# MACHINE LEARNING APPROACH TO DETECT & ANNOTATE EYE DISEASES USING RETINAL IMAGES

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Status Document

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# 1. Project progress

## 1.1 Dataset

The dataset was obtained from Kaggle and comprises a total of 15,900 OCT images. The dataset is divided as follows:

- 7,950 OCT images with AMD (Age-Related Macular Degeneration)
- 7,950 Normal OCT images

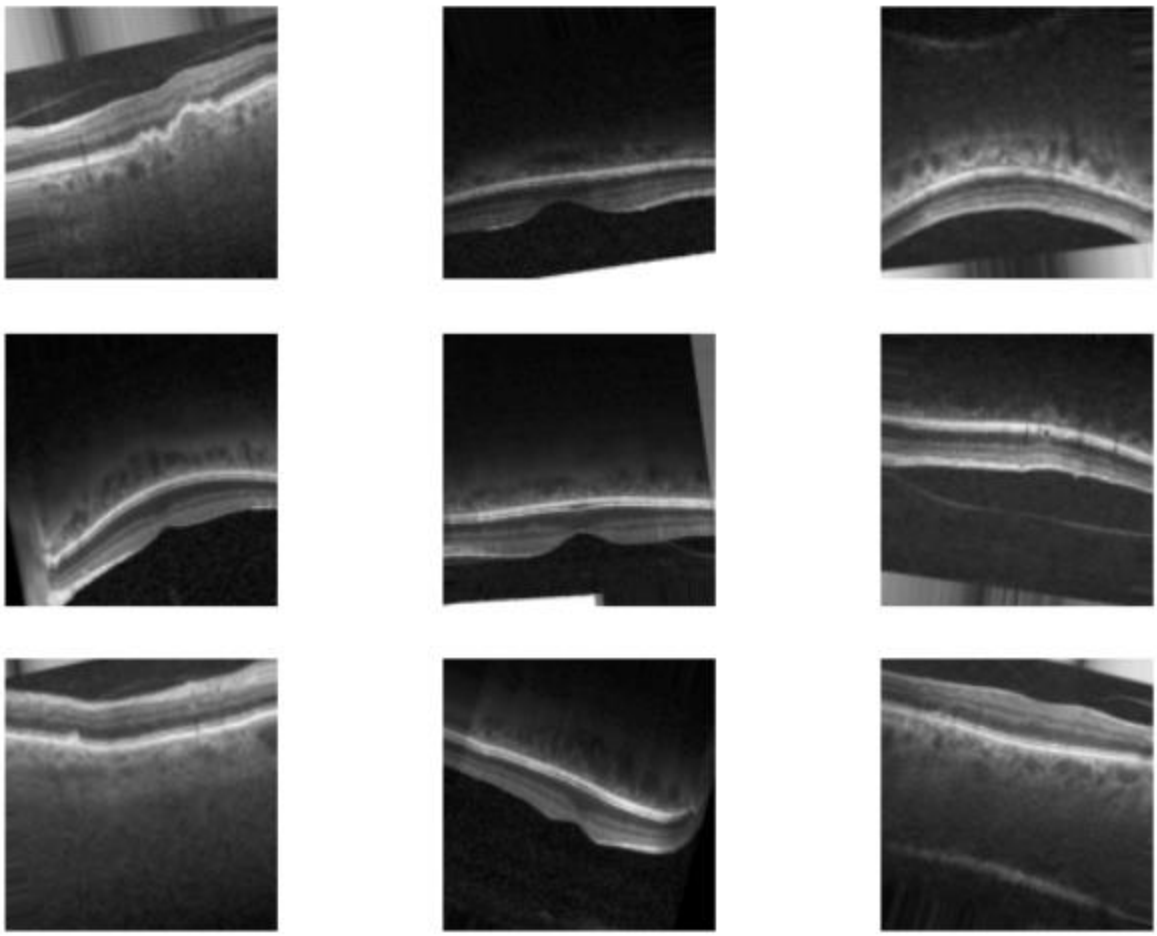

*Figure 1 AMD and Normal OCT images*

## 1.2 Age-Related Macular Degeneration Detection Model

Convolutional neural network (CNN) was utilized to detect symptoms of age-related macular degeneration (AMD) in retinal OCT images. The CNN architecture consisted of multiple layers: three 2D convolutional layers with increasing filter sizes (32, 64, and 128), each followed by max-pooling layers to reduce spatial dimensions. The feature maps were flattened and fed into a fully connected layer with 128 neurons and ReLU activation. To prevent overfitting, a dropout layer with a dropout rate of 0.5 was employed. The output layer had a single neuron with sigmoid activation for binary classification. The model was compiled with the Adam optimizer and binary cross-entropy loss, and accuracy was used as the evaluation metric. This model design aimed to effectively capture relevant patterns and features in retinal OCT images to accurately detect AMD symptoms.

```python
from keras.models import Sequential
from keras.layers import Conv2D, MaxPooling2D, Flatten, Dense, Dropout

# Define the model architecture
model = Sequential()
model.add(Conv2D(32, (3, 3), activation='relu', input_shape=(224, 224, 1)))
model.add(MaxPooling2D((2, 2)))
model.add(Conv2D(64, (3, 3), activation='relu'))
model.add(MaxPooling2D((2, 2)))
model.add(Conv2D(128, (3, 3), activation='relu'))
model.add(MaxPooling2D((2, 2)))
model.add(Flatten())
model.add(Dense(128, activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(1, activation='sigmoid'))

# Compile the model
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])

model.summary()
```

*Figure 2 Model structure 1*

```python
num_epochs = 20  # define number of epochs

history = model.fit(train_generator,
                    steps_per_epoch=len(X_train) // batch_size,
                    epochs=num_epochs,
                    validation_data=val_generator,
                    validation_steps=len(X_val) // batch_size)
```

*Figure 3 Model structure 2*

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 222, 222, 32)      320

 max_pooling2d (MaxPooling2D  (None, 111, 111, 32)     0
 )

 conv2d_1 (Conv2D)           (None, 109, 109, 64)      18496

 max_pooling2d_1 (MaxPooling  (None, 54, 54, 64)       0
 2D)

 conv2d_2 (Conv2D)           (None, 52, 52, 128)       73856

 max_pooling2d_2 (MaxPooling  (None, 26, 26, 128)      0
 2D)

