



STATUS DOCUMENT 2

“TeaBot” – Tea Plantation Preservation Using an Intelligent Robot.



STUDENT NAME: PREMATHILAKE H.T.M.

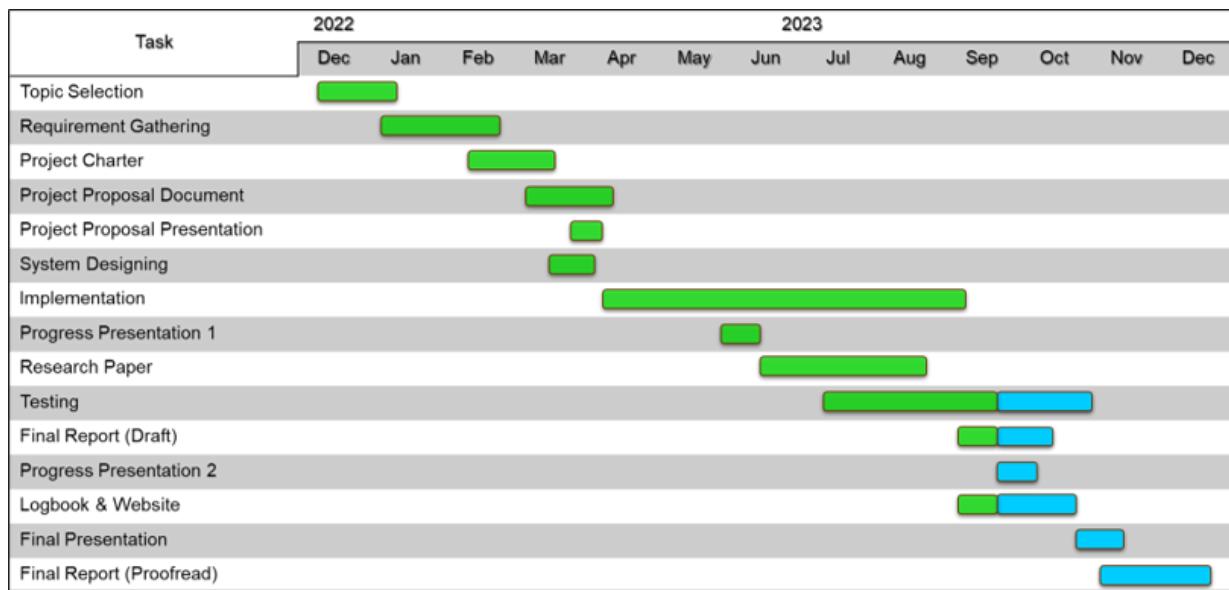
STUDENT NUMBER: IT20265410

GROUP ID: 2023-044

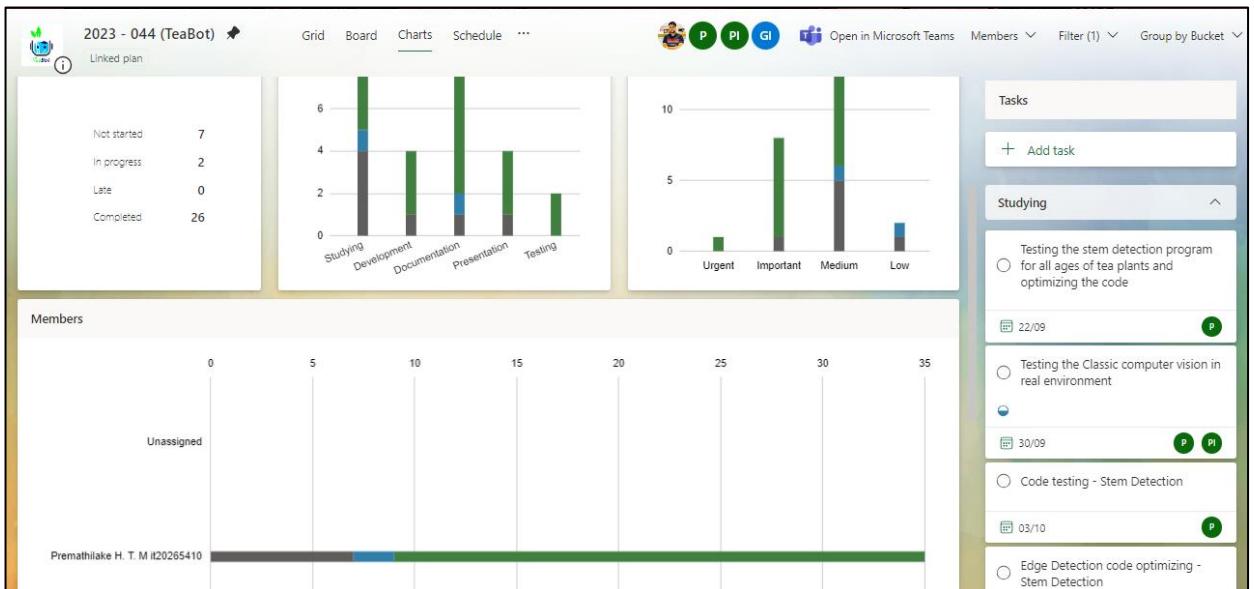
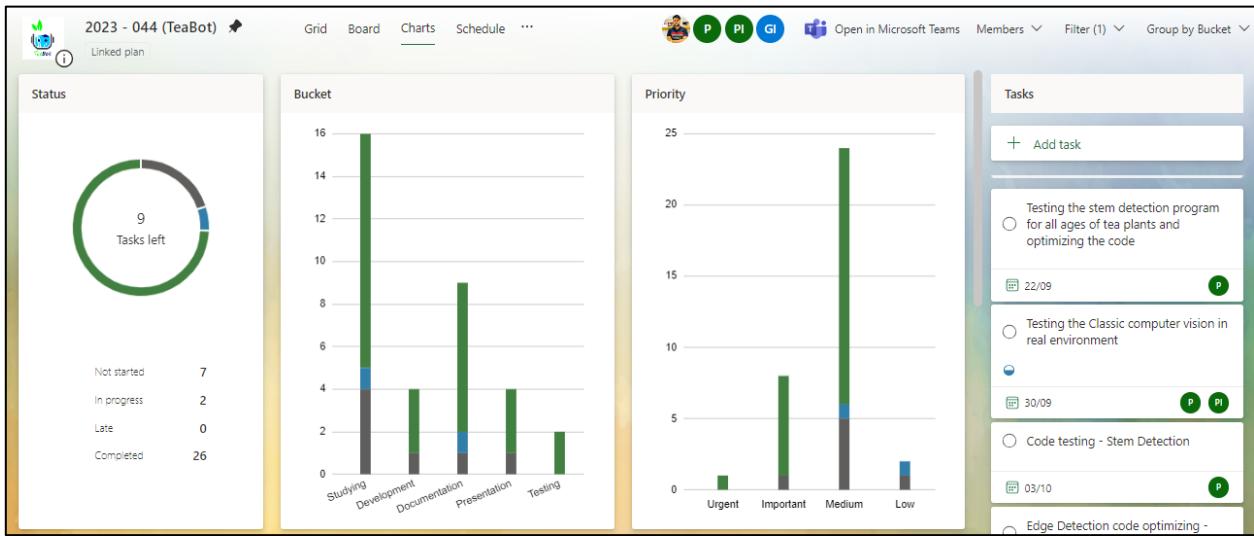
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1 GANNT CHART



2 PROJECT VIEWS MS PLANNER



3 WORK BREAK DOWN STRUCTURE MS PLANNER

This screenshot shows a Microsoft Planner board titled "2023 - 044 (TeaBot)". The board is organized into five columns: Studying, Development, Documentation, Presentation, and Testing. Each column contains a list of tasks with their status, due dates, and assignees.

- Studying:**
 - Testing the stem detection program for all ages of tea plants and optimizing the code (Due: 22/09)
 - Testing the Classic computer vision in real environment (Due: 30/09)
 - Code testing - Stem Detection (Due: 03/10)
 - Edge Detection code optimizing - Stem Detection (Due: 22/09)
- Development:**
 - Project Website (Due: 06/11)
 - Completed tasks:
 - Optimizing the ResNet Model (Completed by Premathilake H. T...)
 - Developing the Lightweight Model (Completed by Premathilake H. T...)
 - Developing the ResNet Model (Completed by Premathilake H. T...)
- Documentation:**
 - Final Report - IT20265410 (Due: 30/10)
 - Project Status Document 2 - IT20265410 (Due: 10/09)
 - Completed tasks:
 - Research Paper (Completed by Premathilake H. T...)
- Presentation:**
 - Progress Presentation - I (Completed by Perera P.V.Y. it203...)
 - Progress Presentation - II (Completed by Bamunusinghe G....)
 - Proposal Presentation (Completed by Perera P.V.Y. it203...)
- Testing:**
 - Completed tasks:
 - Testing the ML models in the testing field (Completed by Gunawardana I.I.E....)
 - Testing the Resenet Model (Completed by Perera P.V.Y. it203...)

This screenshot shows a Microsoft Planner board titled "2023 - 044 (TeaBot)". The board is organized into four columns: Development, Documentation, Presentation, and Testing. Each column contains a list of tasks with their status, due dates, and assignees.

- Development:**
 - Project Website (Due: 06/11)
 - Completed tasks:
 - Optimizing the ResNet Model (Completed by Premathilake H. T...)
 - Developing the Lightweight Model (Completed by Premathilake H. T...)
 - Developing the ResNet Model (Completed by Premathilake H. T...)
- Documentation:**
 - Research Logbook (Due: 30/10)
 - Final Report - IT20265410 (Due: 10/09)
 - Completed tasks:
 - Project Status Document 2 - IT20265410 (Completed by Premathilake H. T...)
 - Research Paper (Completed by Premathilake H. T...)
- Presentation:**
 - Final Presentation and Viva (Due: 28/09)
 - Completed tasks:
 - Progress Presentation - I (Completed by Perera P.V.Y. it203...)
 - Progress Presentation - II (Completed by Bamunusinghe G....)
 - Proposal Presentation (Completed by Perera P.V.Y. it203...)
- Testing:**
 - Completed tasks:
 - Testing the ML models in the testing field (Completed by Gunawardana I.I.E....)
 - Testing the Resenet Model (Completed by Perera P.V.Y. it203...)

