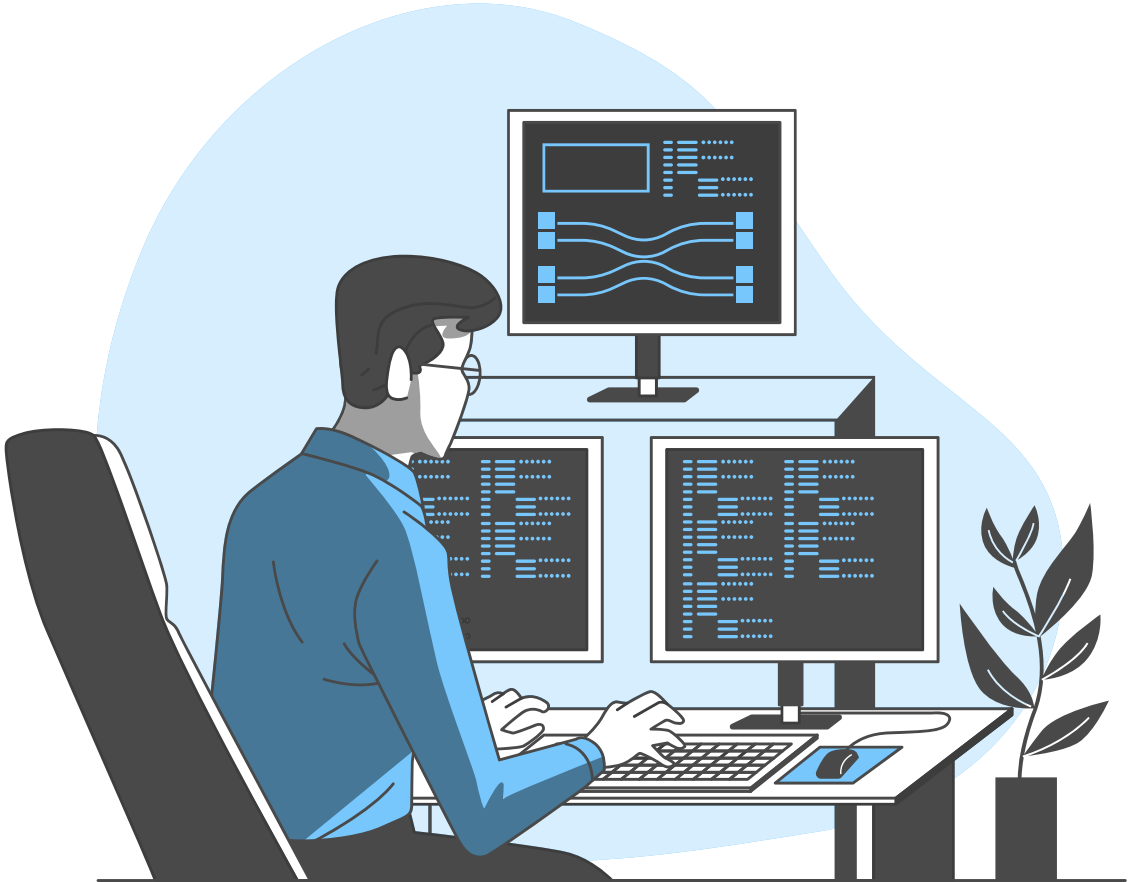


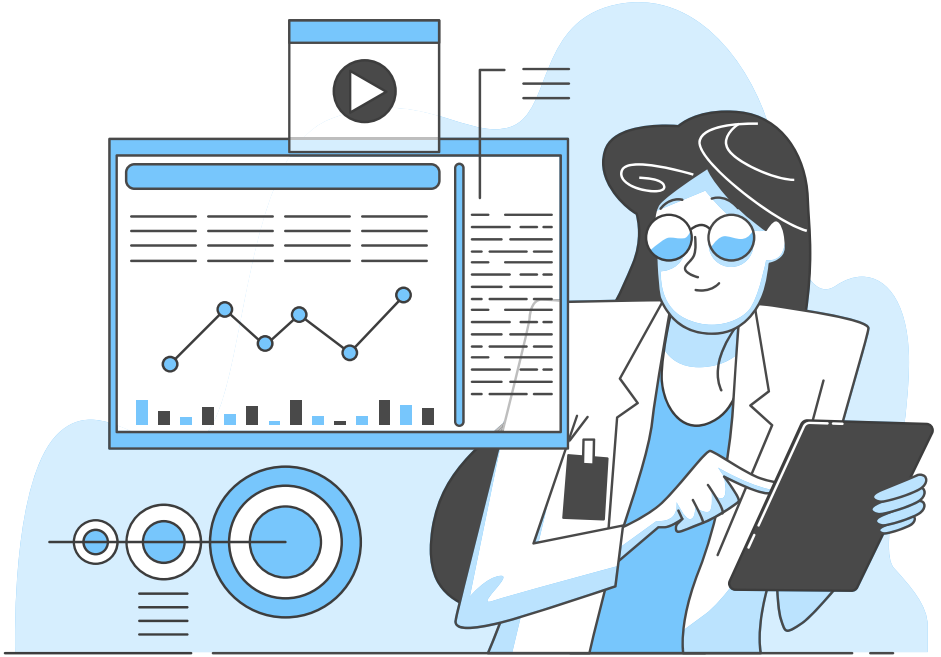
# Digital Health Assistant

## For Software Engineers

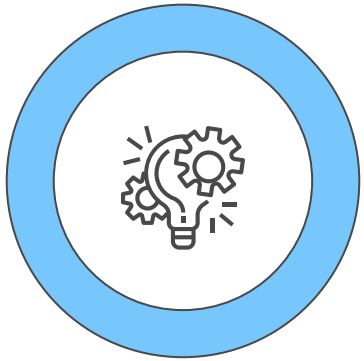
U.B.R.A. Gunaratne
19/ENG/023

# Table of Contents





# 01
# Background



# Problem

- Software engineers spend most of their time sitting on a chair staring at a screen.
- This causes many physical and mental health issues.
- Being less physically active, dehydration, bad posture and stress are common between them.

# Solution

## Reminders

This system reminds the user to take healthy actions, including stretching, keeping hydrated... etc.

...

## Physical Activities

The stretching exercises are made like a computer game to keep it interesting to be done.

...

## Stress Reduction

To reduce the stress the application suggests songs depend on the facial expressions of the user.

...

# Plant Monitoring

- According to WebMD.com gardening helps to reduce stress.
- This desktop application monitors a plant inside the room of the user and informs him about the status of that plant.
- This helps to keep a pleasant working environment also.