 flatten (Flatten)           (None, 86528)             0

 dense (Dense)               (None, 128)               11075712

 dropout (Dropout)           (None, 128)               0

 dense_1 (Dense)             (None, 1)                 129

=================================================================
Total params: 11,168,513
Trainable params: 11,168,513
Non-trainable params: 0
```

*Figure 4 Model summery*

## 2. Project View

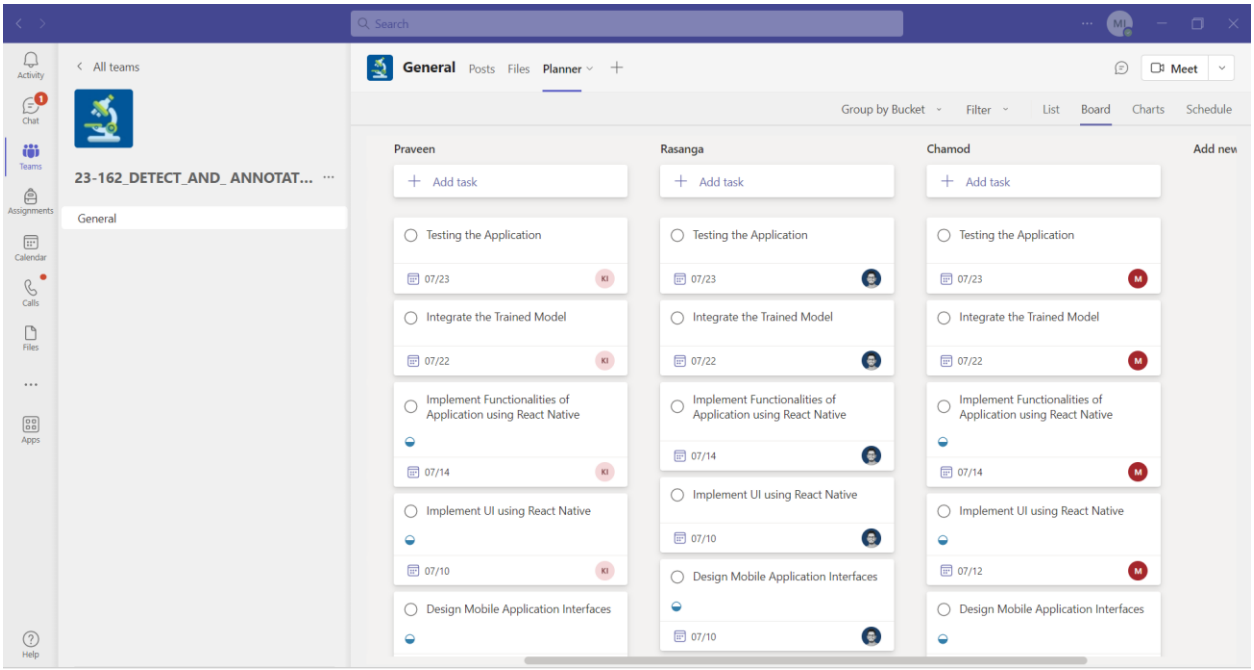


*Figure 5 : Planner – Board View*

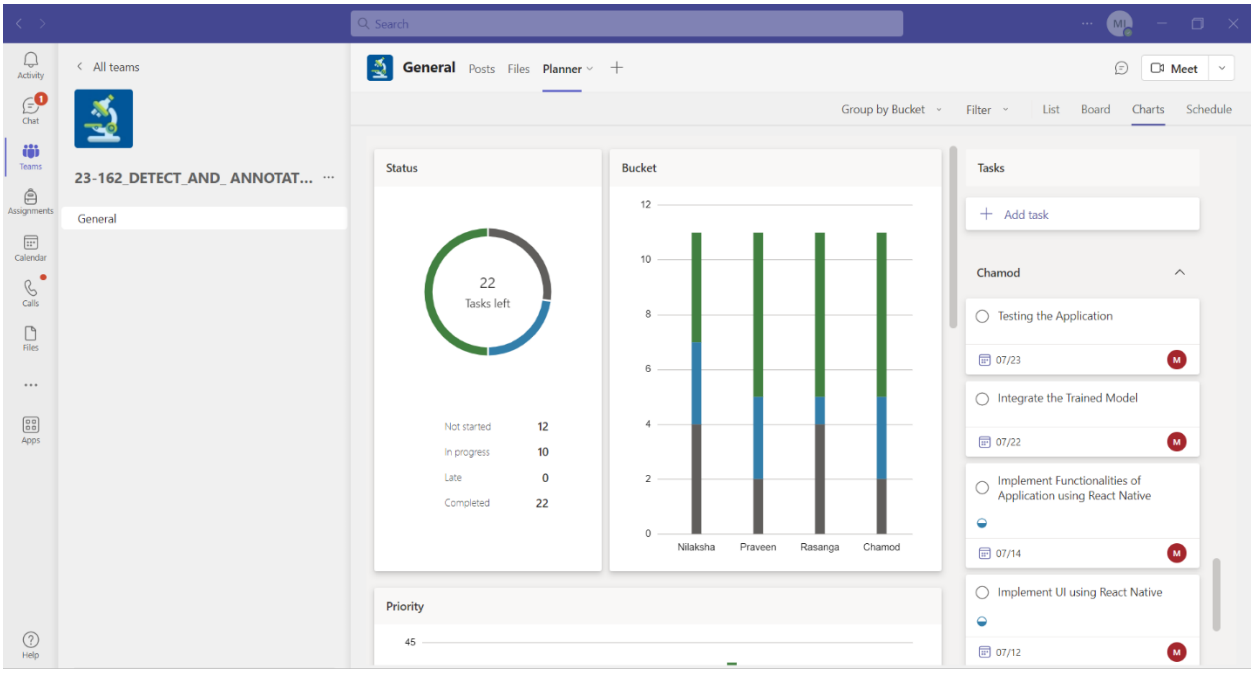


*Figure 6: Planner – Chart View*

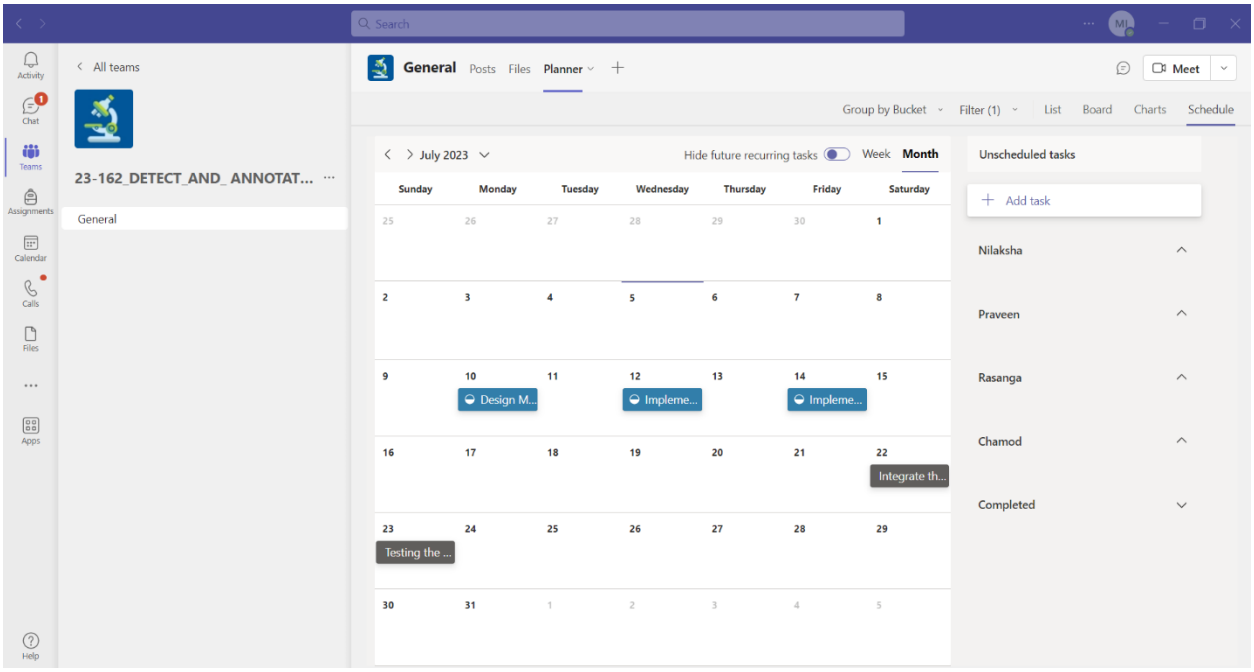


*Figure 7: Planner – Schedule View*

