EMPROVE

AN EMPLOYEE PRODUCTIVITY SYSTEM USING MACHINE LEARNING

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INTRODUCTION

- Increase in employee productivity can lead to greater profits for the company.
- It would also result in increased employee satisfaction.
- Efficient productivity techniques would help employees to perform well without burning out.
- As a result, the quality of the software product would improve tremendously.

PROBLEM STATEMENT

- As the software industry is constantly evolving and as more and more companies are going remote, there is a need for a modern and reliable system that ensures the productivity of employees.

OBJECTIVE

- To create a software system that would maximize employee productivity in the software industry by incorporating features such as task management, Pomodoro technique, drowsiness detection and work stress assessment.

SCOPE

- Set tasks and deadlines.
- Provide timely breaks after 25 minutes of work (Pomodoro technique).
- Detects how lively is the person (active/drowsy).
- Play concentration music.
- Evaluate work stress using WS Assessment.
- Generate productivity report.

LITERATURE SURVEY

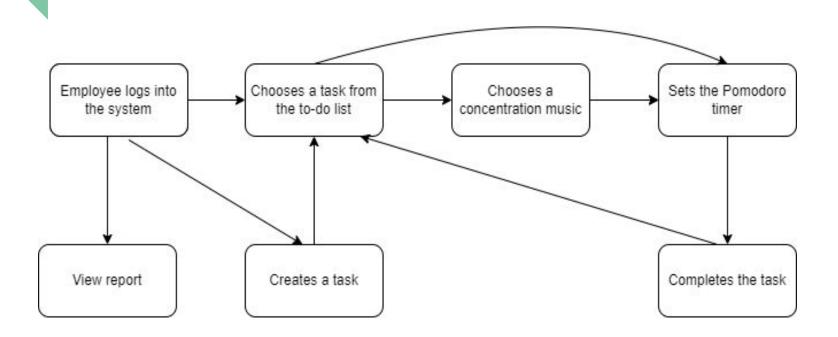| EXISTING WORK	ADVANTAGES	DISADVANTAGES
Driver Drowsiness Detection Using Machine Learning Algorithm [1]	- Utilizes the computation of MAR and EAR in real–time. - Focuses on real–time detection and alerts.	- Limitations in certain conditions such as low lighting or driver obstruction. - Does not mention specific validation studies or accuracy rates about the system.
Real–time Facial Surface Geometry from Monocular Video on Mobile GPUs [2]	- End to end approach. - Custom residual neural network architecture. - Predicts 468 facial landmarks.	- Dependency on GPU support. - Limited evaluation dataset. - Temporal jitter in landmark trajectories.

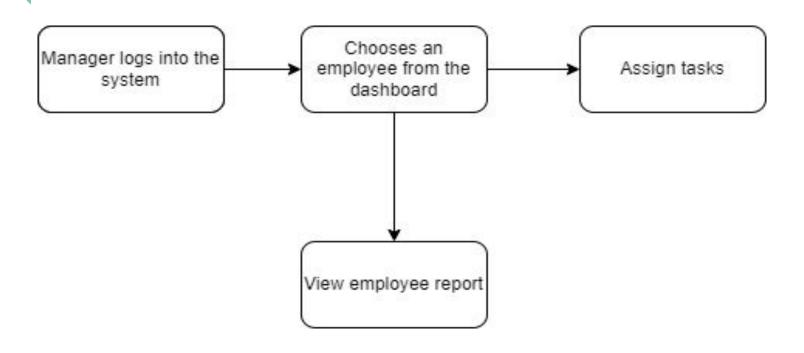|		
Framework for Preventing Procrastination and Increasing Productivity [3]	- Comprehensive understanding of gamification. - Introduction to Pomodoro technique - Proposal of ProScore framework.	- Practical implementation challenges. - Absence of comparison with existing solutions. - Limited scope.
The Power of Music – How environment variables can disrupt or enable productivity [4]	- Comprehensive exploration of effects of music on productivity. - Triangulation of data. - Addressing previous limitations.	- Lack of specific methodology details. - Limited focus on software development. - Limited generalizability.

PROPOSED SYSTEM

- Emprove is a software tool that aims to help employees improve their workplace productivity.
- Task management system to manage tasks assigned to the employees.
- Pomodoro timer for employees to track their work intervals and breaks, thereby improving their focus and productivity.