# Time Tracking

- The user also can log his work time and interval time to see his progress.

# DESK METER

HEALTH + PRODUCTIVITY

# 02
# Objectives

# Objectives

01

## Time Tracking

To help the user to keep track of the work time and rest time

02

## Physical Health

To provide the user with various physical activities to keep the physical health at a good level

03

## Mental Health

To promote the mental health of the user by suggesting songs based on the facial emotional features.

04

## Environment and Stress

To promote a pleasant working environment by helping the user to take care of a plant in the workplace by monitoring it.

# 03
# Engineering Aspect

# Engineering Aspect

## Engineering

Engineering is the application of science and mathematics to solve problems

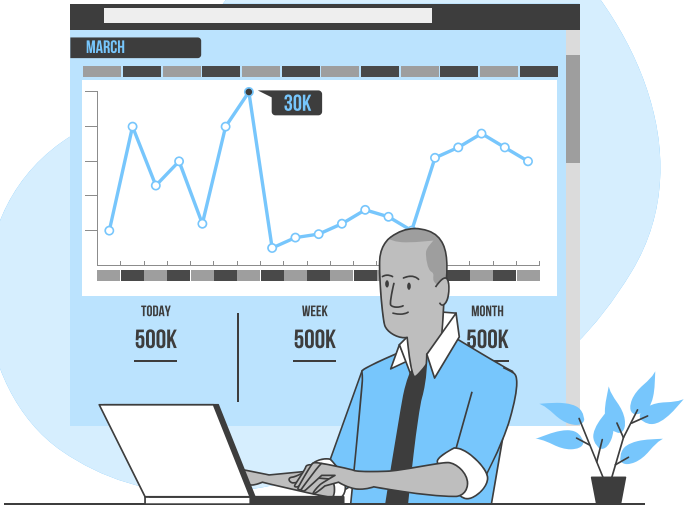
- In this project, the problems which are addressed are the mental and physical health problems with the software engineers.
- To provide solutions for them, many engineering aspects are planned to be integrated.
- Machine learning and computer vision are mainly used engineering aspects in this project.