## 3. Updated Gantt chart

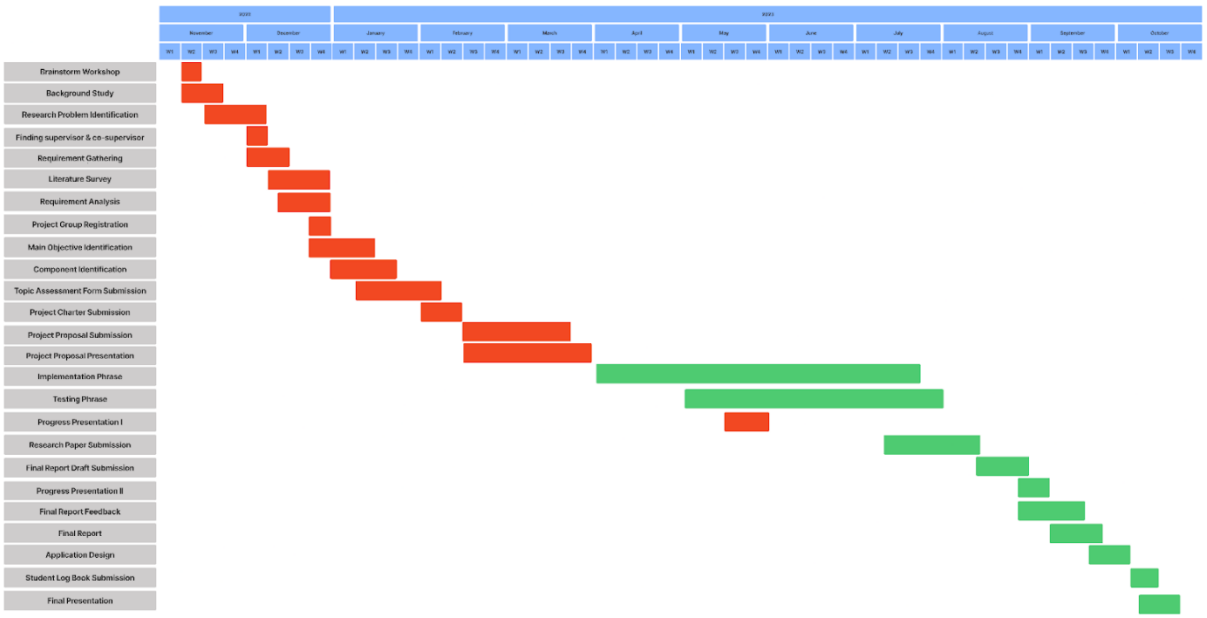


*Figure 8: Gantt Chart*

## 4. Screenshots of chats and calls of MS Teams

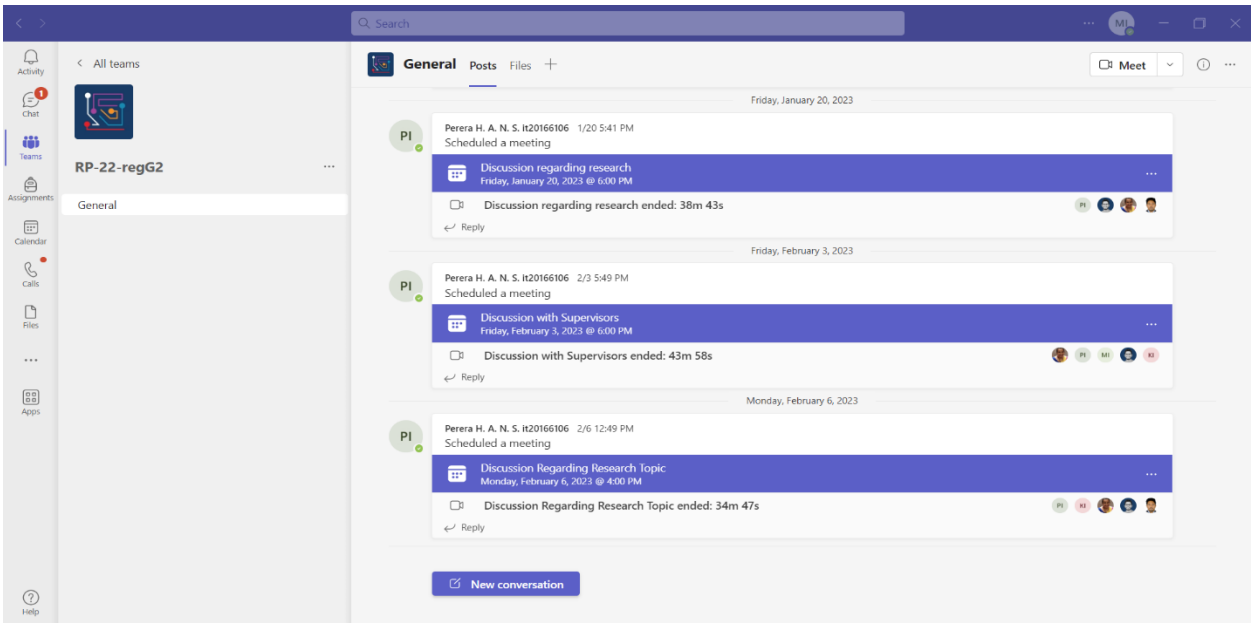