- Drowsiness detection will warn the user when they feel drowsy and help them to stay alert.
- Concentration music feature allows employees to listen to music while working. The music will be selected based on its ability to improve focus and concentration.
- Work Stress Assessment, proposed by the American Institute of Stress is used to evaluate the stress at workplace.
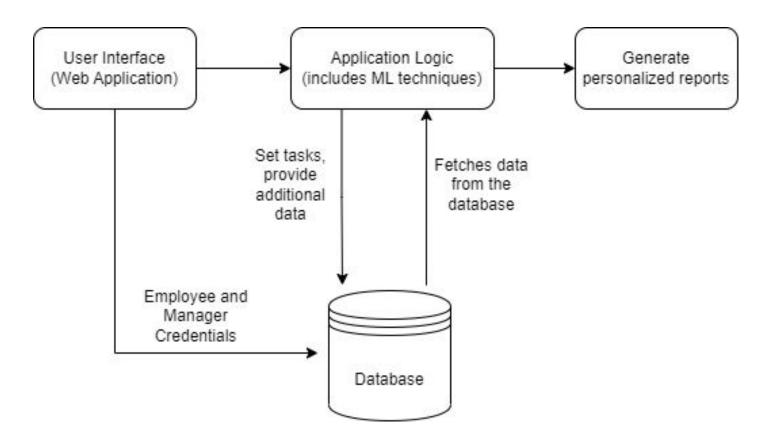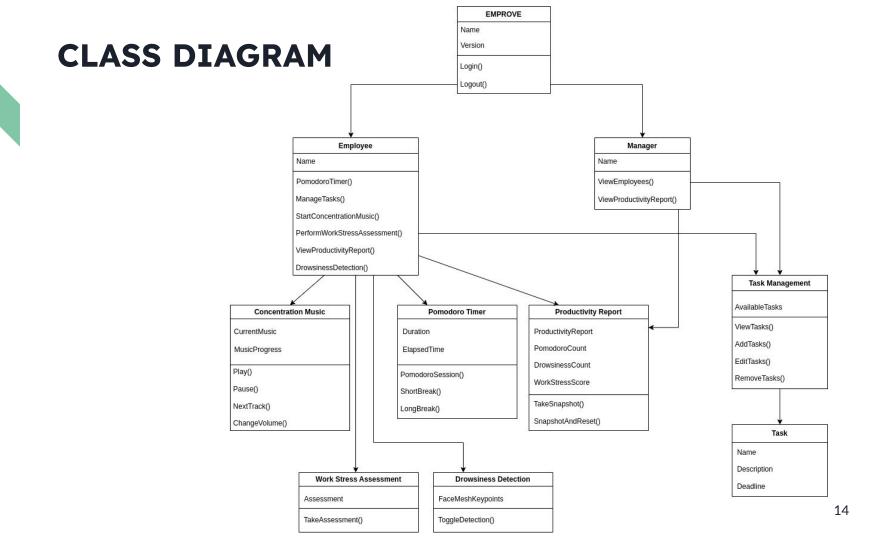
PROCESS FLOW DIAGRAM - EMPLOYEE

PROCESS FLOW DIAGRAM - MANAGER

```
┌──────────────────┐      ┌──────────────────┐      ┌──────────────────┐
│ Manager logs into│─────▶│    Chooses an    │─────▶│   Assign tasks   │
│    the system    │      │ employee from the│      │                  │
│                  │      │    dashboard     │      │                  │
└──────────────────┘      └──────────────────┘      └──────────────────┘
                                   │
                                   ▼
                          ┌──────────────────┐
                          │View employee report│
                          └──────────────────┘
```

ARCHITECTURE DIAGRAM

CLASS DIAGRAM

EMPROVE
- Name
- Version
- Login()
- Logout()

Employee
- Name
- PomodoroTimer()
- ManageTasks()
- StartConcentrationMusic()
- PerformWorkStressAssessment()
- ViewProductivityReport()
- DrowsinessDetection()

Manager
- Name
- ViewEmployees()
- ViewProductivityReport()

Concentration Music
- CurrentMusic
- MusicProgress
- Play()
- Pause()
- NextTrack()
- ChangeVolume()

Pomodoro Timer
- Duration
- ElapsedTime
- PomodoroSession()
- ShortBreak()
- LongBreak()

Productivity Report
- ProductivityReport
- PomodoroCount
- DrowsinessCount
- WorkStressScore
- TakeSnapshot()
- SnapshotAndReset()

Task Management
- AvailableTasks
- ViewTasks()
- AddTasks()
- EditTasks()
- RemoveTasks()

Task
- Name
- Description
- Deadline

Work Stress Assessment
- Assessment
- TakeAssessment()

Drowsiness Detection
- FaceMeshKeypoints
- ToggleDetection()