# 04

# Methodology

# Scope and Requirements

This system is useful for any person who is sitting most of the day in front of a screen.




1. Song recommendation using facial expression detection.
2. Monitoring the health of a plant
3. Detecting hand and body movements to ensure the perfect body poses for stretching.
4. Notifying the user to hydrate, sit up and have a break.
5. Tracking the work time and storing the data.

# Scope and Requirements


1. Song recommendation using facial expression detection.
2. Monitoring the health of a plant
3. Detecting hand and body movements to ensure the perfect body poses for stretching.
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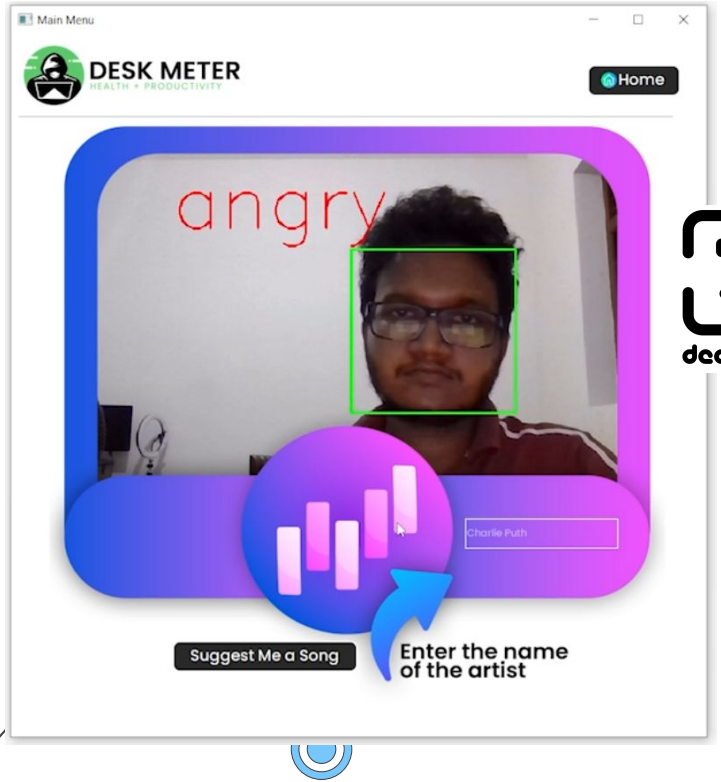
# Song recommendation using facial expression detection




