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# EMOTIONAL FACIAL RECOGNITION SYSTEM

ReflectAI

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**RESEARCH**  
**TECHNOLOGIES**  
**FUNCTIONALITY**  
**DESIGN**  
**TESTING**  
**SMART MIRROR**  
**REFLECTION**

**INTRODUCTION**

# INTRODUCTION

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## Creating a smart mirror that recognizes a users emotions.

In recent years, there has been a rapid advancement in the field of artificial intelligence (AI) and its various applications. This has led to an increased interest in exploring the potential of AI in various industries, including healthcare, finance, and transportation.





# RESEARCH

## Applications being used :

- Computer Vision - Computer vision is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from digital images, videos and other visual inputs
- Deep Learning - Deep learning is a method in artificial intelligence (AI) that teaches computers to process data in a way that is inspired by the human brain.
- The Internet of Things (IoT) describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.
- Raspberry Pi & Arduino - Arduino is an electronic board with a simple microcontroller, whereas Raspberry Pi is a full-fledged computer.

# TOOLS & TECHNOLOGIES

Various tools and technologies that I've used throughout my thesis:



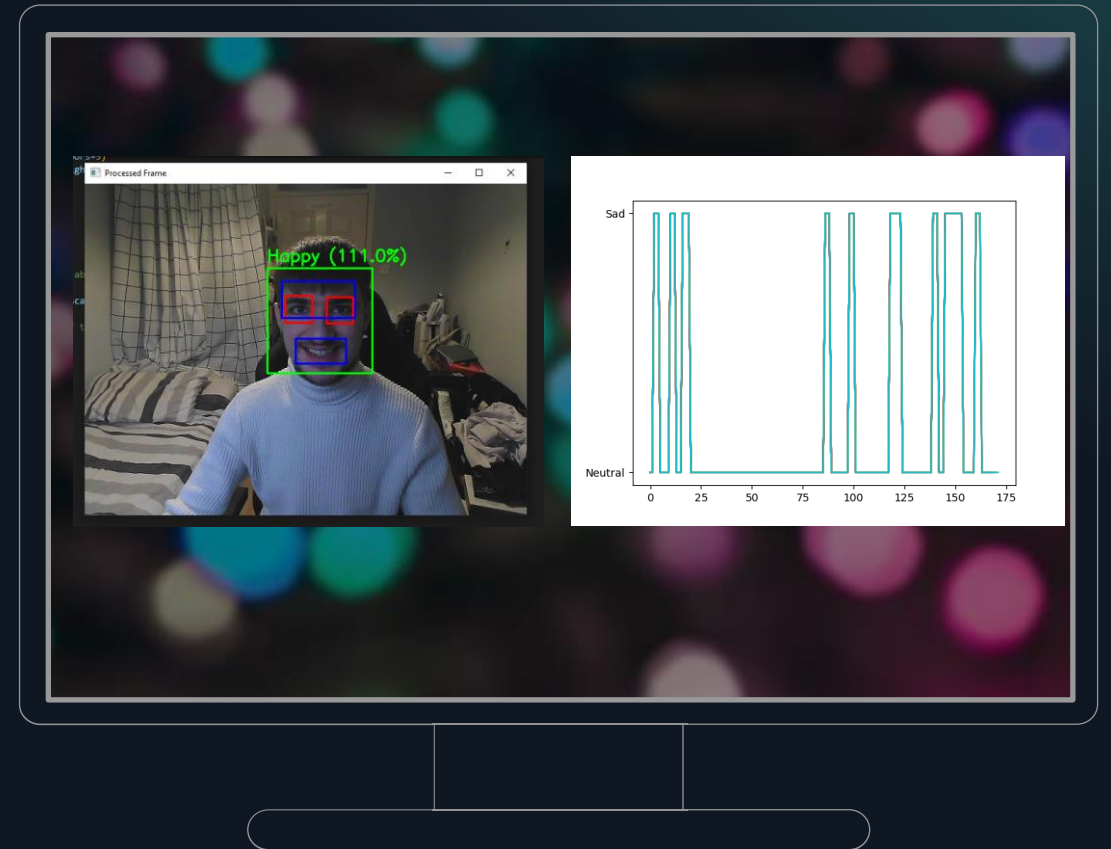
- Azure Cognitive Services
- OpenCV
- Python
- CSV
- Excel
- Pickle
- CV2
- DateTime
- DLib

