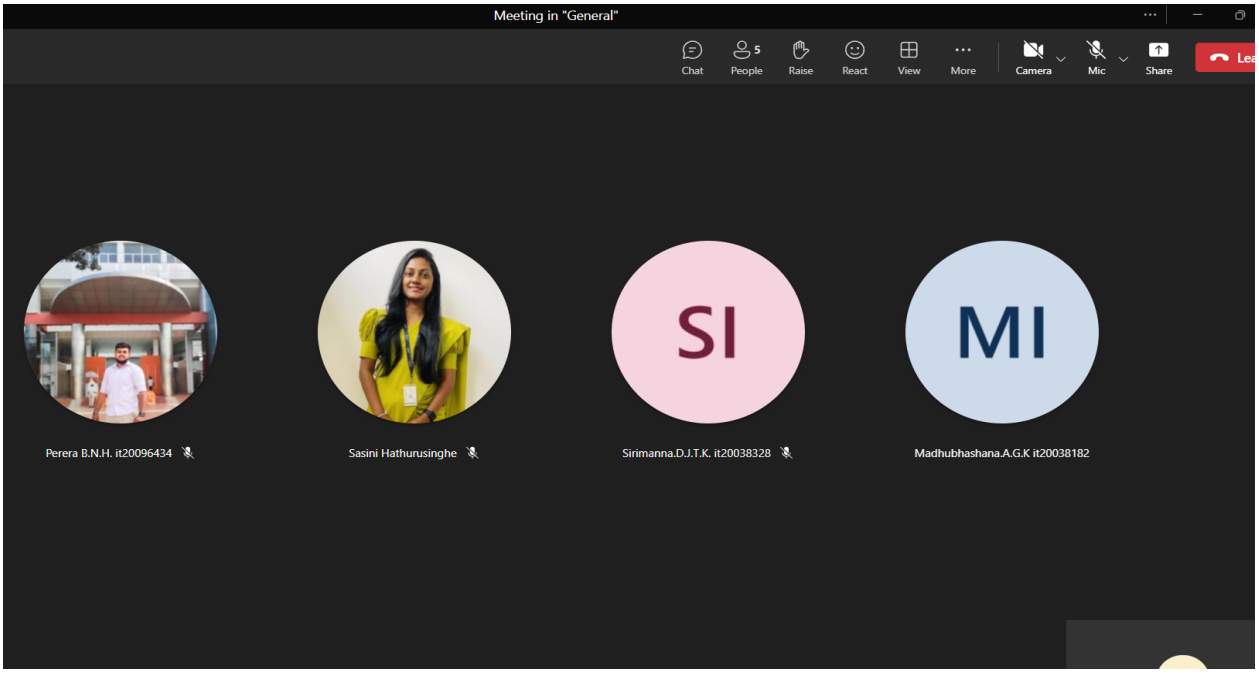


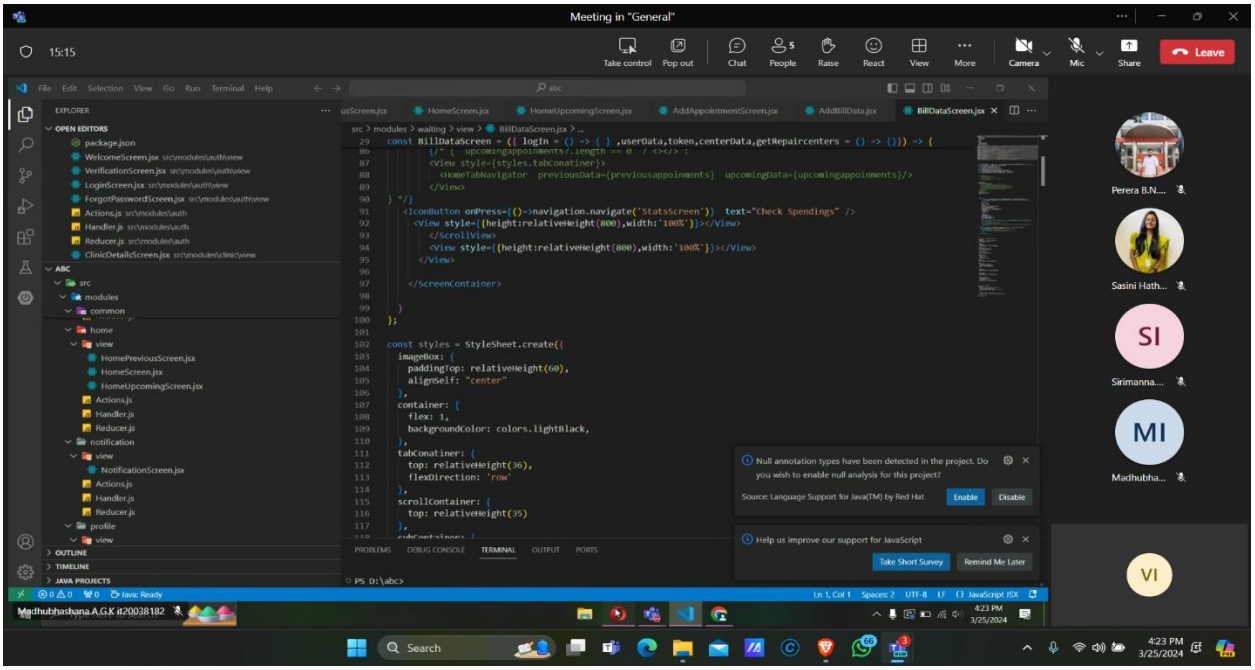
2.2 Teams Calls with Research Team



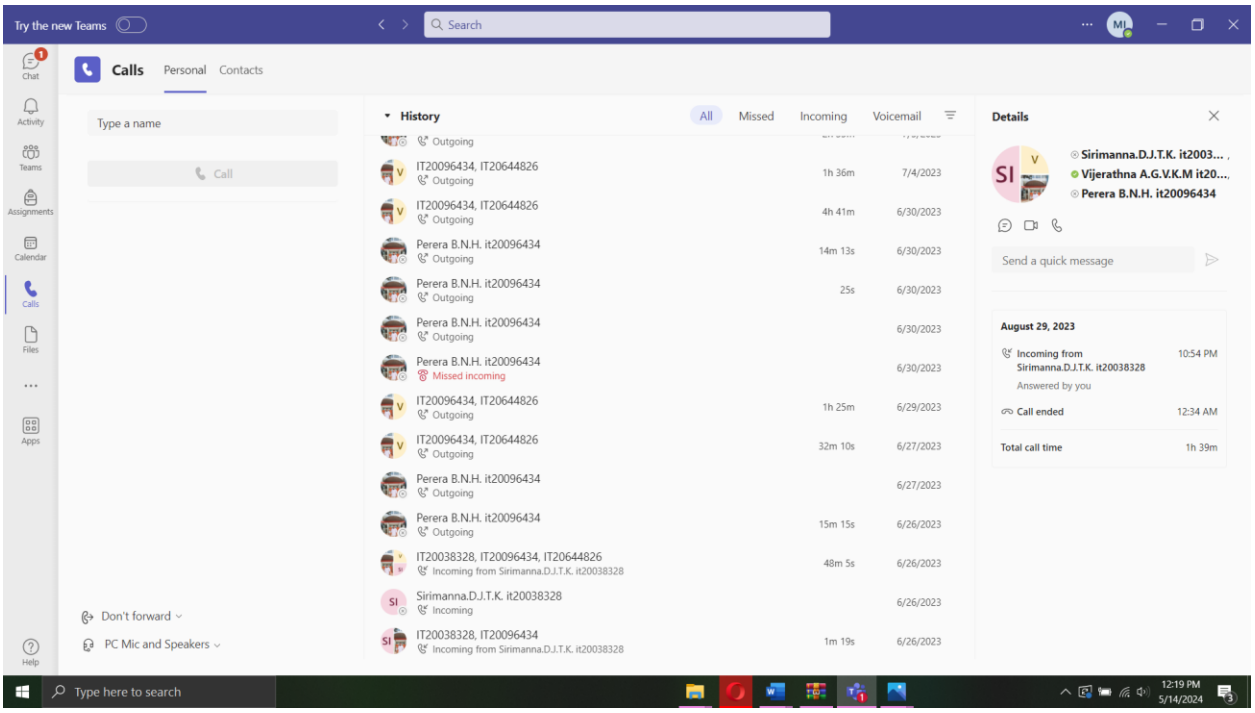


2.3 Teams calls with co supervisor

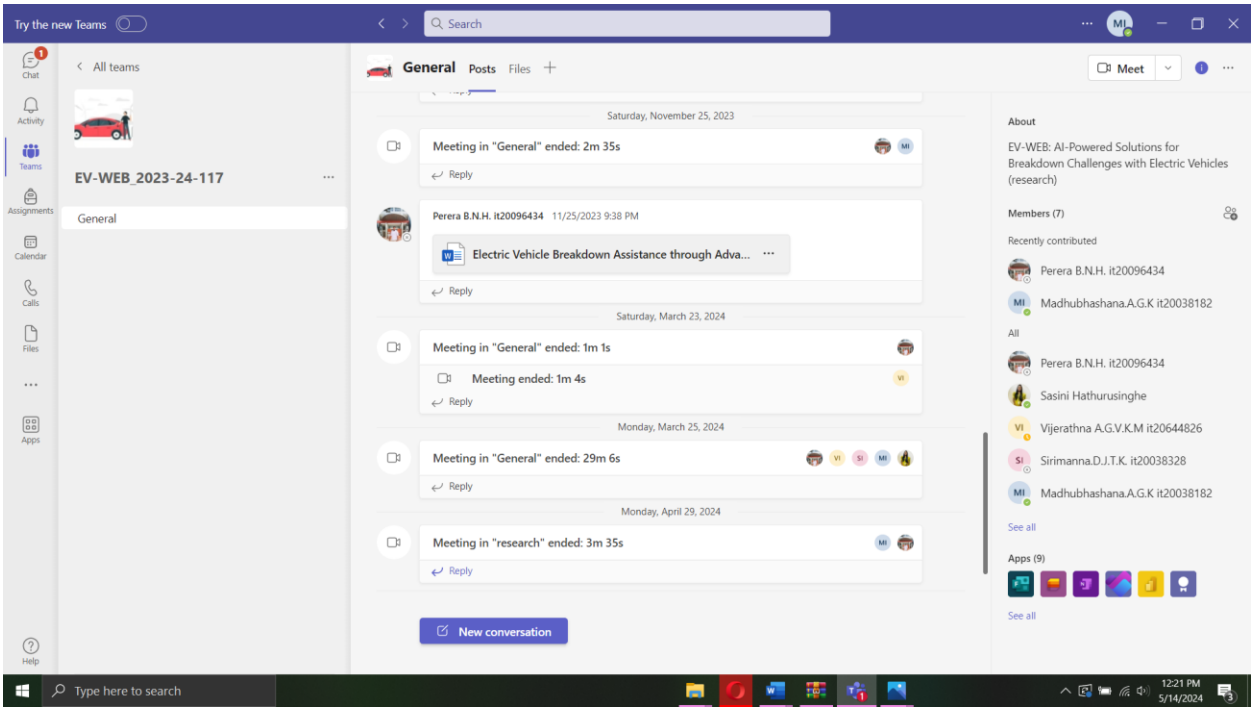




2.4 Teams Calls with Group members

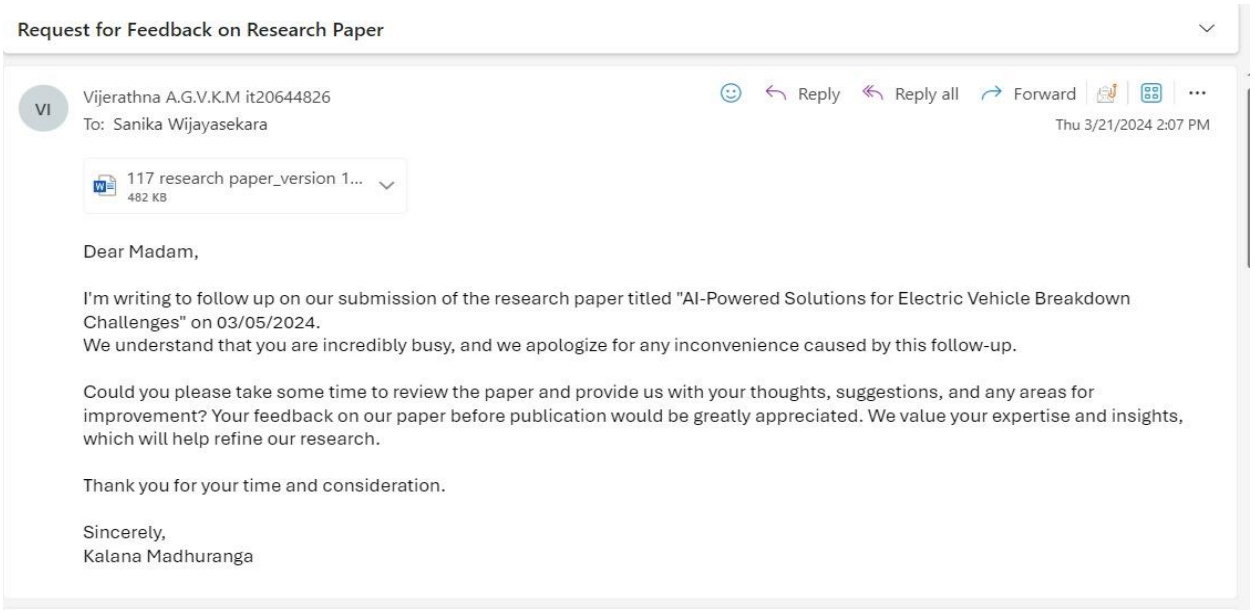


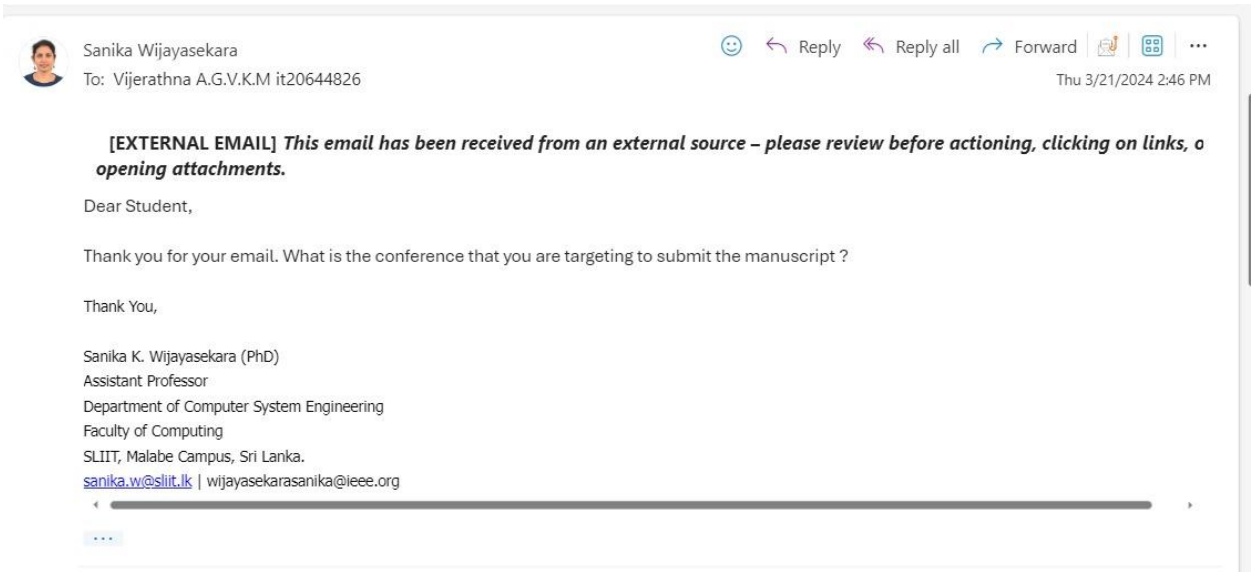
2.5 Teams Group Chat



3. Emails on Outlook

3.1 Outlook Mails with Supervisor