deepface

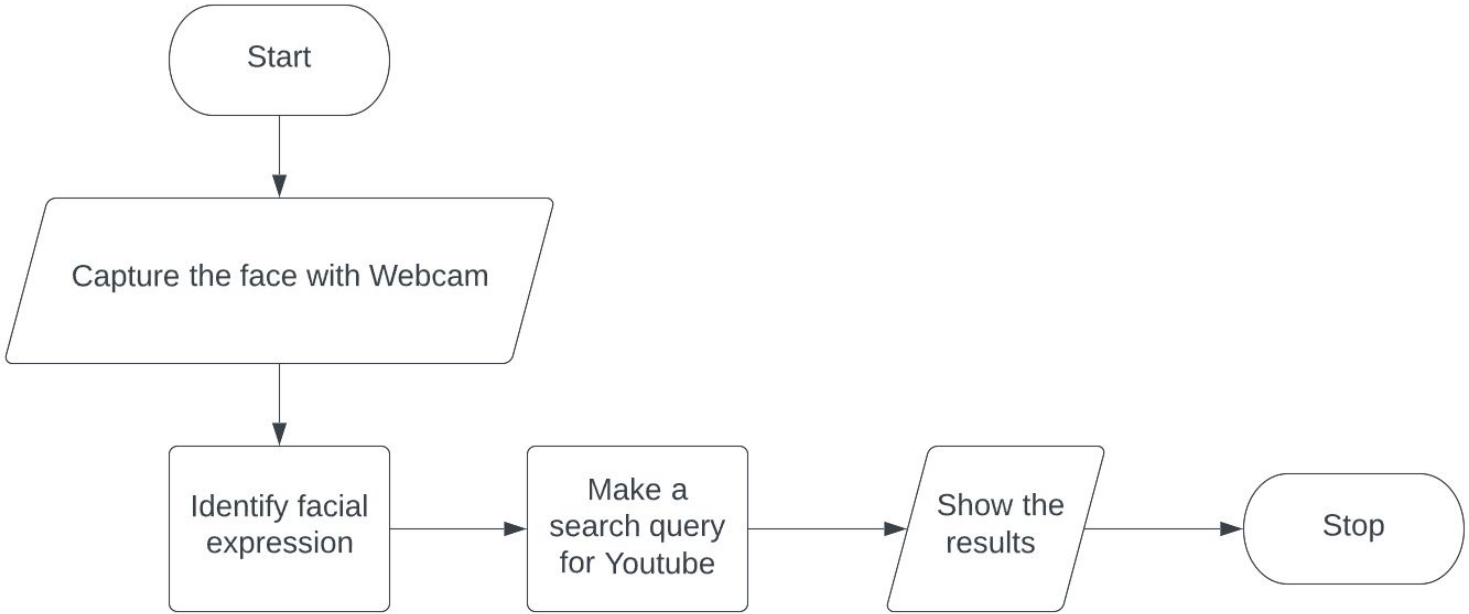
- Deepface is used
- Deepface is a lightweight face recognition and facial attribute analysis (age, gender, emotion and race) framework for python.
- Emotions : Happy, sad, angry, neutral, surprised
- Used libraries : Deepface and OpenCV (mainly aimed at real-time computer vision)

# Deepface


Facial Expression Dataset

- Accuracy 97%
- employs a nine-layer neural network with over 120 million connection weights
- trained on four million images uploaded by Facebook users

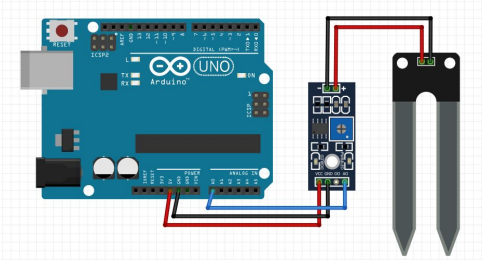
# Process

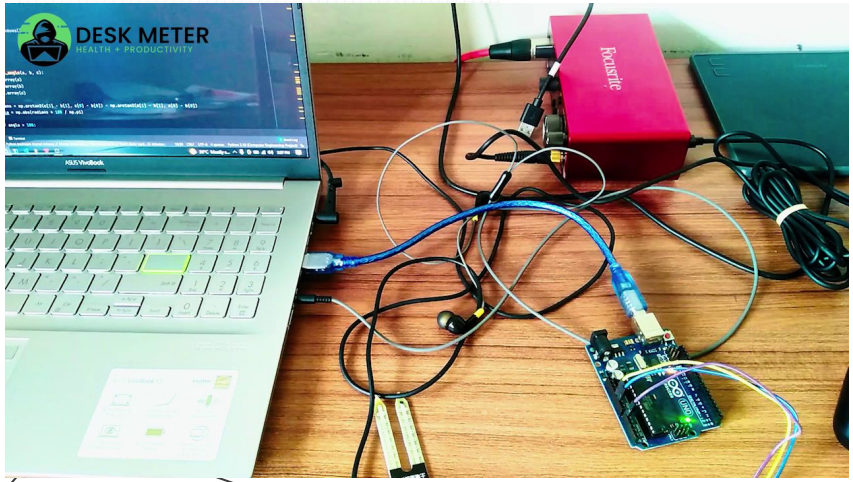

Start
Capture the face with Webcam
Identify facial expression
Make a search query for Youtube
Show the results
Stop

# Scope and Requirements


1. Song recommendation using facial expression detection.
2. Monitoring the health of a plant
3. Detecting hand and body movements to ensure the perfect body poses for stretching.
4. Notifying the user to hydrate, sit up and have a break.
5. Tracking the work time and storing the data.