4 EMAILS, MEETINGS WITH SUPERVISOR, CO-SUPERVISOR

GI Gunawardana I.I.E. it19973470 <it19973470@my.sliit.lk>      ...
To: Shashika Lokuliyana; Narmada Gamage
Cc: Premathilake H. T. M it20265410; Perera P.V.Y. it20382476 +2 others

 TeaBot Research Paper.pdf 
7 MB

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

Dear Madam,

I hereby attached our finalized research paper of the TeaBot for your reference. We are looking for a positive reply.

Thank you for your time and consideration.

Regards,
Gunawardana I.I.E (IT19973470)

Research Paper - TeaBot ICAC 

Narmada Gamage <narmada.g@sliit.lk>      ...
To: Gunawardana I.I.E. it19973470
Cc: Premathilake H. T. M it20265410; Perera P.V.Y. it20382476; Bamunusinghe G.P it20011970; Shashika Lokuliyana
Tue 15/08/2023 18:46

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

Dear team,

Kindly check whether it is possible to do address below comments as well.

1. Improve the abstract including the results obtained
2. Separate large paragraphs into smaller paragraphs. (i.e : Literature review 1st paragraph)
3. As a percentage, space of considerable amount of paper is used to pictures. Remove 1 or 2 diagrams from the paper if possible.
4. Highlight the significance of the results in the conclusion very briefly.

Best Regards!

Narmada Gamage
Program Coordinator | ISE Specialization, B.Sc. in IT
Lecturer | Department of CSE
SLIIT | Malabe Campus
+94 117 543925 | +94 717 404036

Research Paper - TeaBot ICAC X

Gunawardana I.I.E. it19973470 <it19973470@my.sliit.lk>
To: Shashika Lokuliyana; Narmada Gamage
Cc: Premathilake H. T. M it20265410; Perera P.V.Y. it20382476; Bamunusinghe G.P it20011970

Intelligent Agriculture Robot ... 662 KB

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

Dear Madam,

I hereby attached the final version (up to now) of the paper. We only submitted the paper to the ICAC. Because of the busy with project work, we were bit late to complete the paper and we had only the time to do only Rajitha sir's comments. But we heard yesterday, the ICAC deadline was extended. So, we hope to do another amendments given by Narmada madam and do some improvements and resubmit the paper to the ICAC.

Madam, shall we arrange a meeting to share the updates on the project? Can you provide us a free date and a time slot to discuss the project? We will explain the source codes and the functionalities of the robot on the meeting day.

Thank you

Regards,
Gunawardana I.I.E

Request for Available Time Slot to Discuss Progress on the "TeaBot" Research Project - Premathilake H. T. M it20265410 - Outlook - Google Chrome about:blank

Request for Available Time Slot to Discuss Progress on the "TeaBot" Research Project RP 2023 X

Gunawardana I.I.E. it19973470 <it19973470@my.sliit.lk>
To: Shashika Lokuliyana
Cc: Premathilake H. T. M it20265410; Bamunusinghe G.P it20011970; Perera P.V.Y. it20382476; Narmada Gamage

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

Dear Madam,

We are reaching out to request an available time slot for a discussion concerning the recent developments in our "TeaBot" research project. The extension of the ICAC submission deadline is until August 30th, and we have been working with Rajitha Sir to implement further enhancements. Additionally, we are working on the amendments suggested by Narmada Madam.

Our intention is to present both the project updates and our research paper for your review. Considering your demanding schedule madam, we kindly ask for your assistance in identifying a suitable date and time for the meeting.

Your time and consideration are highly valued. Thank you for your continued support.

Best Regards,
Gunawardana I.I.E

Request for Vehicle Access for PP2 - TeaBot [RP 2023 X]

P Premathilake H. T. M it20265410
To: Shashika Lokuliyana
Cc: Gunawardana I.I.E. it19973470; Perera P.V.Y. it20382476; Bamunusinghe G.P it20011970

Dear Madam,

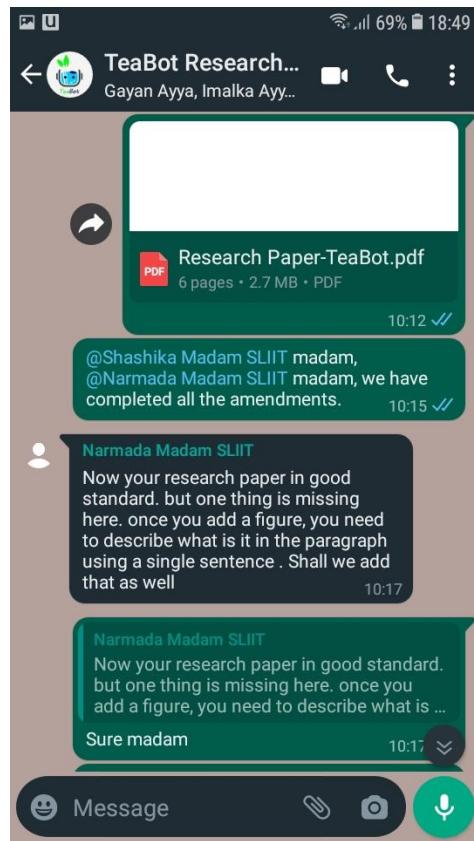
Our PP2 is scheduled for Monday, the 4th, at 12:00 PM. As previously discussed madam, we kindly request permission to bring our vehicle (car), with number 'KA 3522', in order to transport the robot to SLIIT.

Your continued support and consideration are greatly appreciated.

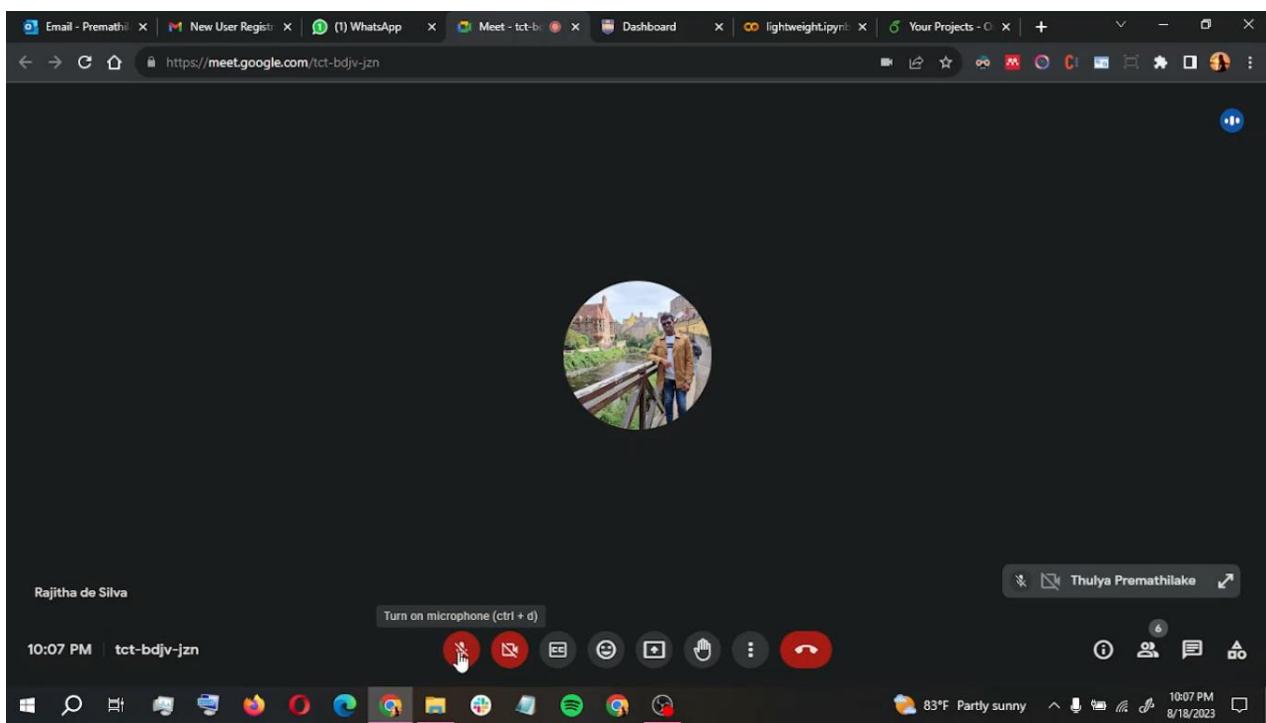
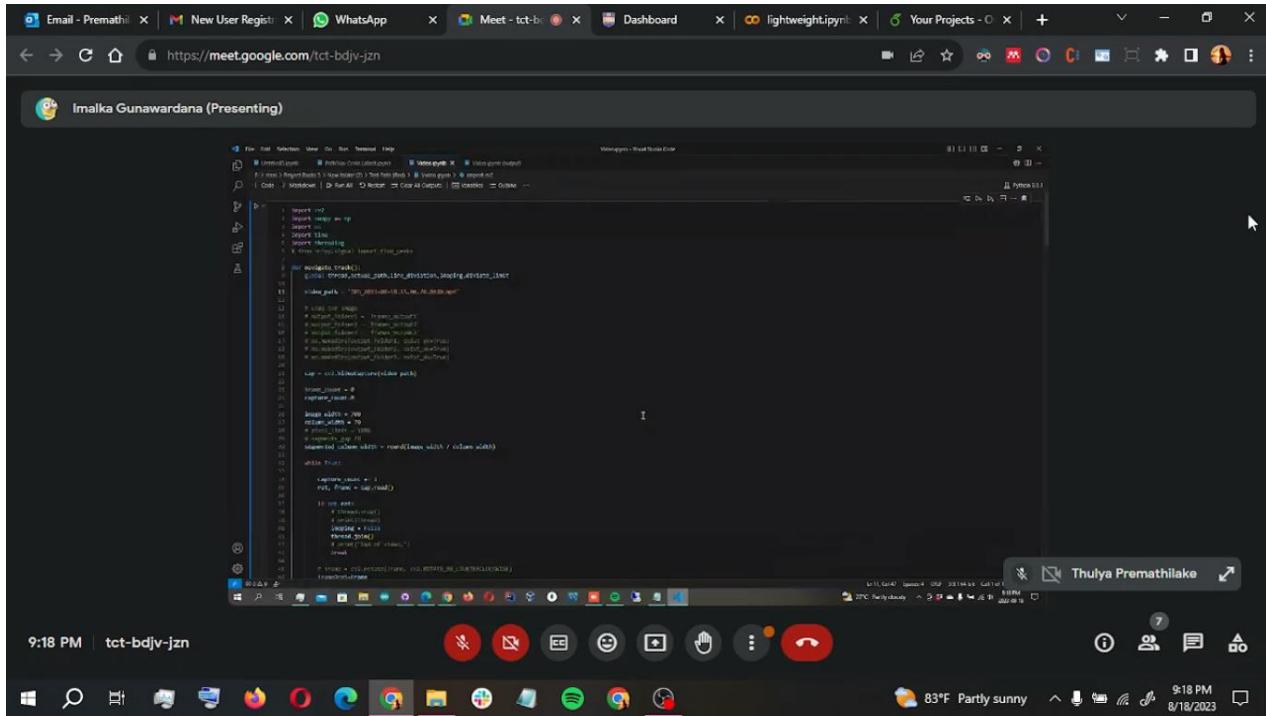
Thank you for your attention to this matter.