Sanika Wijayasekara
To: Vijerathna A.G.V.K.M it20644826

Reply | Reply all | Forward

Thu 3/21/2024 2:46 PM

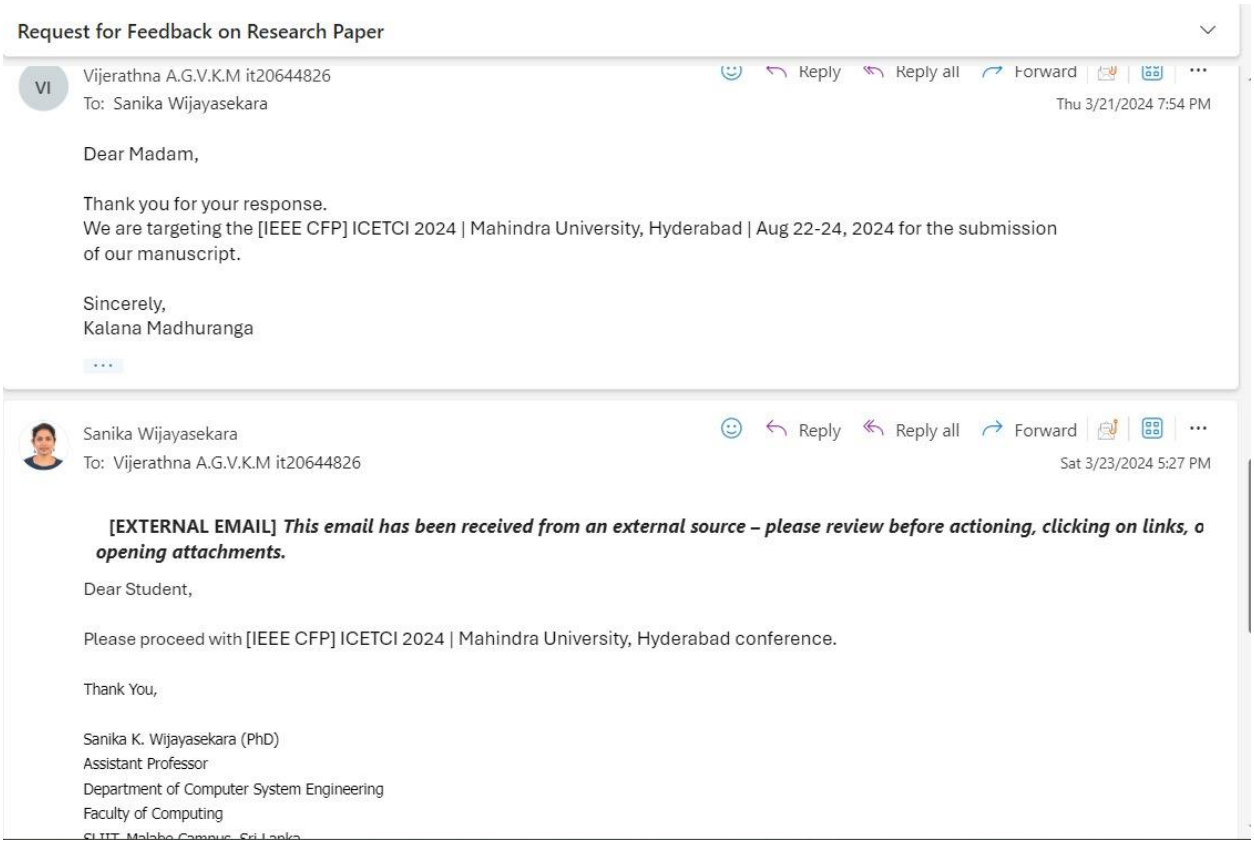
[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning, clicking on links, o opening attachments.***

Dear Student,

Thank you for your email. What is the conference that you are targeting to submit the manuscript ?

Thank You,

Sanika K. Wijayasekara (PhD)
Assistant Professor