# Monitoring the health of a plant

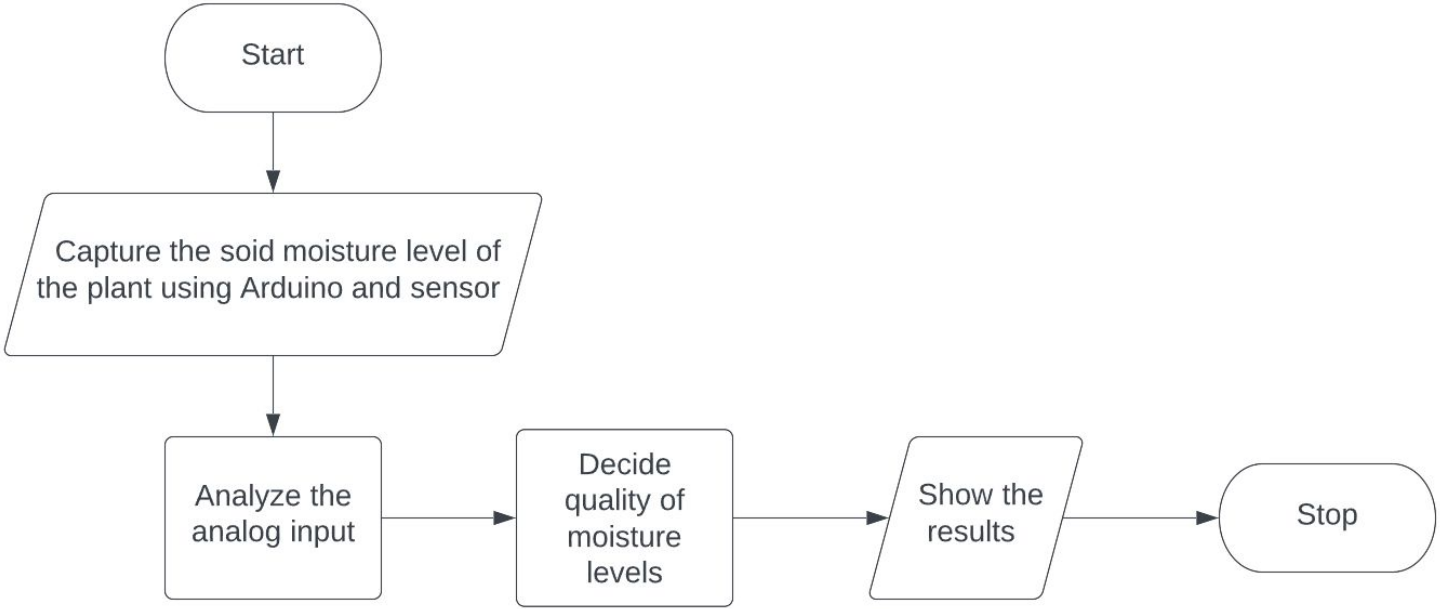





Soil Moisture Sensor

- Arduino Uno R3 with a Soil Moisture Sensor Module
- Used pyFirmata to program Arduino Uno with Python
- pyFirmata is a Python interface for Firmata protocol. Communicates with the Arduino development board.