- OpenFace
- Facial Feature Detection Scripts.
- Visual Studio Code, this is both an IDE and a text editor.
- GitHub / Git
- Facial emotion recognition system
- NumPy library for numerical operations
- Pandas library for data manipulation
- Matplotlib library for data visualization
- Artificial intelligence techniques

# FUNCTIONALITY

## Main functions that the system displays:

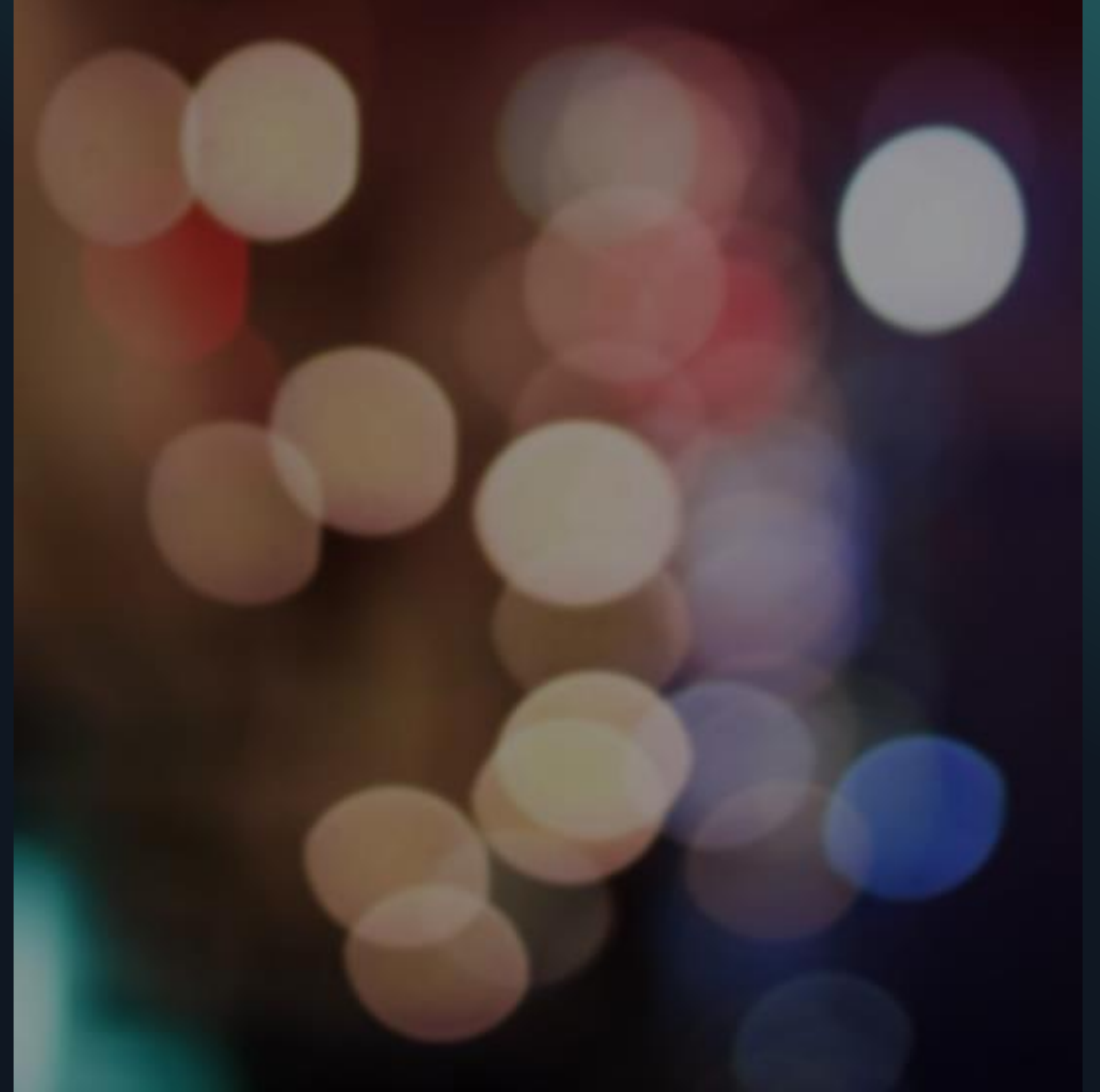
- The code uses OpenCV to access your webcam and then Haar Classifiers to detect your facial features.
- Custom Parameters set to detect emotions.
- Shows a Live Graph of the data its receiving based on the emotions you are displaying.
- Saves this data into 3 file types, CV2, Excel and PKL.
- Physical Mirror with touch screen technology through the use of an Infrared Frame.