Sincerely,
H.T.M. Premathilake (IT20265410)

WhatsApp conversations with the supervisor and co-supervisor



5 EMAILS, MEETINGS WITH EXTERNAL SUPERVISOR



Discussions regarding research paper with external supervisor Dr Rajitha De Silva.

Research Paper - TeaBot ICAC

like you to correct before submission. Due to limited time, I will limit my feedback to the most important bits although I think there's more to be fixed if we had more time. Please find the below comments I have grouped section-wise.

1. Authors: Change my affiliation to: Lincoln Agri-Robotics, University of Lincoln, United Kingdom

2. Abstract:

- Avoid referring too much to Sri Lanka and ceylon tea because it takes away the generality of the paper. Your paper should read like a scientific document and hence, significance of tea in SL could be limited to one sentence with statistical relevance (1st sentence does this job). Remove all the other bits about how good ceylon tea is because they are scientifically irrelevant for the goal of this paper.
- The abstract also lacks the technicality. Talk about what you have done, your key novelty contributions of this paper.

3. Keywords: Limit to 5 keywords. My suggestion: precision agriculture, computer vision, robotics, machine learning, autonomous navigation

4. Introduction:

- Avoid repetition of sentences from abstract. Rephrase the 1st sentence.
- Add a few references in introduction when you talk about GDP, ceylon tea and labour.
- The last part of introduction reveals too much of your system. The introduction should explain the significance of your research, motivation for doing it, your key outcomes and how you achieved it in generic terms. The system overview, dimensions and other technical bits must be introduced in your methodology section.
- Add a few bullet points at the end of introduction highlighting your key deliverables of this research. See attached example image.

5. Lit. Review:

- Remove first sentence. No need to clarify that.
- The lit. review talks about multiple aspects of your research: navigation, tea plantations, stem detection and etc. Break the lit. review into paragraphs based on these themes.

6. Methodology:

- In section B: 1800 and 3800? What are these numbers. Add units to these numbers.
- Equation 2 refers to Excess Green Index (ExG). Mention this and add the corresponding reference.

7. Result: Merge with discussion section and change title to "Results and Discussion"

- In the discussion, add some examples of good and bad stem detection images and talk about why those bad examples are bad. What environmental challenges may have caused to false detection and how would you improve them in the future.

8. Conclusion:

- Remove 1st sentence. No need to introduce what conclusion is.
- The paper lacks a future works section. It is advisable to add a small future works section highlighting the potential improvements to your system. Separate this from conclusion. Future works must come before the conclusion.

I don't expect you to correct all the above suggestions given the limited time. But I strongly advise you to fix as much as you can for a positive outcome. Good luck with the submission!

Best Regards,
Rajitha

https://www.overleaf.com/project/64d6026f474d6c9b5dee073f

Research Paper - TeaBot

Code Editor Visual Editor

Track changes is off >

rajithamadhawaz: Put these in a sentence.
Aug 25, 2023 3:18 PM
You: Sir, added as the last sentence of the 124 line
Aug 25, 2023 3:53 PM • Edit • Delete
Hit Enter to reply

Resolve Reply

Current file Overview

File outline

- Introduction
- Literature Review
- Methodology
 - Robot Controller
 - Robot Arm Hardware Setup
 - Robotic Arm Software Setup
 - Remote Controller Web Inter...
 - Robot Arm Stabilization
 - Practical Implementation
 - Automatic Navigation
 - Stem Identification
 - Result & Discussion
 - Conclusion

main.tex

MyReferences.bib

Code Editor

```
\begin{document}
\title{A Robotic Arm for Ceylon Tea Stem Detection and Water Spraying}
\author{Rajitha De Silva}
\date{\today}

\begin{abstract}
This paper presents a novel robotic arm system designed for the efficient detection and spraying of ceylon tea stems. The system is built using a Arduino Nano microcontroller and a ROS framework. It features a robotic arm with three degrees of freedom (DOF) and a water spraying mechanism. The arm is stabilized using a gyroscope sensor to maintain its orientation. The system uses a camera to detect the tea stems and a pump to spray water onto them. The experimental results show that the system is able to detect and spray on tea stems with a success rate of over 90%.
\end{abstract}

\begin{keywords}
precision agriculture, computer vision, robotics, machine learning, autonomous navigation
\end{keywords}

\begin{introduction}
The tea industry is a major contributor to the economy of Sri Lanka. However, the manual labor involved in tea stem detection and spraying is time-consuming and labor-intensive. This paper proposes a robotic arm system to automate this process. The system is designed to be cost-effective and easy to maintain. It uses a combination of computer vision and robotics to achieve high accuracy and efficiency.
\end{introduction}

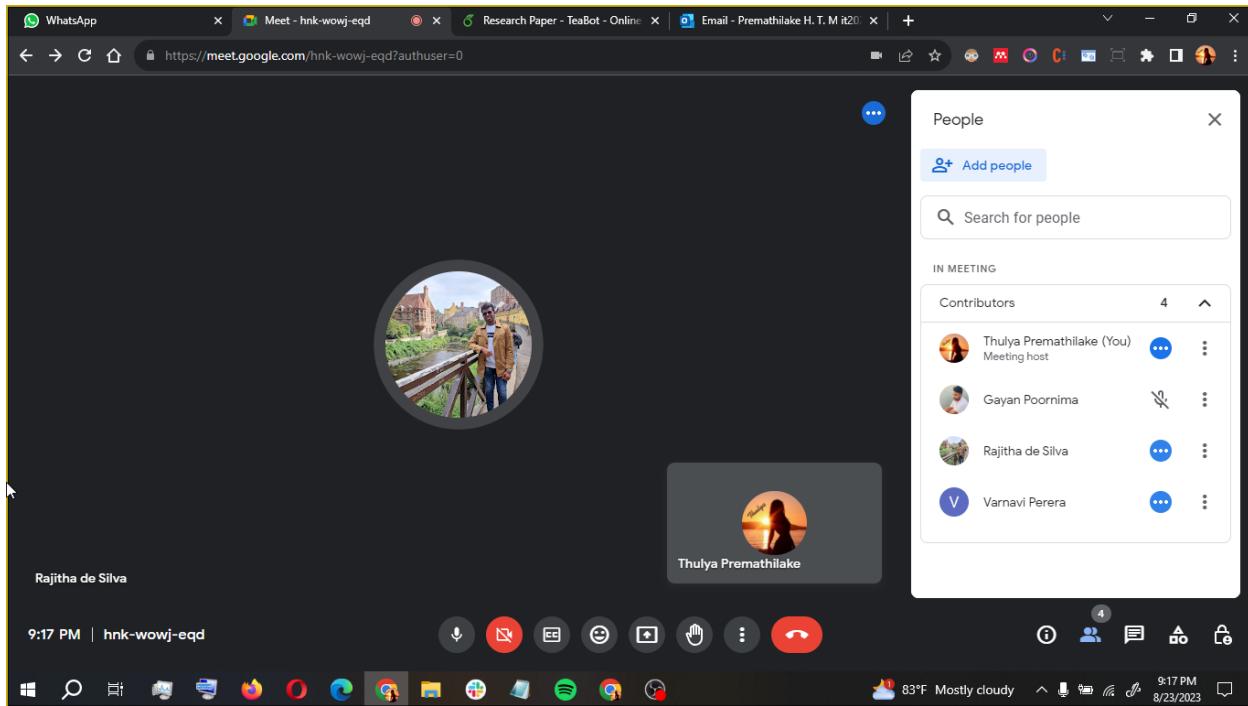
\begin{methodology}
The system consists of several components. The robotic arm is built using a servo motors and a frame. The water spraying mechanism is powered by a DC motor and a pump. The control system is based on an Arduino Nano microcontroller. The camera is used to capture images of the tea stems. The software is developed using ROS framework. The system is tested in a controlled environment and the results are promising.
\end{methodology}

\begin{result}
The experimental results show that the system is able to detect and spray on tea stems with a success rate of over 90%. The system is able to detect tea stems in various orientations and positions. The spraying mechanism is able to spray water accurately onto the tea stems. The system is able to detect tea stems in real-time and spray water onto them.
\end{result}

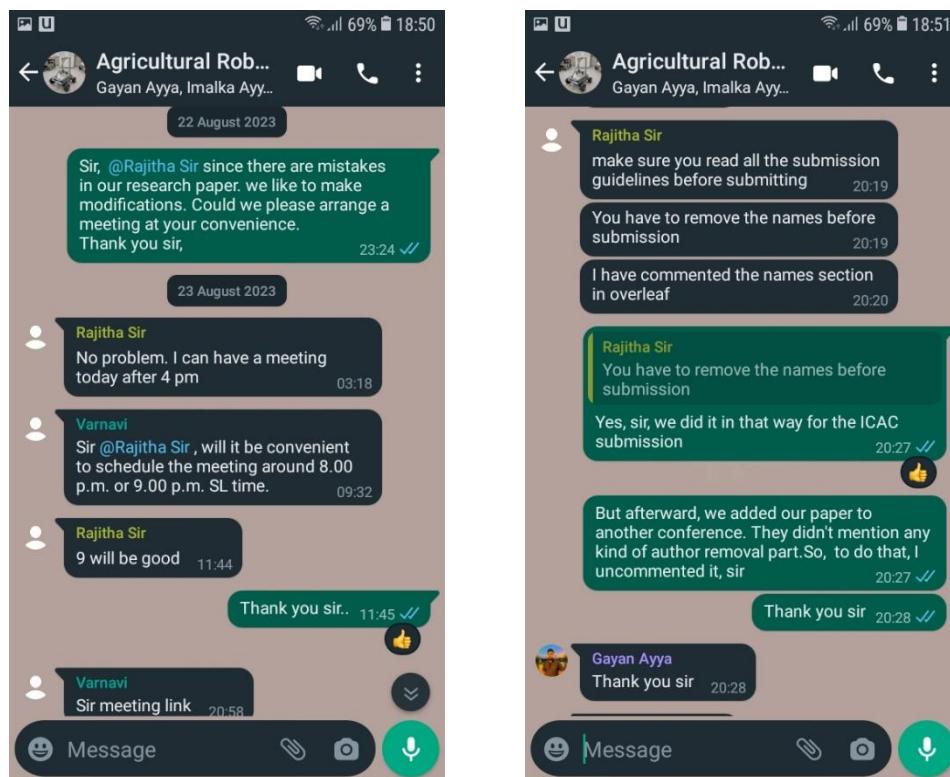
\begin{discussion}
The system has several advantages. It is able to work in difficult environments where manual labor is not feasible. It is able to work 24/7 without any break. It is able to work in harsh weather conditions. It is able to work in remote areas where manual labor is not available. The system is able to detect tea stems in various orientations and positions. The spraying mechanism is able to spray water accurately onto the tea stems. The system is able to detect tea stems in real-time and spray water onto them.
\end{discussion}

\begin{conclusion}
The system is a significant advancement in the field of tea processing. It has the potential to revolutionize the tea industry. The system is able to detect tea stems in various orientations and positions. The spraying mechanism is able to spray water accurately onto the tea stems. The system is able to detect tea stems in real-time and spray water onto them.
\end{conclusion}

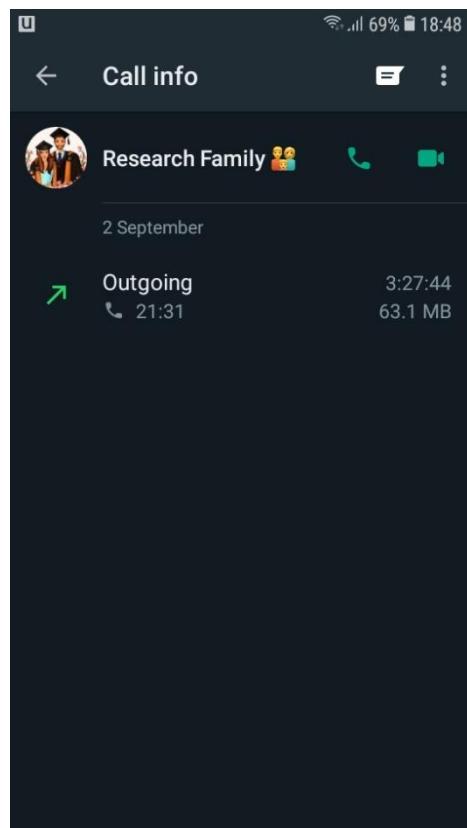
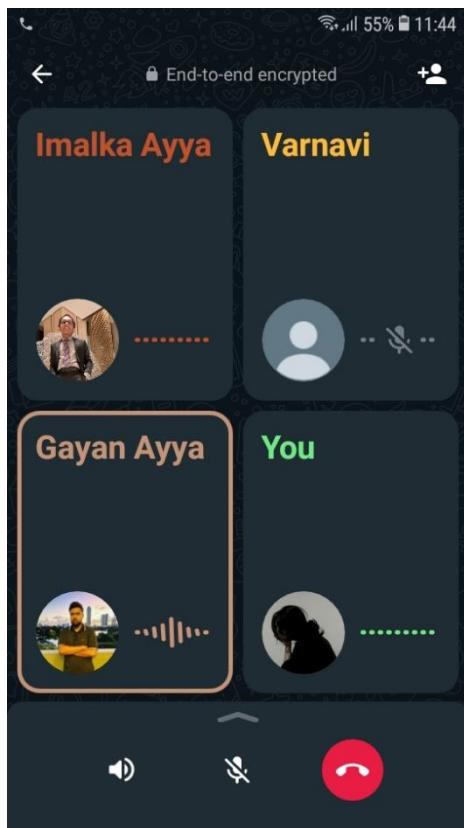
```