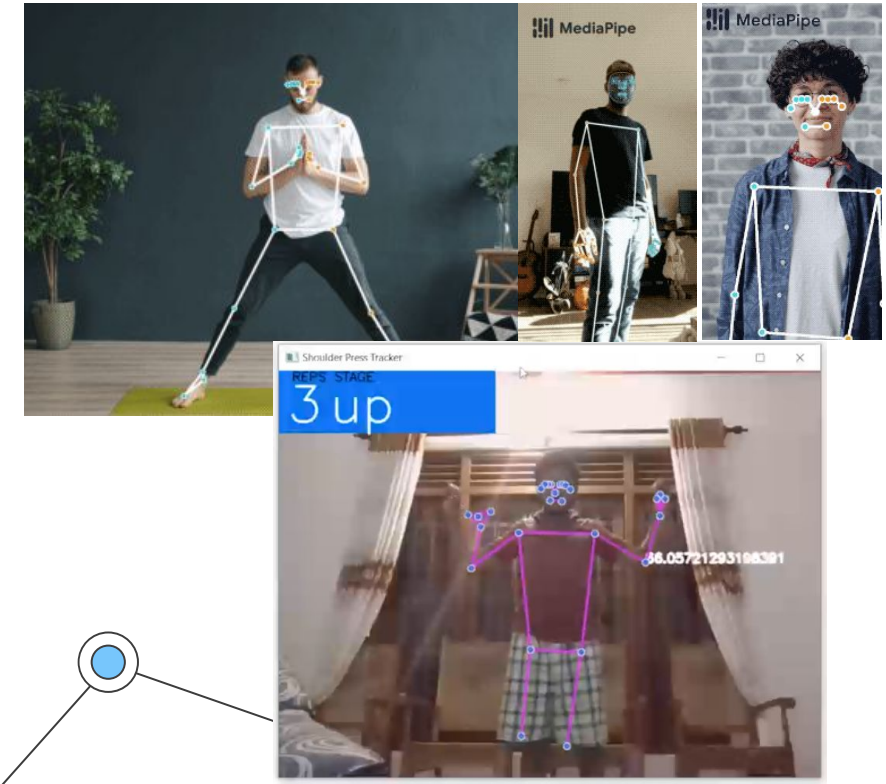
# Process


Start
Capture the soid moisture level of the plant using Arduino and sensor
Analyze the analog input
Decide quality of moisture levels
Show the results
Stop

# Scope and Requirements

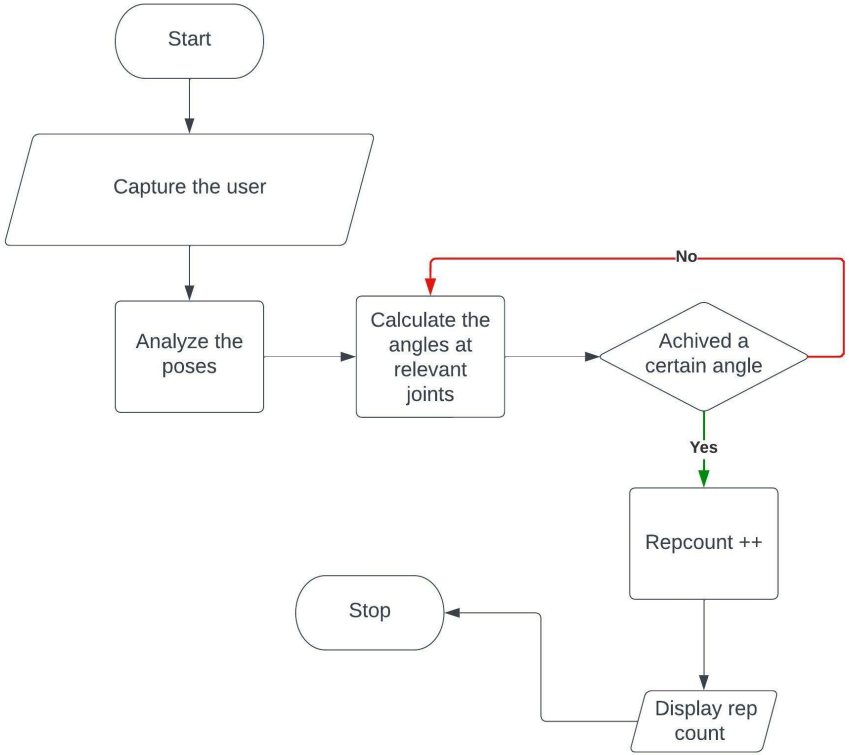

1. Song recommendation using facial expression detection.
2. Monitoring the health of a plant
3. Detecting body movements to ensure the perfect body poses for stretching.
4. Notifying the user to hydrate, sit up and have a break.
5. Tracking the work time and storing the data.

# Detecting body movements to ensure the perfect body poses for stretching




- Using mediapipe to estimate the poses of the body.
- MediaPipe offers cross-platform, customizable ML solutions for live and streaming media.
- Calculating the angles at joints to count the reps.

# Process


Start
Capture the user
Analyze the poses
Calculate the angles at relevant joints
Achived a certain angle
No
Yes
Repcount ++
Stop
Display rep count

# Scope and Requirements

- Using local notifications.
- Tracking working time to make sure that the person do the necessary.