*Figure 9: Screenshots of MS Teams Group*

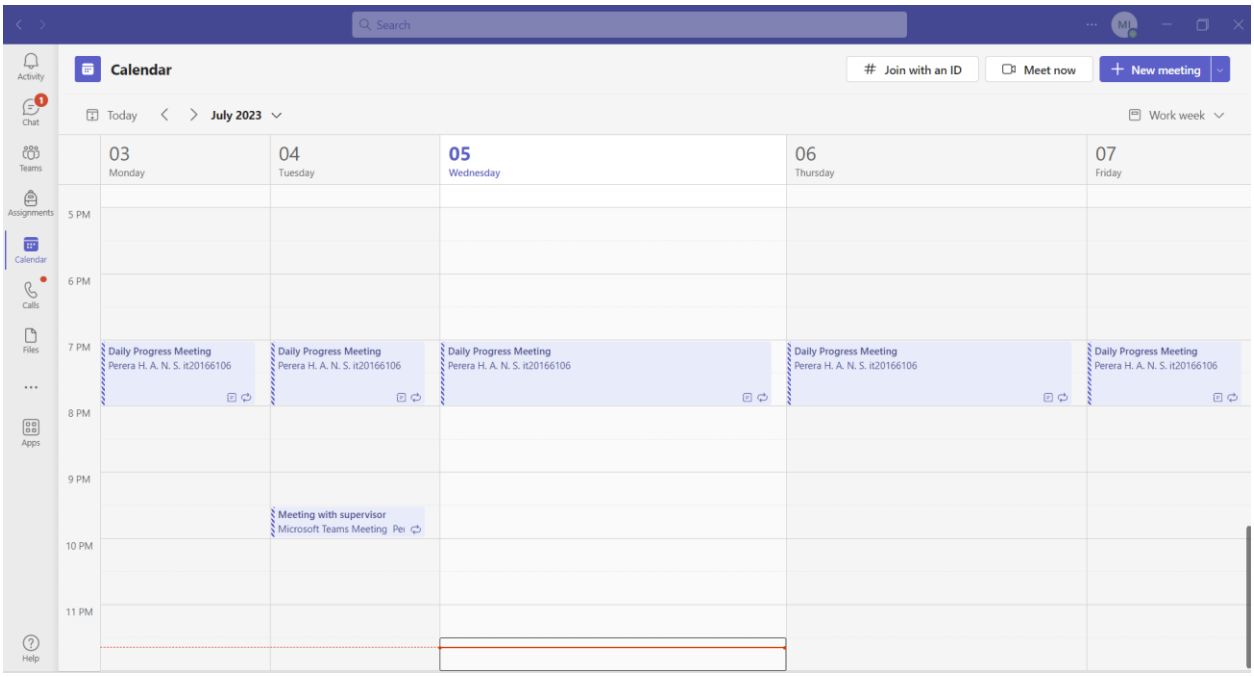


*Figure 10: Screenshots of MS Teams Calendar*

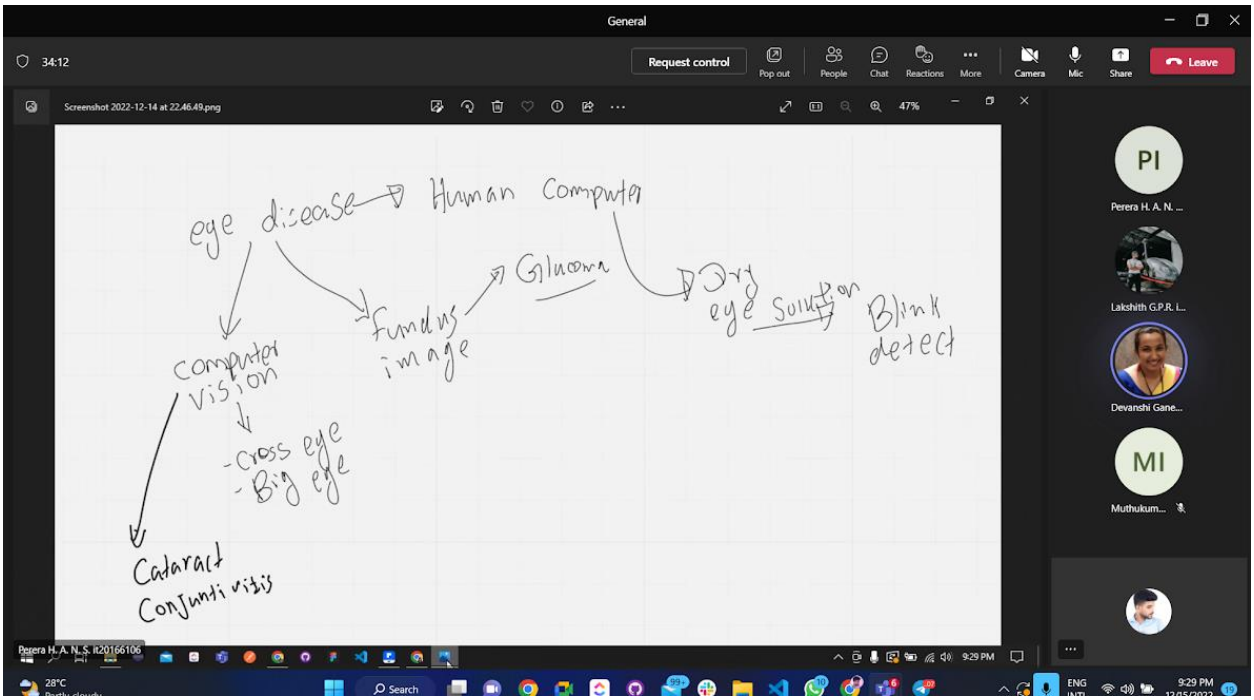


*Figure 11: Screenshots of Group Meeting with Supervisor*