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TASK MANAGEMENT MODULE

Presentation for Meeting - II

Create a presentation for the upcoming system design meeting

Deadline: 2023-05-18
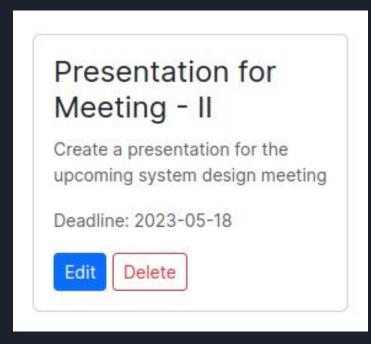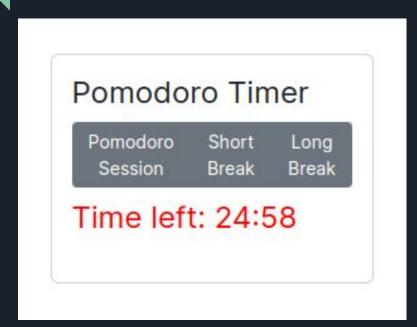
Edit   Delete

- Can create tasks and set deadlines.
- Interface includes several features such as
  - Adding new tasks
  - Editing existing tasks
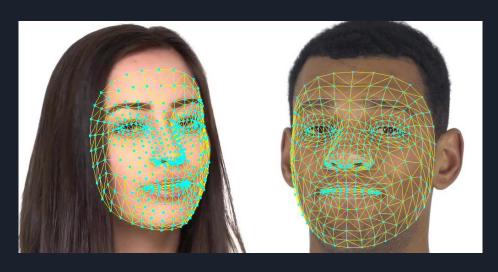 - Removing tasks

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POMODORO TIMER MODULE

Pomodoro Timer

| Pomodoro Session | Short Break | Long Break |

Time left: 24:58

- Pomodoro technique prevents burnout and promotes focus.
- Has the following 3 modes
  - Pomodoro Session – 25 minutes
  - Short Break – 5 minutes
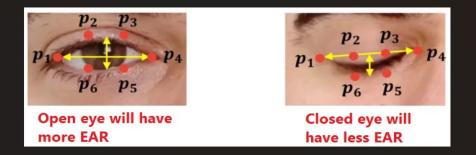 - Long Break – 15 minutes

CONCENTRATION MUSIC MODULE

- Employees can listen to concentration music to help them relax and focus.
- The interface includes several features such as
  - Selection of music
  - Adjust the volume
  - Play and pause the music

DROWSINESS DETECTION MODULE

- Employee drowsiness is detected based on facial keypoints.
- If drowsy, it will alert the employee and will suggest to take a break.
- Would help the employees to stay alert and avoid mistakes.

- EAR is obtained by detecting a face from an image and finding the Euclidean distance of the corresponding key points of the eye.
- Similarly, MAR is also calculated.

Open eye will have more EAR

Closed eye will have less EAR

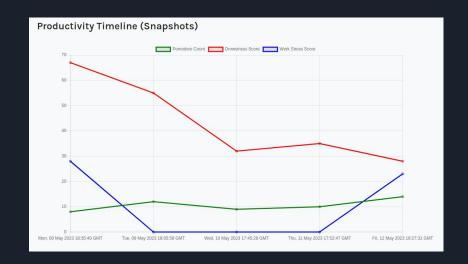$$EAR = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

WORK STRESS ASSESSMENT MODULE

- Proposed by the American Institute of Stress and the Marlin Company.
- Has 8 statements with scores from 1 to 5.
- The work stress score classifies stress into 5 categories.

WS Score	Stress Category
08 – 15	Calm
16 – 20	Fairly Low
21 – 25	Moderate Stress
26 – 30	Severe
31 – 40	Dangerous

PRODUCTIVITY REPORT MODULE

- Provides a detailed report on employee productivity.
- Shows Pomodoro count, drowsiness count and work stress score.
- Productivity metrics are visualised using a multi line plot.

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CONCLUSION

- Emprove is a powerful tool to track tasks, manage time and stay focused and productive throughout the workday.
- The software offers a range of benefits for both employees and managers.
- Companies can achieve higher levels of productivity, better task management and provide a healthier work–life balance for their employees.

REFERENCES

[1] Prasath N, Sreemathy J, Vigneshwaran P, "Driver Drowsiness Detection Using Machine Learning Algorithm", 2022 8th International Conference on Advanced Computing and Communication Systems (ICACCS), Jun 2022.

[2] Yury Kartynnik, Artsiom Ablavatski, Ivan Grishchenko, Matthias Grundmann, "Real–time Facial Surface Geometry from Monocular Video on Mobile GPUs", arXiv preprint arXiv:1907.06724v1, Jul 2019.

[3] Amit A J, Gautam Shankararam S R, Pradeep P , Perumalraja R, Kamalesh S, "Framework for Preventing Procrastination and Increasing Productivity", 2021 3rd International Conference on Signal Processing and Communication (ICPSC), May 2021.

[4] Sean Jentz, Victor Winkelmann, "The Power of Music – How environmental variables can disrupt or enable productivity".

THANK YOU