WhatsApp conversations with the external supervisor.



WhatsApp conversations with the team members.



6 MS TEAMS AND CALLS

Premathilake H. T. M it20265410 6/21 10:08 PM
https://drive.google.com/drive/folders/1rKJn0XN3R-nJN6H_Z0FXxVsrBd-3HVL3?usp=sharing

Premathilake H. T. M it20265410 6/21 10:15 PM

Task	2022	2023											
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Topic Selection													
Requirement Gathering													
Project Charter													
Project Proposal Document													
Project Proposal Presentation													
System Designing													
Implementation													
Progress Presentation 1													
Research Paper													
Testing													
Final Report													
Progress Presentation 2													
Logbook & Website													
Final Presentation													
Final Report													

Meeting in "General" ended:

PP2 Slide Deck ended: 1h 16m

PP2 Slides started

Perera P.V.Y. it20382476 8/27 4:41 PM

Mobile-UNet employs depth-wise separable convolutions and skip-connectors to efficiently capture features in the given inputs. Mobile-UNet's decoder network uses up-sampling feature maps and concatenation with skip connectors to reconstruct high-resolution segmentation maps from the compact feature representations generated by the encoder, ensuring precise navigation path prediction.

See less

Meeting ended: 1h 32m

General Posts Files Tasks + Meet ...

Premathilake H. T. M it20265410 9/2 6:52 PM
PP2 Slides.pptx

Perera P.V.Y. it20382476 9/2 7:00 PM
Algorithm development for stem identification
calculating the position of the end of the stem
capturing a frame from the video through the webcam

Meeting ended: 3h 56m PI PI

Reply Sunday, September 3, 2023

General started collapse all

Recording has started PI

Recording has stopped. Saving recording... PI

Meeting Recorded by: Perera P.V.Y. it203...
3h 9m
This recording is set to expire. View or change the expiration date here. Learn more

Meeting ended: 12h 20m PI PI PI

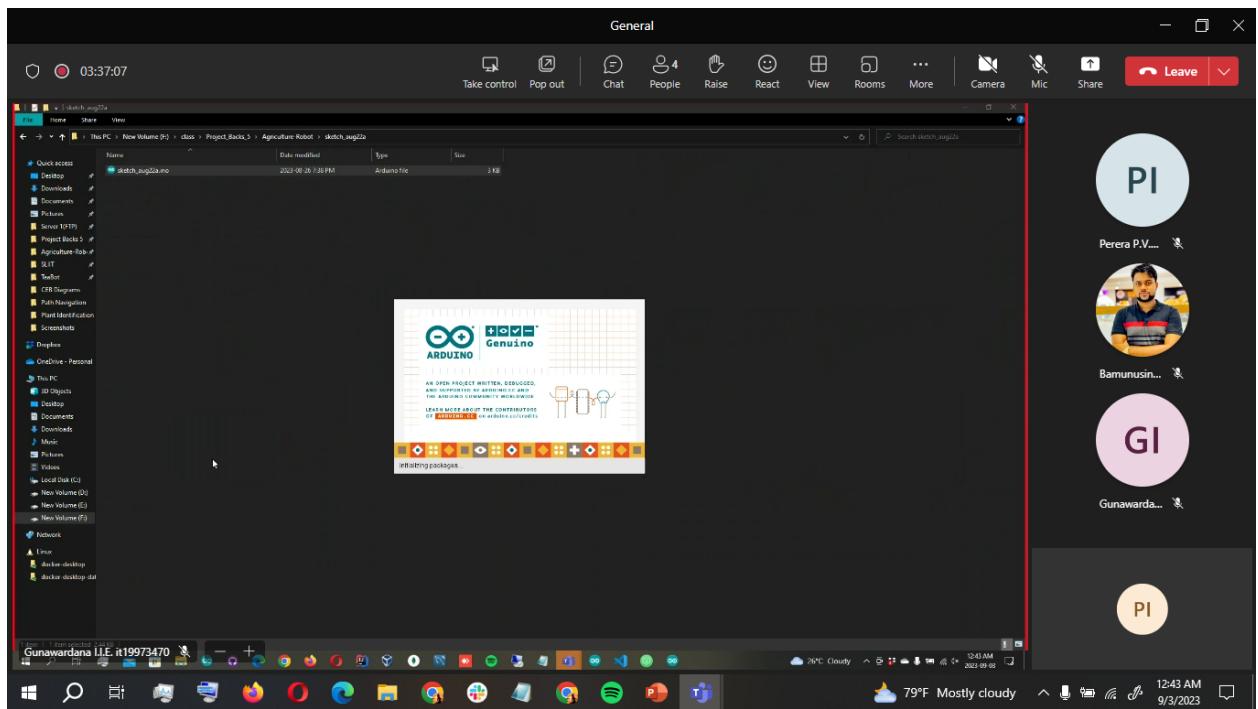
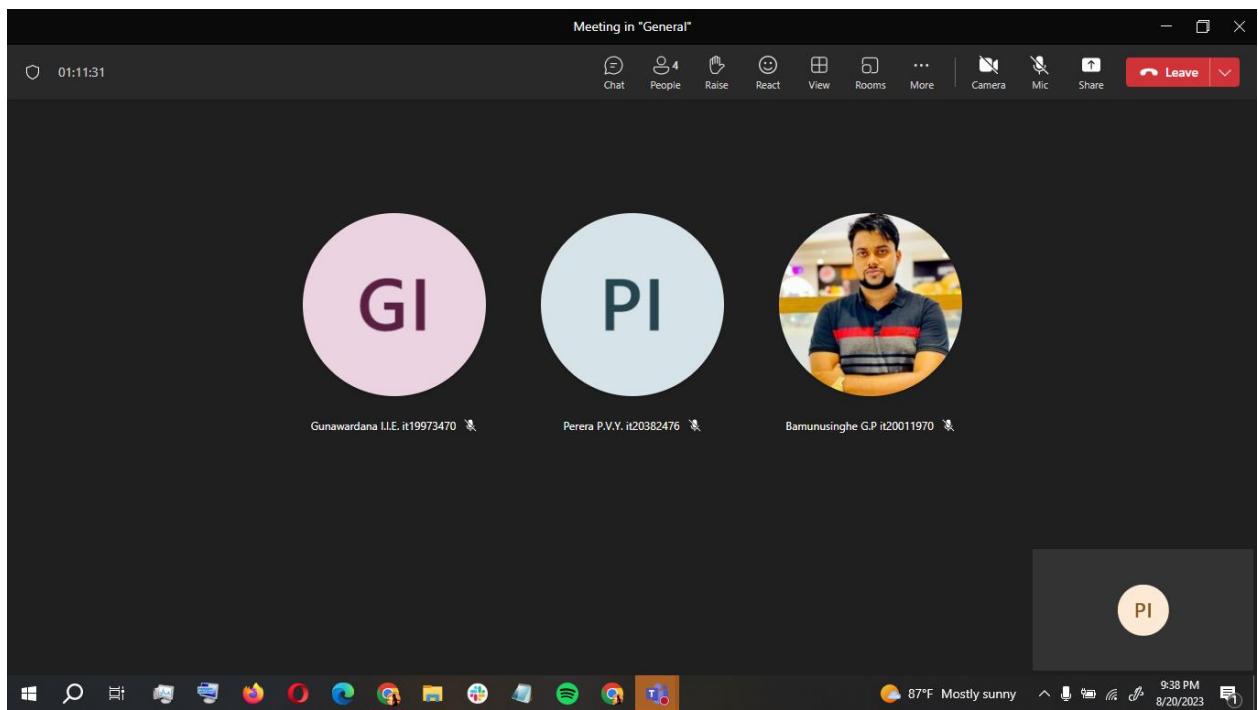
Reply