Department of Computer System Engineering
Faculty of Computing
SLIIT, Malabe Campus, Sri Lanka.
sanika.w@sliit.lk | wijayasekarasanika@ieee.org



Request for Feedback on Research Paper

VI

Vijerathna A.G.V.K.M it20644826
To: Sanika Wijayasekara

Reply | Reply all | Forward

Thu 3/21/2024 7:54 PM

Dear Madam,

Thank you for your response.
We are targeting the [IEEE CFP] ICETCI 2024 | Mahindra University, Hyderabad | Aug 22-24, 2024 for the submission of our manuscript.

Sincerely,
Kalana Madhuranga

Sanika Wijayasekara
To: Vijerathna A.G.V.K.M it20644826

Reply | Reply all | Forward

Sat 3/23/2024 5:27 PM

[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning, clicking on links, o opening attachments.***

Dear Student,

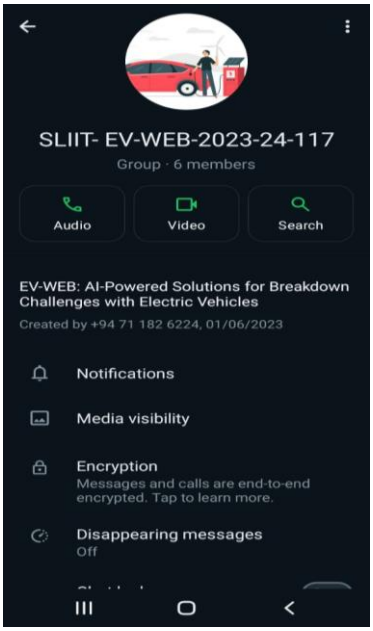
Please proceed with [IEEE CFP] ICETCI 2024 | Mahindra University, Hyderabad conference.