# IMPLEMENTATION

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- Python
- OpenCV
- Azure Cognitive Services
- Raspberry Pi
- LED screen
- 2 Way Glass
- Monitor





```
# Replace <subscription_key> with your Azure Face API subscription key
subscription_key = "bb67bd956c014f3ea8cf89621c75de21"

# Replace <endpoint> with the endpoint for your Azure Face API instance
endpoint = "https://smartemotionalmirror.cognitiveservices.azure.com"

# Define headers for the API request, including the subscription key
headers = {
    'Content-Type': 'application/octet-stream',
    'Ocp-Apim-Subscription-Key': subscription_key
}

def recognize_emotion_and_face():
    """
    Recognize emotions and faces in a webcam video stream using Azure Face API

    Returns:
        dict: a dictionary of emotions and faces information or None if an error occurs
    """
    # Open a connection to the default webcam
```

# DESIGN

## How It was designed:

View:

- Clean and Simplistic.
- Clear view for ease of Understanding.
- Clear indications of facial features.

Code:

- Correct indentations.
- Commented each part.
- Organized folder structure.

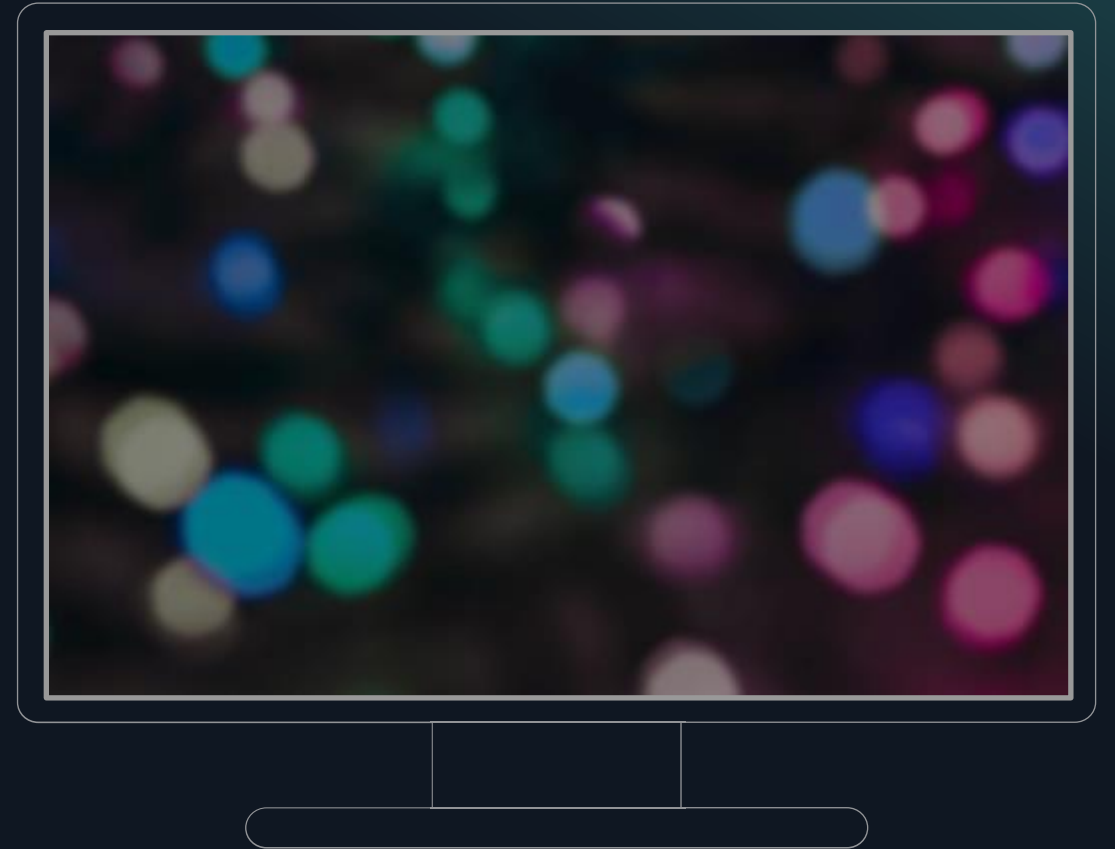


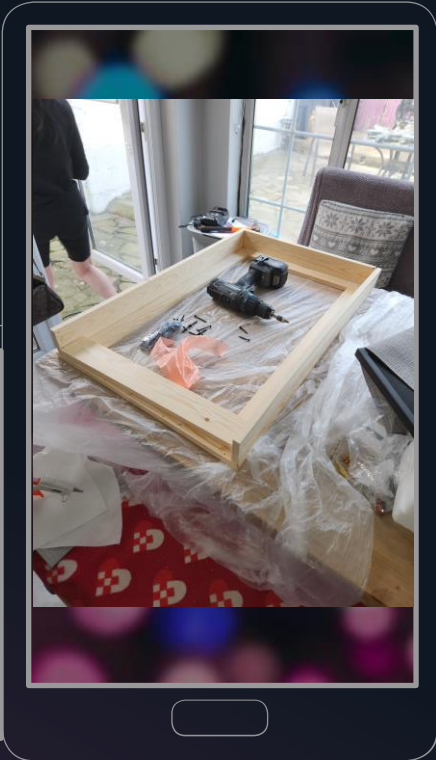
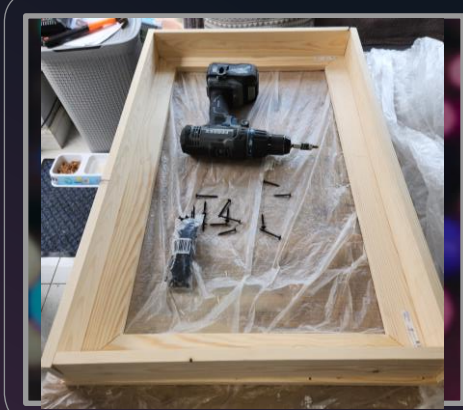


# TESTING

## Testing Techniques done:

- Testing done throughout the code.
- Utilizing the terminal.
- Fail safes installed.
- Error messages caught and displayed.
- Unit Testing.
- User Testing.





# SMART MIRROR

Physical component made – Smart Emotional Recognition Mirror:

- 15mm x 40mm planks of wood
- 3.5mm screws at various lengths
- Hand Saw
- Jigsaw Saw
- Single Bevel Sliding Saw
- 3mm thick acrylic 2-way mirror
- AOC 31.5" monitor
- Infrared Frame
- Raspberry Pi

# REFLECTION



Overall a success.

However would have loved to be able to develop more.

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# THANK YOU!

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