General Posts Files Tasks + Meet

+ New Upload Share Copy link Sync Download ... All Documents* Y I

... > General > Bamunusinghe G.P it20011970, Perera P.V.Y. it20382476, Premathilake H. T. M it20265410

Name	Modified	Modified By
Recordings	March 3	Premathilake H. T. M it20265410
agri robot.pdf	February 8	Perera P.V.Y. it20382476
IT4010-TAF (2).docx	February 8	Perera P.V.Y. it20382476
TA (1).docx	February 8	Perera P.V.Y. it20382476
TA.docx	February 8	Perera P.V.Y. it20382476
Submitted Docs	March 13	Bamunusinghe G.P it20011970



Meeting in "General"

04:04:55

Take control Pop out Chat People Raise View More Camera Mic Share Leave

File Home Insert Draw Design Transitions Animations Slide Show Record Review Help Storyboarding

Perera P.V.Y.it20382476

Clipboard Slides

Font Paragraph Drawing Editing Voice Sensitivity Add-ins

18 Hardware - Robot Chassis

- Move forward or backward
- Set the speed to drive (Twist)
- Steering according to the given angles
- Turn left or right while driving forward or backward (Twist)
- Skid steer to left or right
- Smooth driving
- Optimized to protect the motors from sudden start or stop
- One dedicated battery for the motors for the maximum power
- Another dedicated battery for the drivers + Arduino + raspberry for a better performance
- Tested in a hard environment

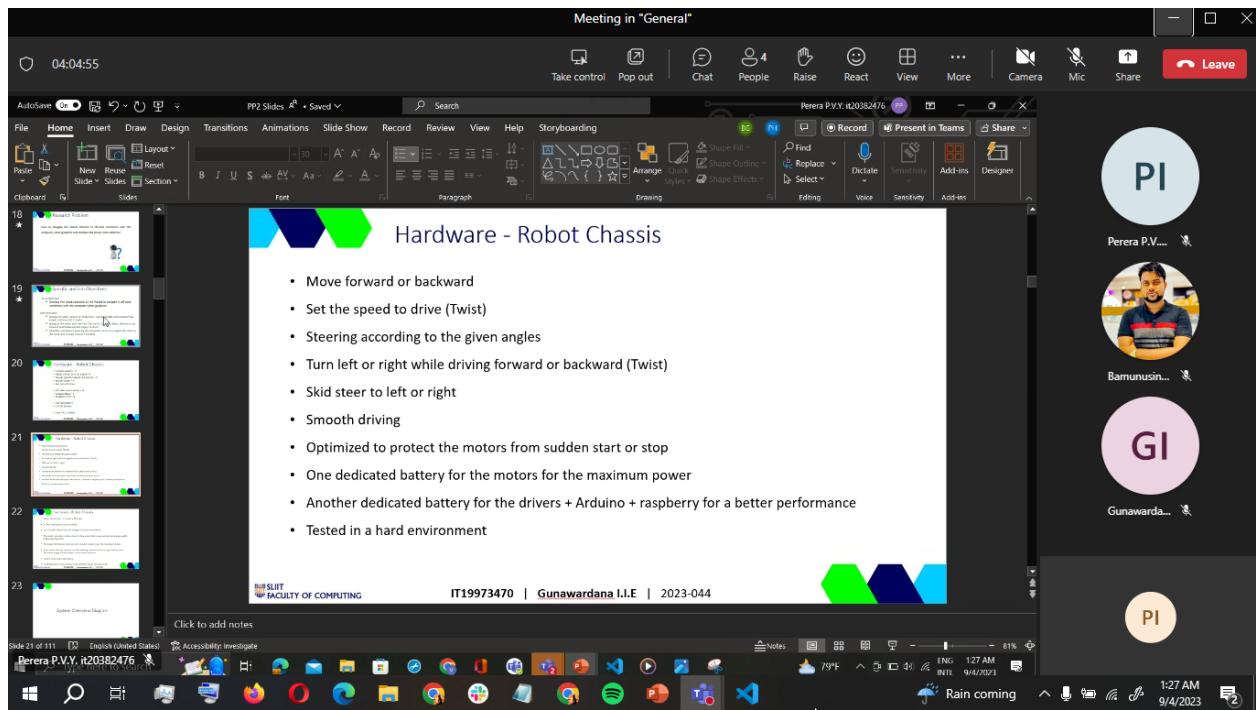
Slide 21 of 111 | English (United States) Perera P.V.Y.it20382476 Click to add notes