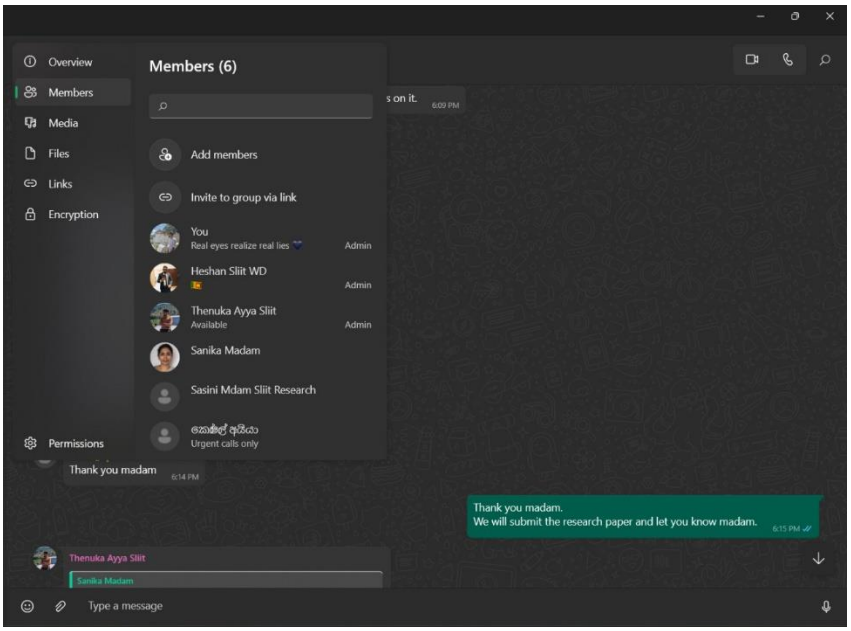
Thank You,

Sanika K. Wijayasekara (PhD)
Assistant Professor
Department of Computer System Engineering
Faculty of Computing
SLIIT, Malabe Campus, Sri Lanka