1. Song recommendation using facial expression detection.
2. Monitoring the health of a plant
3. Detecting body movements to ensure the perfect body poses for stretching.
4. Notifying the user to hydrate, sit up and have a break.
5. Tracking the work time and storing the data.

# Scope and Requirements

- The user is able to identify his/progress through the time.
- Able to organise better.

1. Song recommendation using facial expression detection.
2. Monitoring the health of a plant
3. Detecting body movements to ensure the perfect body poses for stretching.
4. Notifying the user to hydrate, sit up and have a break.
5. Tracking the work time and storing the data.

# Languages

## Python

## C

Arduino (C) for programming the Arduino Uno Rev3

# Tools (Software Applications)

## PyCharm

IDE used for Python programming.

## Adobe Photoshop

Graphic Designing and UI Designing

## Arduino IDE

Application to write and upload programs to Arduino compatible boards

## Adobe Audition

Audio editing software.

## Adobe Premiere Pro

Video editing software.

# Tools (Libraries, Frameworks and etc)

pyFirmata

Python interface for Firmata protocol. Communicates with the Arduino development board


pyQT5

Designing Graphical User Interfaces


A library for real time computer vision functions.

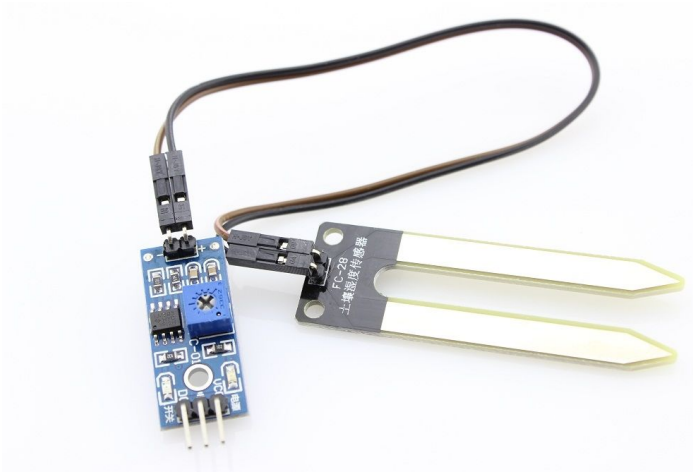

Media processing framework


Realtime cloud database

# Tools (Hardware)


## Arduino Uno R3

Arduino development board



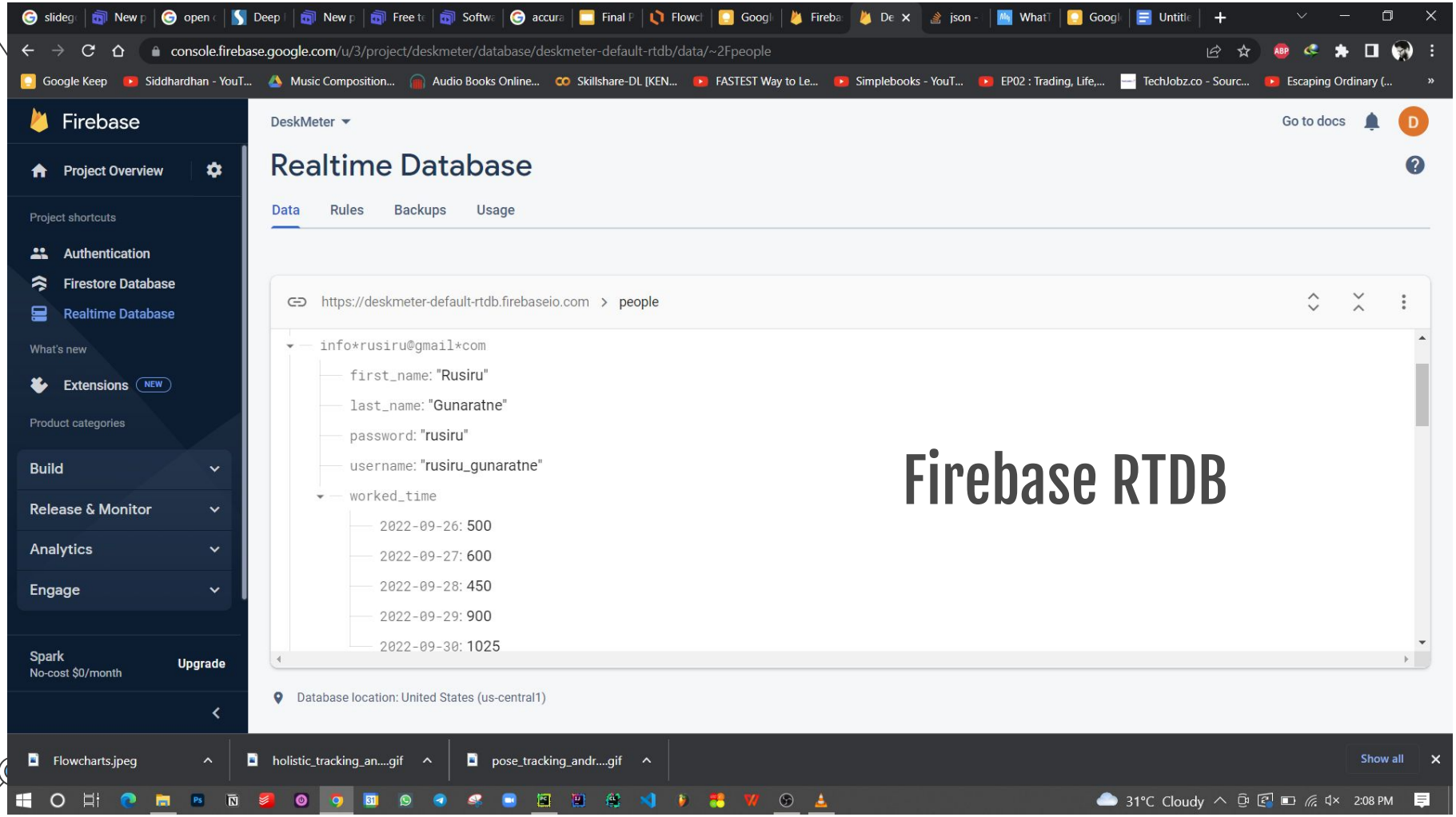
## Soil Moisture Sensor Module

Measures the amount of soil moisture

# 05

# Progress


# Graphical User Interfaces


console.firebase.google.com/u/3/project/deskmeter/database/deskmeter-default-rtdb/data/~2Fpeople