IT19973470 | Gunawardana I.I.E | 2023-044

RUSSIT FACULTY OF COMPUTING

1:27 AM 9/4/2023 Rain coming 1:27 AM 9/4/2023

Perera P.V.Y. it20382476 Bamunusinghe G.P. it20011970

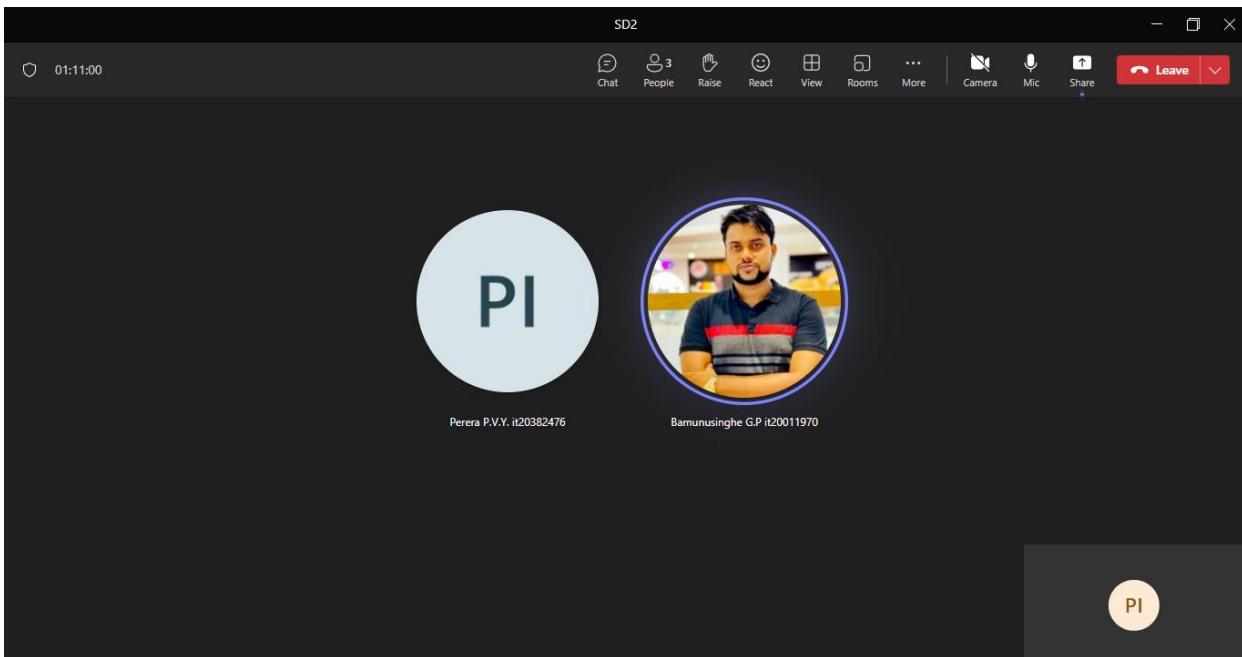


SD2

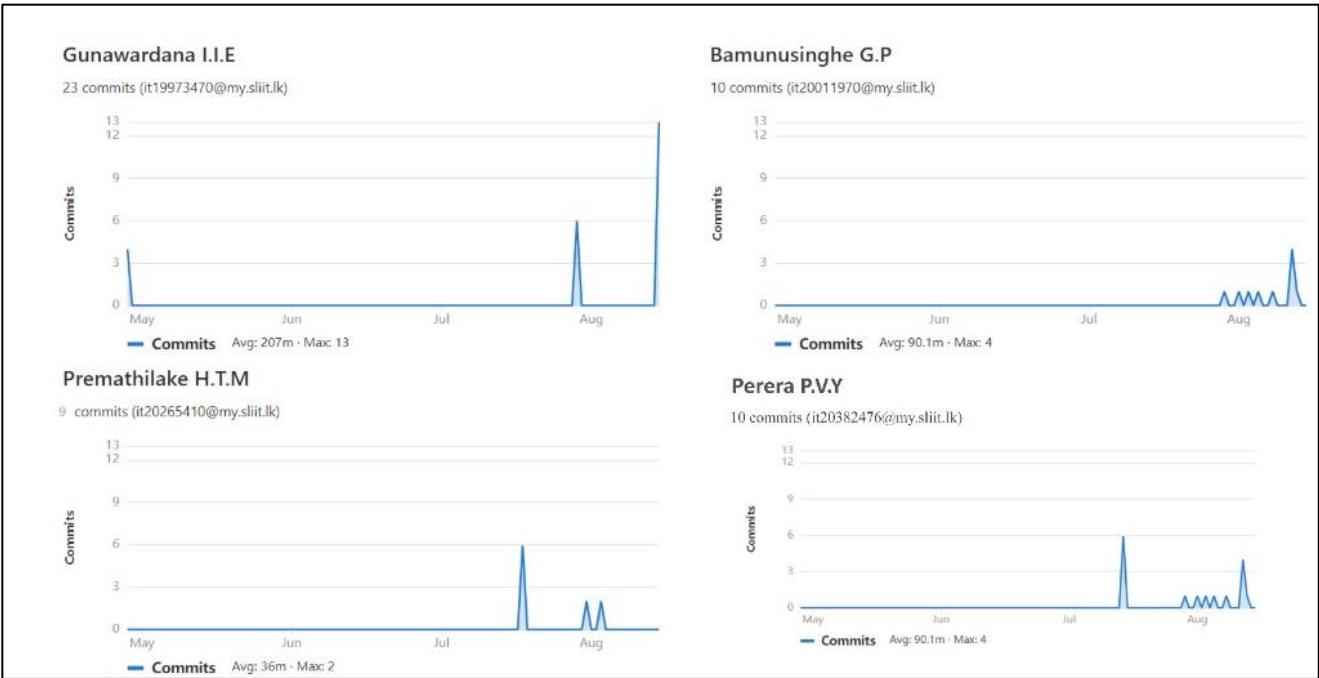
01:11:00

Chat People Raise View More Camera Mic Share Leave

Perera P.V.Y. it20382476 Bamunusinghe G.P. it20011970



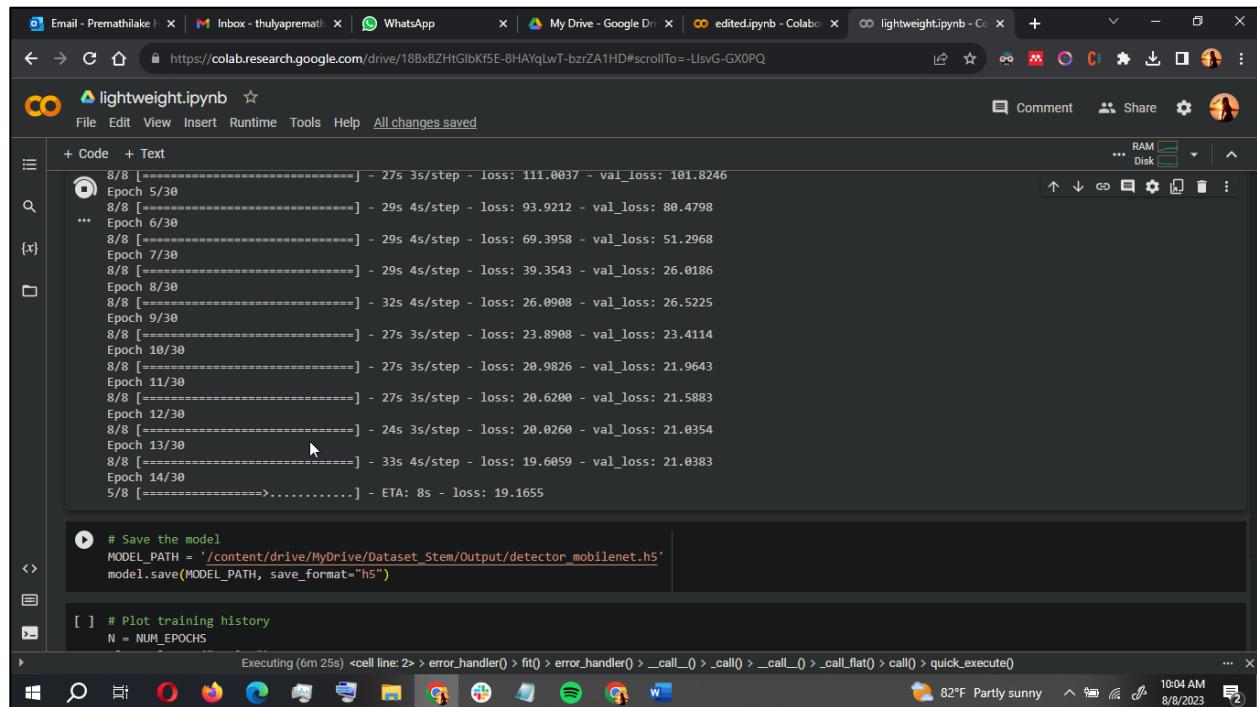
7 GITLAB GRAPHS



8 DEVELOPED PROTOTYPE

Developed lightweight model based on ResNet50 model to identify the tea stem.

```
112 # Load MobileNetV2 model with pre-trained weights (excluding top layers)
113 base_model = MobileNetV2(weights='imagenet', include_top=False, input_shape=(224, 224, 3))
114
115 # Add your custom regression head
116 x = base_model.output
117 x = GlobalAveragePooling2D()(x) # Global average pooling layer
118 x = Dense(1024, activation='relu')(x)
119 x = Dense(256, activation='relu')(x)
120 x = Dense(32, activation='relu')(x)
121 predictions = Dense(2)(x) # Output layer with 2 units for x and y coordinates
122
123 # Create the model
124 model = Model(inputs=base_model.input, outputs=predictions)
125
126 # Freeze MobileNetV2 layers
127 for layer in base_model.layers:
128     layer.trainable = False
129
130 # Compile the model
131 INIT_LR = 1e-4
132 NUM_EPOCHS = 30
133 BATCH_SIZE = 62
134 loss_fn = Huber()
135 opt = Adam(INIT_LR)
136 model.compile(loss=loss_fn, optimizer=opt)
137 print(model.summary())
138
139 # Train the model
140 H = model.fit(
141     trainImages, trainTargets,
142     validation_data=(valImages, valTargets),
143     batch_size=BATCH_SIZE,
```

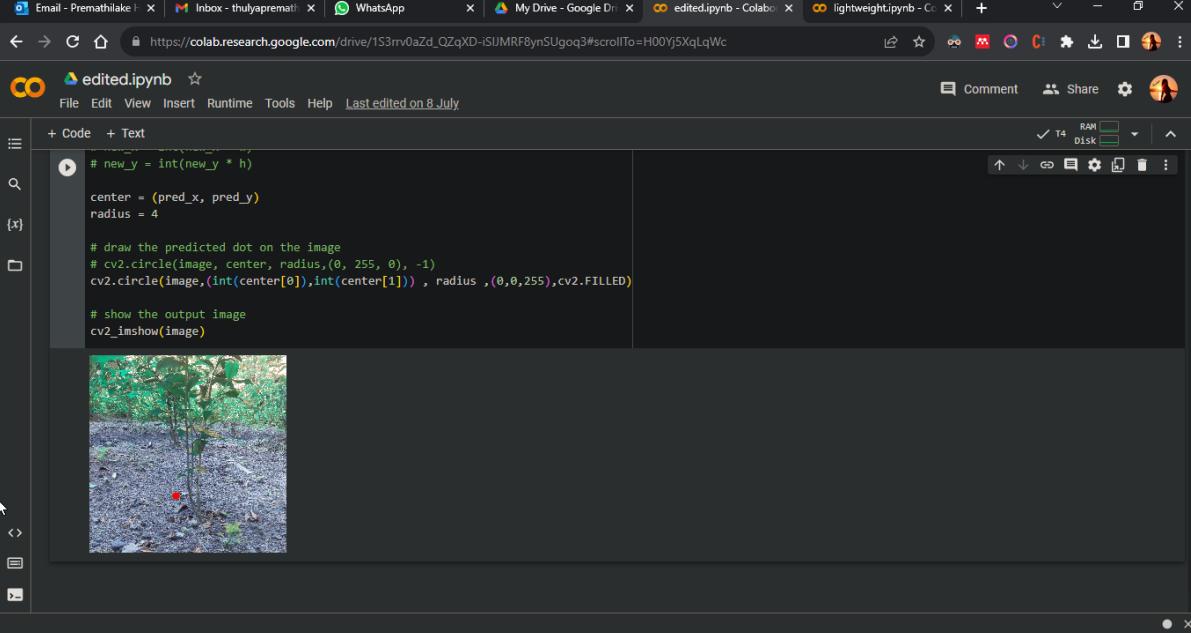


The screenshot shows a Google Colab notebook titled "lightweight.ipynb". The code cell contains the script provided above, which trains a model using MobileNetV2 as a base and adds a custom regression head. The output of the cell shows training logs for 30 epochs, with metrics like loss and validation loss displayed. Below the code cell, there is another cell containing code to save the trained model and plot training history.

```
# Save the model
MODEL_PATH = '/content/drive/MyDrive/Dataset_Steem/Output/detector_mobilenet.h5'
model.save(MODEL_PATH, save_format="h5")
```

```
[ ] # Plot training history
N = NUM_EPOCHS
```

Compared the ResNet50 model answer with the developed lightweight model, which is MobileNetV2.