4. Maintain the WhatsApp Group

4.1 WhatsApp Group Details





5. Test Results

5.1 Model Accuracy

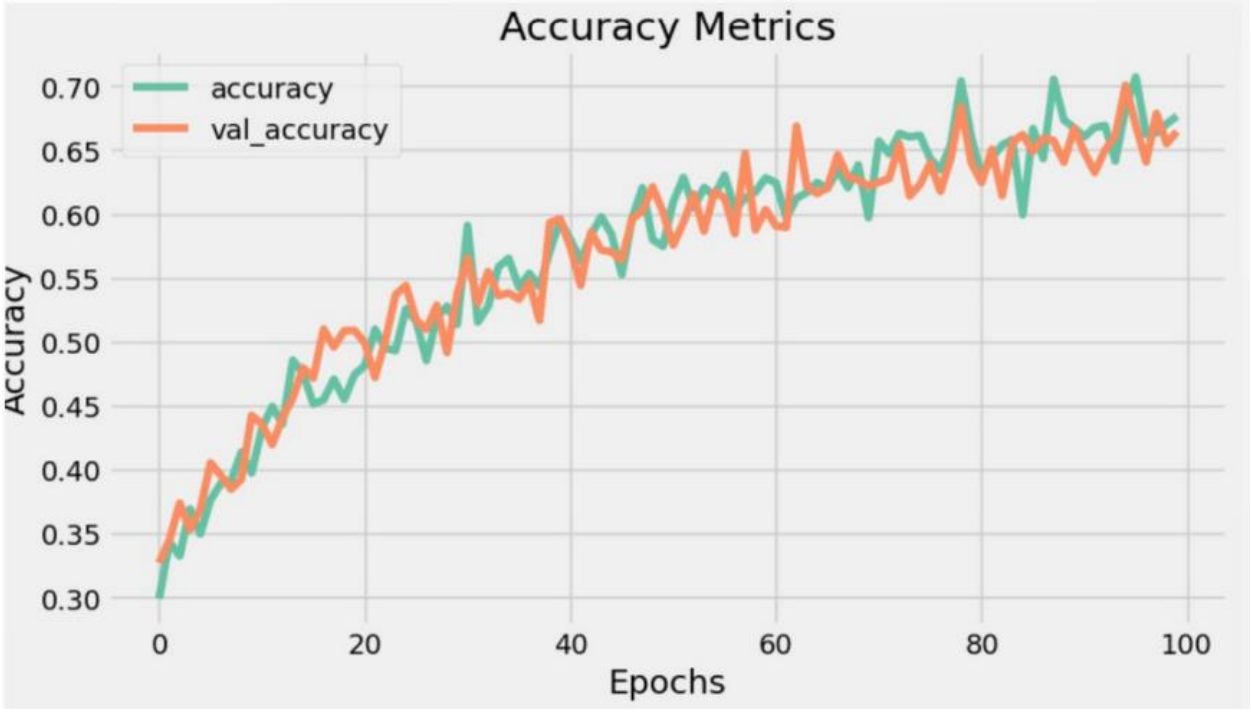
```
# Trainer
trainer = Trainer(
    model=model,
    args=training_args,
    train_dataset=train_dataset,
)

# Train the Model
trainer.train()
```

```
# Save the Fine-tuned Model
model.save_pretrained("./bert_chatbot")
tokenizer.save_pretrained("./bert_chatbot")

# Load the Model and Tokenizer for Inference
model = BertForSequenceClassification.from_pretrained("./bert_chatbot")
tokenizer = BertTokenizer.from_pretrained("./bert_chatbot")
```

```
# Response Generation
def chatbot_response(user_input):
    inputs = tokenizer(user_input, return_tensors="pt", truncation=True, padding="max_length", max_length=128)
    with torch.no_grad():
        outputs = model(**inputs)
    pred_label = torch.argmax(outputs.logits, dim=1).item()
    intent = label_encoder.inverse_transform([pred_label])[0]
    responses = conversations[intent]
    return random.choice(responses)
```

```
"battery_life": [
    "Proper battery maintenance can help prolong the lifespan of your EV.",
    "Avoid regularly charging your EV to 100% capacity to reduce battery degradation.",
    "Extreme temperatures, both hot and cold, can accelerate battery aging.",
    "Regular software updates from your EV manufacturer may include battery management improvements.",
    "Consider leasing an EV if you're concerned about battery degradation over time.",
    "Some EV manufacturers offer battery replacement programs for aging battery packs.",
    "Battery health monitoring systems can alert you to potential issues before they become serious.",
    "Frequent fast charging can contribute to faster battery degradation.",
    "Battery degradation is typically gradual and may not be noticeable in daily driving.",
    "Keep your EV plugged in when not in use to prevent deep discharges, which can harm the battery.",
    "Battery warranties often include provisions for gradual capacity loss over time.",
    "Consider consulting with a certified technician for battery maintenance tips specific to your EV model.",
    "Periodically check your EV's battery health through diagnostic tools or mobile apps.",
    "Battery chemistry advancements are continuously improving the longevity of EV batteries.",
    "Recycling programs are available for end-of-life EV batteries to minimize environmental impact.",
    "Battery thermal management systems help regulate temperature and extend battery life.",
    "Regularly update your EV's charging habits based on best practices recommended by the manufacturer.",
    "Battery degradation rates can vary based on factors such as climate and driving habits.",
    "Drive your EV regularly to maintain optimal battery health.",
    "Keep your EV's battery within its recommended temperature range for best performance and longevity.",
    "Consider purchasing an extended warranty to cover potential battery issues beyond the standard warranty period.",
    "Educate yourself on proper storage techniques if you plan to leave your EV unused for an extended period.",
    "Battery replacement costs are decreasing as technology advances and economies of scale improve.",
    "Stay informed about advancements in battery technology that may impact future replacement options.",
    "Some EV manufacturers offer battery upgrade options for older models."
],
"maintenance": [
    "Regularly checking tire pressure can help maximize your EV's efficiency and range.",
    "Electric vehicles typically require less frequent brake maintenance due to regenerative braking.",
    "Keep your EV's exterior clean to maintain its appearance and protect the paint.",
    "Consult your EV's owner's manual for recommended maintenance intervals and procedures.",
    "Some EVs feature self-diagnostic systems that alert you to potential maintenance issues.",
    "Schedule regular service appointments with certified EV technicians to ensure optimal performance.",
    "Check and replace air filters as recommended by your EV manufacturer.",
    "Keep your EV's charging port clean and free of debris to ensure a secure connection.",
    "Regularly inspecting suspension components can help ensure a smooth and comfortable ride.",
    "Maintain proper coolant levels to prevent overheating and ensure efficient battery operation.",
    "Some EV manufacturers offer extended service plans for added peace of mind.",
    "Invest in quality floor mats to protect your EV's interior from dirt and debris.",
    "Keep your EV's battery terminals clean and corrosion-free to maintain electrical connections.",
    "Schedule regular software updates to ensure your EV's systems are up-to-date.",
    "Keep an eye on your EV's fluid levels and top up as needed according to manufacturer guidelines.",
    "Consider investing in a battery conditioner to maintain optimal battery health during periods of inactivity.",
    "Inspect your EV's lights regularly to ensure they are functioning properly.",
    "Educate yourself on common EV maintenance tasks you can perform at home.",
    "Maintain accurate records of your EV's maintenance history for potential resale value.",
    "Schedule regular brake inspections to ensure optimal performance and safety.",
    "Some EV manufacturers offer mobile service options for added convenience.",
    "Keep your EV's windshield clean and replace wiper blades as needed for clear visibility.",
    "Inspect your EV's charging cable for signs of wear or damage and replace if necessary.",
    "Store your EV in a climate-controlled environment to minimize temperature extremes."
```

```
[ ] dataset_dir = '/content/drive/MyDrive/Automobile-parts'

[ ] classes = sorted(os.listdir(dataset_dir))
    classes

['Bevel-gear',
 'bearing',
 'charging_port',
 'drive_shaft',
 'filter',
 'helical_gear',
 'shocker',
 'wheel']

[ ] # Number of images in each category
    no_of_files = {}
    for c in classes:
        for dirpath, dirnames, filenames in os.walk(os.path.join(dataset_dir,c)):
            no_of_files[c] = len(filenames)
    no_of_files

    sum(no_of_files.values())

352

    file_extensions = []
    file_formats =['.png', '.jpg', '.jpeg', '.tiff', '.bmp', '.gif']
    for f in file_formats:
      for c in classes:
        for dirpath, dirnames, filenames in os.walk(os.path.join(dataset_dir,c)):
            for fl in filenames:
              if fl.endswith(f) and f not in file_extensions:
                file_extensions.append(f)
    for dirpath, dirnames, filenames in os.walk(os.path.join(dataset_dir,c)):
       for fl in filenames:
            if ('.'+fl.split('.')[1]) not in file_extensions:
                file_extensions.append('.'+fl.split('.')[1])
    file_extensions

['.png', '.jpg', '.jpeg']
```