Firebase
DeskMeter
Go to docs
Realtime Database
Data
Rules
Backups
Usage
Project Overview
Project shortcuts
Authentication
Firestore Database
Realtime Database
What's new
Extensions
Product categories
Build
Release & Monitor
Analytics
Engage
Spark
No-cost $0/month
Upgrade
https://deskmeter-default-rtdb.firebaseio.com > people
info*rusiru@gmail*com
first_name: "Rusiru"
last_name: "Gunaratne"
password: "rusiru"
username: "rusiru_gunaratne"
worked_time
2022-09-26: 500
2022-09-27: 600
2022-09-28: 450
2022-09-29: 900
2022-09-30: 1025
Database location: United States (us-central1)
Firebase RTDB
Flowcharts.jpeg
holistic_tracking_an....gif
pose_tracking_andr....gif
Show all
31°C Cloudy
2:08 PM

| Task | Week 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Literature review and platform setup | ■ | | | | | | | | | | | |
| Identification of software and hardware components required | ■ | ■ | | | | | | | | | | |
| Designing user interfaces | | | ■ | | | | | | | | | |
| Data collection | | | ■ | ■ | | | | | | | | |
| Firebase setup | | | | | ■ | | | | | | | |
| Arduino circuit setup and integrating with Python | | | | | ■ | ■ | | | | | | |
| Developing song recommendation system | | | | | | | ■ | ■ | | | | |
| Developing computer vision based game system | | | | | | | | ■ | ■ | | | |
| Unit testing | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Integrating all the units | | | | | | | | | | ■ | | |
| Integration testing | | | | | | | | | | | ■ | |
| Deployment of the setup | | | | | | | | | | | | ■ |

# 06

# Demonstration

DESK METER

HEALTH + PRODUCTIVITY

# Thank You!

## Any Questions ?