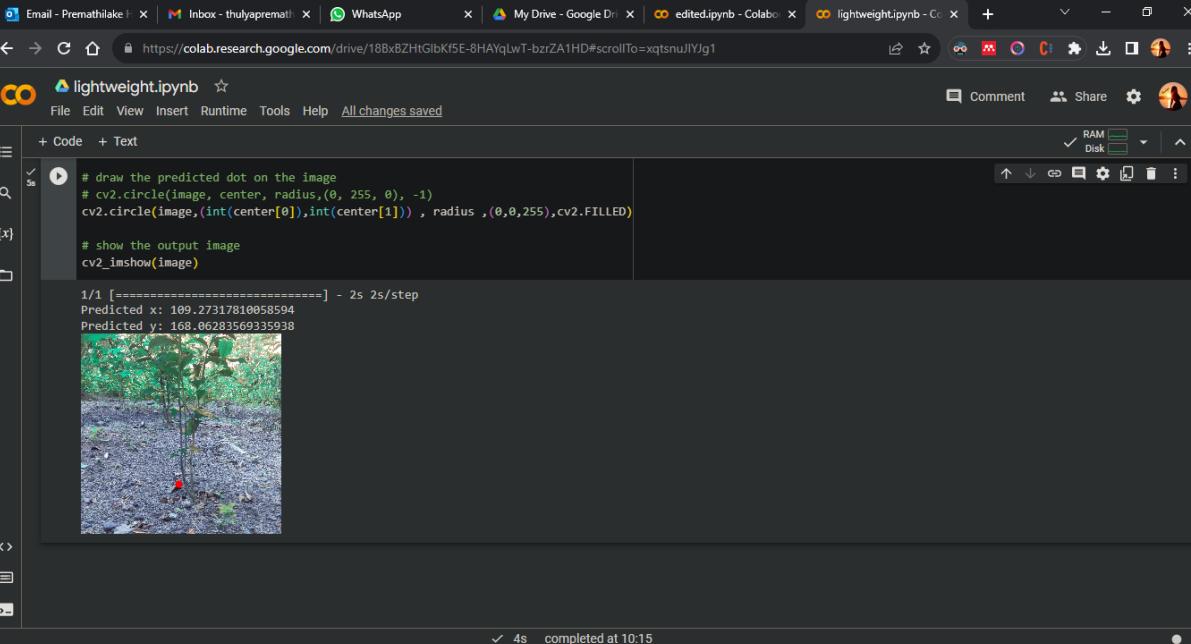


```
# new_y = int(new_y * h)
center = (pred_x, pred_y)
radius = 4

# draw the predicted dot on the image
# cv2.circle(image, center, radius,(0, 255, 0), -1)
cv2.circle(image,(int(center[0]),int(center[1])), radius ,(0,0,255),cv2.FILLED)

# show the output image
cv2_imshow(image)
```

ResNet50 model answer



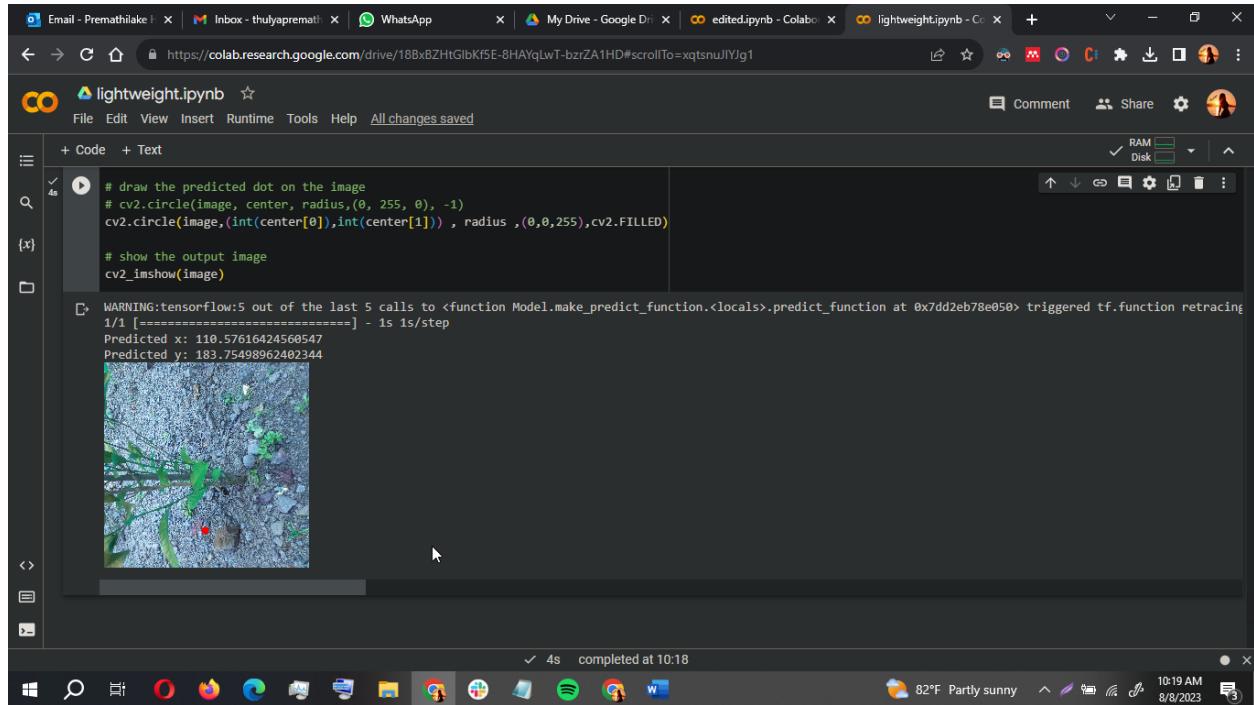
```
# draw the predicted dot on the image
# cv2.circle(image, center, radius,(0, 255, 0), -1)
cv2.circle(image,(int(center[0]),int(center[1])), radius ,(0,0,255),cv2.FILLED)

# show the output image
cv2_imshow(image)
```

1/1 [=====] - 2s 2s/step
Predicted x: 109.27317810058594
Predicted y: 169.06283569335928

MobileNetV2 model answer

While developing the MobileNetV2 model encountered the error below.



The screenshot shows a Google Colab notebook titled "lightweight.ipynb". The code cell contains the following Python code:

```
# draw the predicted dot on the image
# cv2.circle(image, center, radius,(0, 255, 0), -1)
cv2.circle(image,(int(center[0]),int(center[1])), radius ,(0,0,255),cv2.FILLED)

# show the output image
cv2.imshow(image)
```

Below the code, there is an error message:

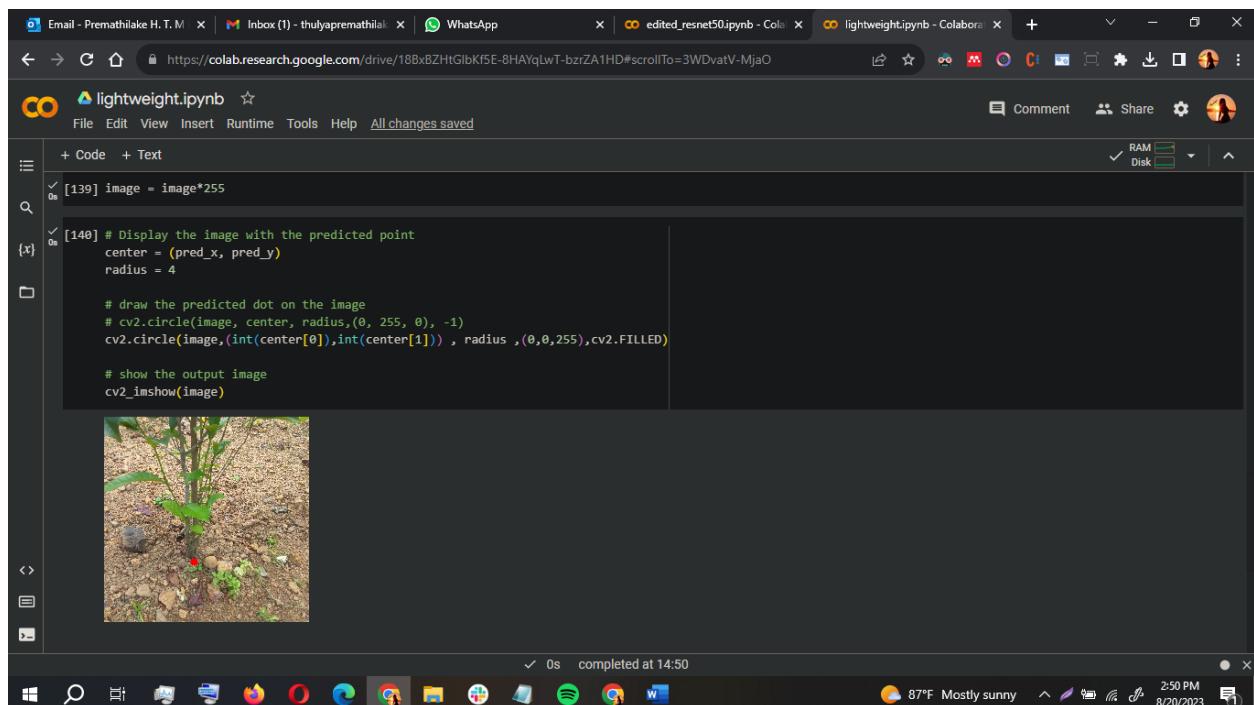
```
WARNING:tensorflow:5 out of the last 5 calls to <function Model.make_predict_function.<locals>.predict_function at 0x7dd2eb78e050> triggered tf.function retracing
1/1 [=====] - 1s 1s/step
```

Following the message are the predicted coordinates:

```
Predicted x: 110.57616424560547
Predicted y: 183.75498962402344
```

The output image shows a small red dot placed on a green plant in a soil background.

Then it was fixed by using some of the online resources.