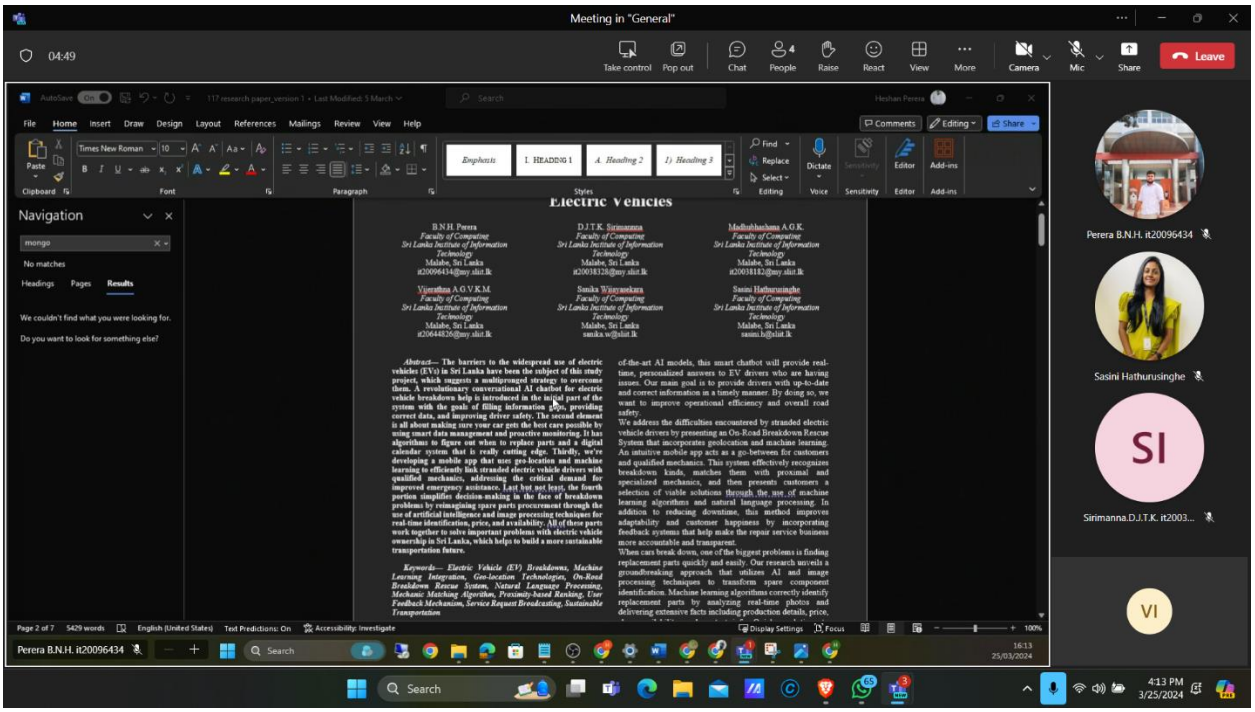


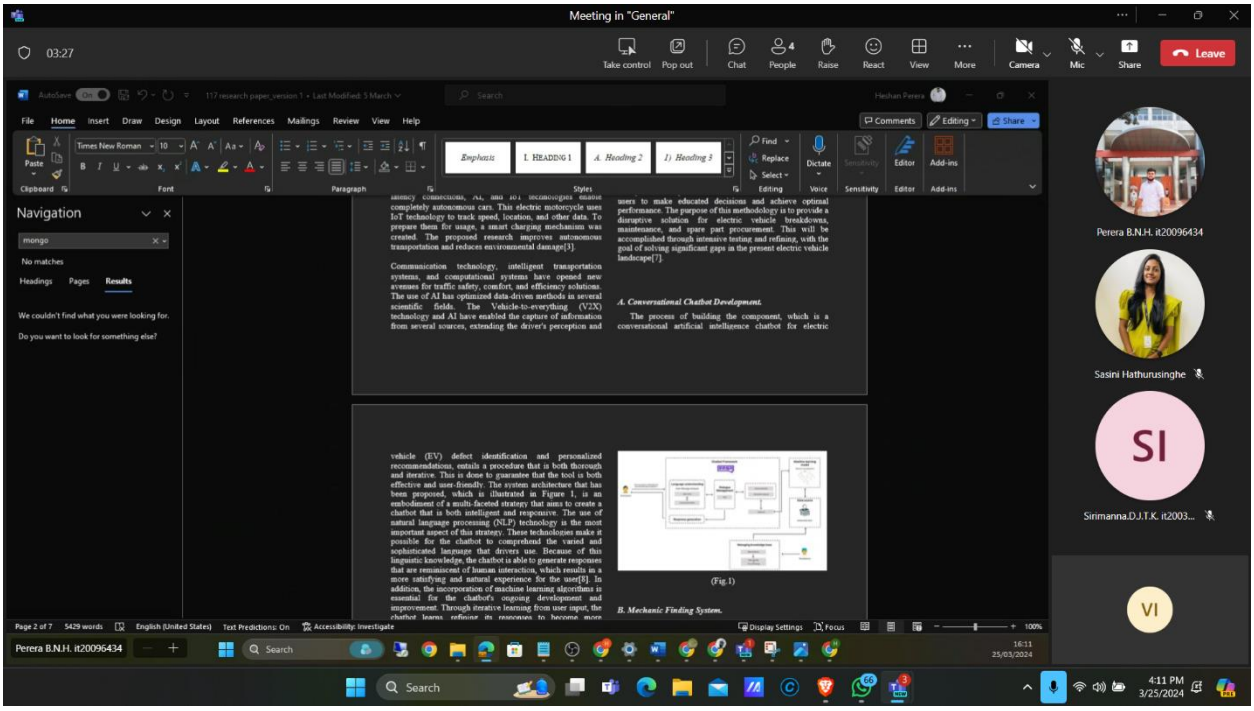
5.2 Model Loss

5.3 Training Model Output

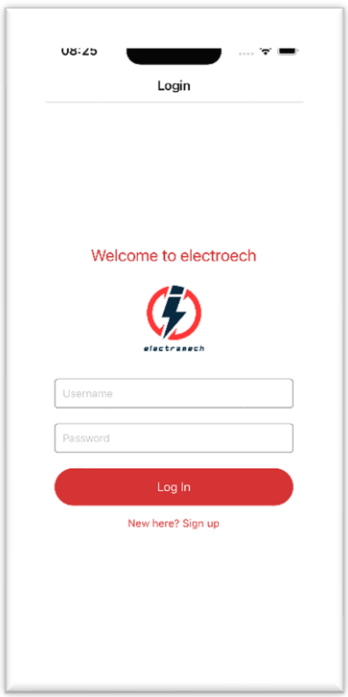
```
[ ]  predicted_part_index = np.argmax(predictions[0])
     predicted_part_name = classes[predicted_part_index]

     print("Predicted car part:", predicted_part_name)

     Predicted car part: shocker
```

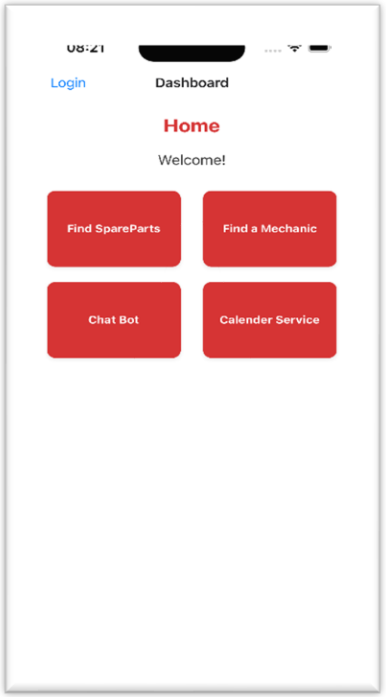
6. Research Paper

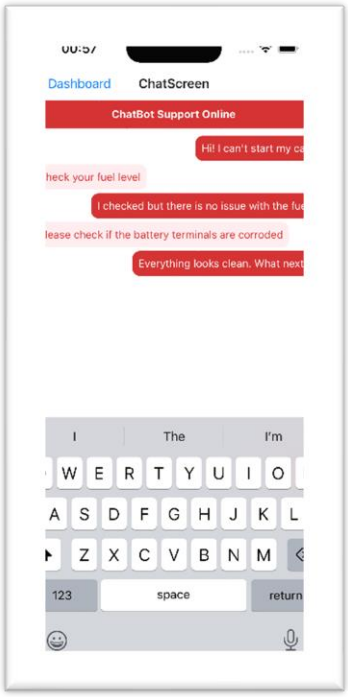




7. Mobile Application



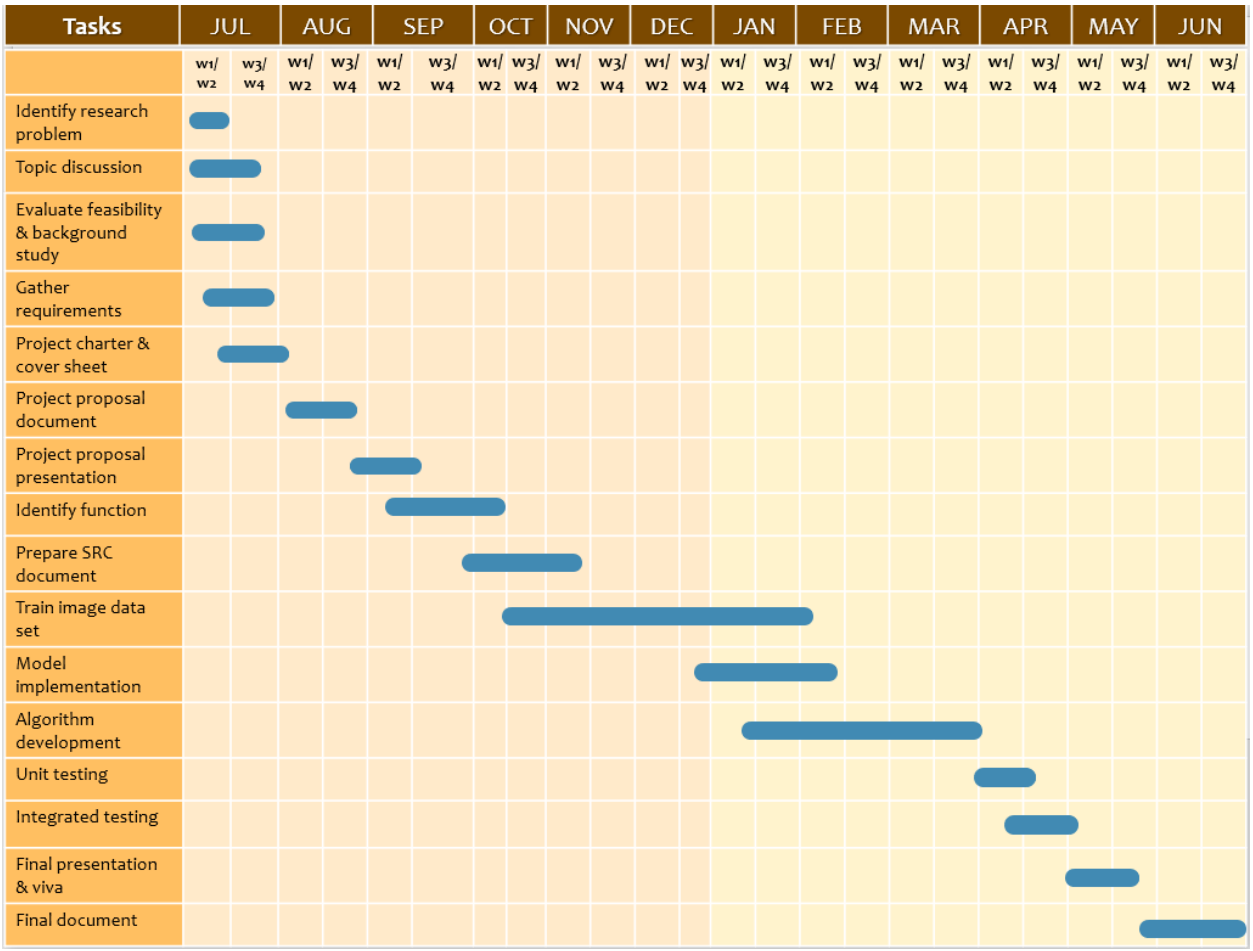




8. App Logo

electramech

9. Gannt Chart



10. Work Breakdown Chart