The screenshot shows a Google Colab notebook titled "lightweight.ipynb". The code cell contains the following Python code:

```
[139] image = image*255

[140] # Display the image with the predicted point
center = (pred_x, pred_y)
radius = 4

# draw the predicted dot on the image
# cv2.circle(image, center, radius,(0, 255, 0), -1)
cv2.circle(image,(int(center[0]),int(center[1])), radius ,(0,0,255),cv2.FILLED)

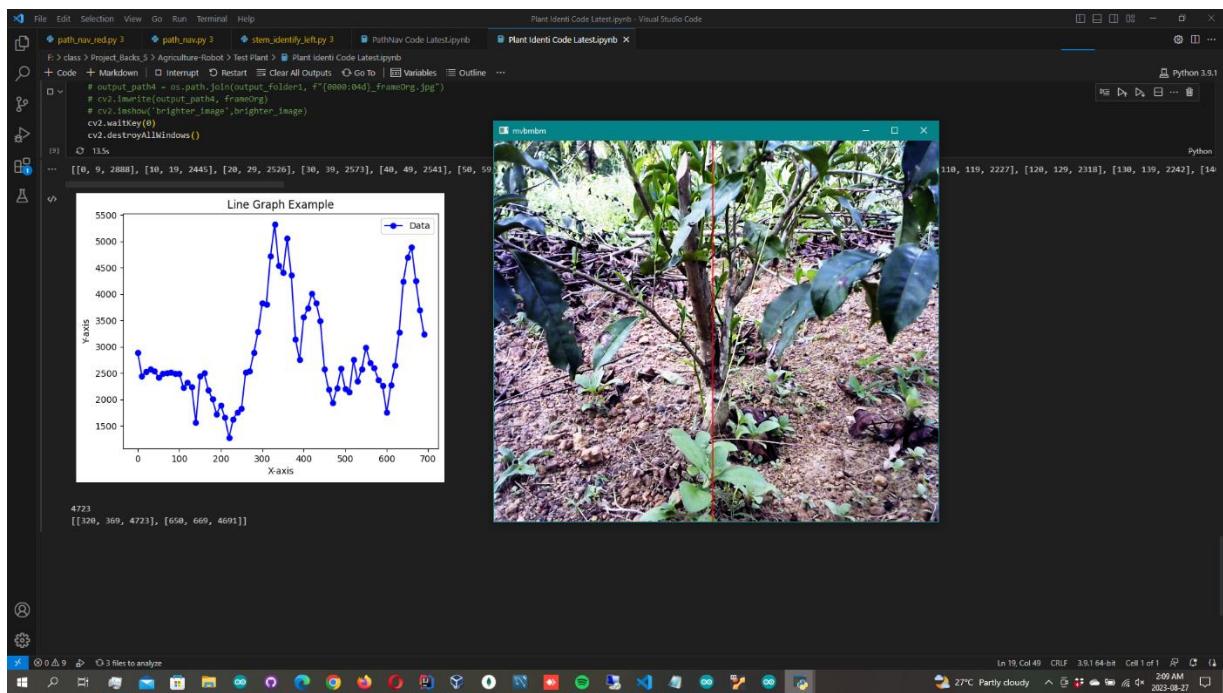
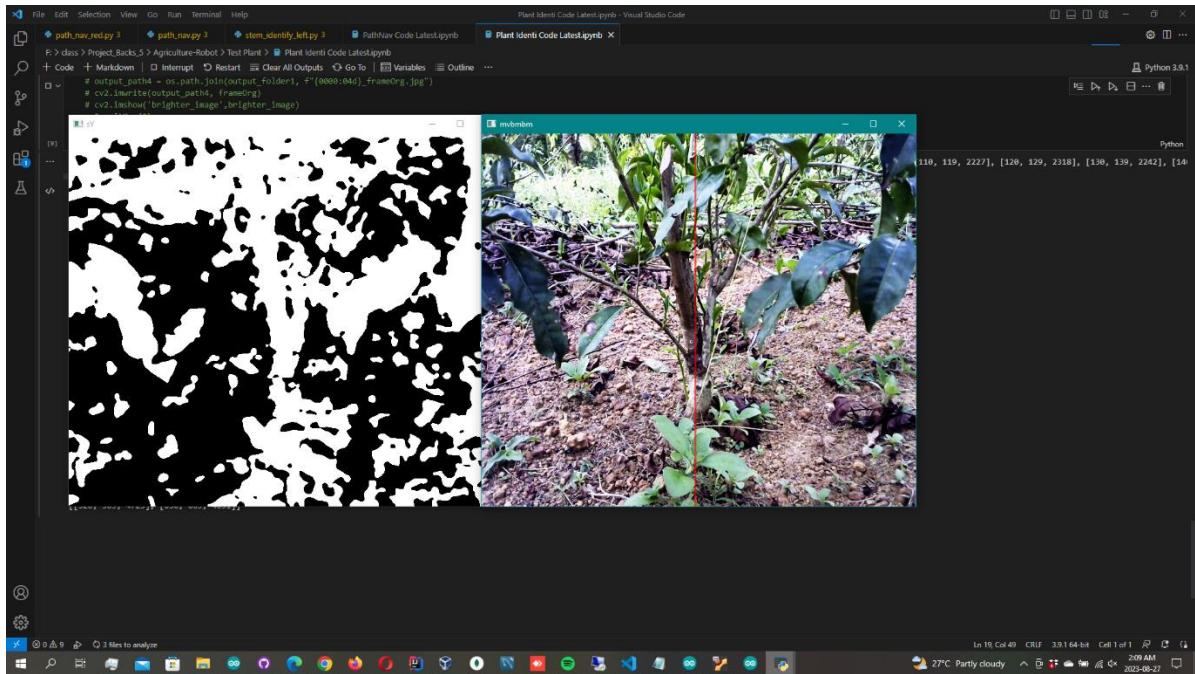
# show the output image
cv2.imshow(image)
```

The output image shows a small red dot placed on a green plant in a soil background, similar to the one in the previous screenshot but with a different background texture.

But due to the high resource consumption in the model, implemented a classic computer vision-based approach to identify the tea stem.

```
stem_identify_left (1).py X Workspace Trust
C: > Users > HP > Downloads > stem_identify_left (1).py
  0y
  70     # Convert org frame
  71     frame = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
  72
  73     sobel_x = cv2.Sobel(frame, cv2.CV_64F, 1, 0, ksize=3)
  74
  75     frame = cv2.bitwise_not(frame)
  76
  77     threshold_value=120
  78     ret,frame=cv2.threshold(frame,threshold_value,255, cv2.THRESH_BINARY)
  79
  80     frame[frame < threshold_value] = 0
  81     frame[frame ≥ threshold_value] = 255
  82
  83     kernel=np.ones((2,2),np.uint8)
  84     frame=cv2.erode(frame,kernel,iterations=3)
  85
  86     blur = cv2.GaussianBlur(frame,(25,25),0)
  87     frame = cv2.threshold(blur, 100, 255, cv2.THRESH_BINARY)[1]
  88
  89
  90     areas = stats[1:,cv2.CC_STAT_AREA]
  91
  92     frame = np.zeros((labels.shape), np.uint8)
  93
  94     for i in range(0, nlabels - 1):
  95         |   frame[labels == i + 1] = 255
  96
  97     res2=frame
  98     frameCpy = frameOrg.copy()
  99     pixel_arr = []
 100    # loop over the image
 101    temp_column_number = -1
 102    for column_number in range(0, image_width):
 103        if temp_column_number == -1:
 104            |   temp_column_number = column_number
 105            count = count + 1
 106            column_values = frame[:image_width-100 + 1, column_number]
 107            column_pixel_count = column_pixel_count + len(column_values[column_values == 255])
 108
 109    data = np.array(y)
 110    # Find peaks using scipy's find_peaks function
 111    # print(pixel_arr)
 112    temp_pixel_arr = []
 113    for i in range(0, len(pixel_arr)):
 114        if pixel_arr[i][2] ≥ average_value:
 115            |   temp_pixel_arr.append(pixel_arr[i])
 116
 117    pixel_arr = list(temp_pixel_arr)
 118
 119
 120    def ascByPixelNumber(k):
 121        |   return k[0]
 122
 123
 124    pixel_arr.sort(key=ascByPixelNumber)
```

Accurate result of the classic computer vision approach.



Plant Identi Code Latest.ipynb - Visual Studio Code

```
File Edit Selection View Go Run Terminal Help
path_nav_replay 3 path_nav.py 3 stem_identity_leftpy 3 PathNav Code Latest.ipynb Plant Identi Code Latest.ipynb
F: > class > Project_Backs_5 > Agriculture-Robot > Test Plant > Plant Identi Code Latest.ipynb
+ Code + Markdown | ⚡ Interrupt ⚡ Restart ⚡ Clear All Outputs ⚡ Go To ⚡ Variables ⚡ Outline ...
Python 3.9.1
```

```
import cv2
import numpy as np
import os
import matplotlib.pyplot as plt
from scipy.signal import find_peaks

# Load the image
# output_folder = 'frames_output'
# output_folder2 = 'frames_output2'
# output_folder3 = 'frames_output3'
# os.makedirs(output_folders, exist_ok=True)
image_width = 700
column_width = 70
# pixel_limit = 100
# pixel_limit2 = 500
segments_gap=50
segmented_column_width = round(image_width / column_width)

frame = cv2.imread('IPC_2023-08-16-15.59.26.1298.jpg')
frameOrg=frame
frame = cv2.resize(frame, (image_width,image_width*100))
# frame=cv2.GaussianBlur(frame,(3,3),0)
# lap=cv2.Laplacian(frame,cv2.CV_64F)
# lap=cv2.convertScaleAbs(lap)
# frameOrg=frame
b, g, r = cv2.split(frame)
# brightness_reduction_factor = 0.9

# Perform pixel-wise addition to change brightness
# brighter_image = np.clip(frame - (255 * (1 - brightness_reduction_factor)), 0, 255)

## Apply histogram equalization to each channel separately
b_eq = cv2.equalizeHist(b)
g_eq = cv2.equalizeHist(g)
r_eq = cv2.equalizeHist(r)

## Merge the equalized channels back to form the enhanced color image
frame = cv2.merge([b_eq, g_eq, r_eq])
frameOrg=frame

## Convert the BGR image to HSV image.
hsv = cv2.cvtColor(frame, cv2.COLOR_BGR2HSV)

## frame = cv2.medianBlur(frame,3)
## frame = cv2.boxFilter(frame,-1,(10,10))

## Set the lower and upper HSV values according to the value selected
# 3 files to analyze
```

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Plant Identi Code Latest.ipynb - Visual Studio Code

```
File Edit Selection View Go Run Terminal Help
path_nav_replay 3 path_nav.py 3 stem_identity_leftpy 3 PathNav Code Latest.ipynb Plant Identi Code Latest.ipynb
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```

```
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## Set the lower and upper HSV values according to the value selected
# 3 files to analyze
```

In 19, Col 49 CRLF 3.9.1 64-bit Cell 1 of 1 207 AM 27°C Partly cloudy 2023-08-27

Inaccurate result of the classic computer vision approach.

