PROJECT REPORT

MoodMirror

Real-Time Mental Health Companion Mirror for Students

Prepared By,
Group 08
Department of Information and Communication Technology
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1. Project title:

Real-Time Mental Health Companion Mirror for Students Using Multimodal Emotion Detection.

MoodMirror, A Real-Time Mental Health Companion is an AI powered system designed to help university students manage their emotional well-being through daily mood check-ins. By analyzing facial expressions, voice tone, and body posture, MoodMirror detects the user's emotional state in real-time and offers personalized feedback such as calming music, motivational quotes, mental health tips, or mindfulness prompts.

Unlike traditional mental health tools, MoodMirror is proactive, interactive, and designed to integrate seamlessly into a student's daily routine—whether as a smart mirror interface, desktop app, or web platform making emotional wellness support more engaging, accessible, and reflective.

2. Project Personnel

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3. Declaration page

I certify that this report does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university, and to the best of my knowledge and belief, it does not contain any material previously developed, published or written by another person except where due reference is made in the text.

4. Acknowledgement

We would like to express our heartfelt gratitude to everyone who supported us throughout the development of MoodMirror.

Advisors and supervisors:

First and foremost, we extend our sincere thanks to our supervisor/lecturer Mr. B.N Seneviratne for the continuous guidance, valuable feedback, and encouragement that greatly contributed to the success of this project.

We would also like to thank our department, the Department of Information and Communication Technology, Faculty of Technology, University of Sri Jayewardenepura, for providing us with the necessary resources and opportunities to carry out this project.

Technical Support and Infrastructure Providers:

We extend our gratitude to those who provided technical support and infrastructure, including software, and computing resources. Their support ensured that the system ran smoothly.

Contributors:

Our heartfelt gratitude goes to all contributors, who helped make this project a success. We appreciate all contributions for their contribution to this project.

Special thanks go to our peers who participated in the user testing phase and provided insightful suggestions to improve the usability and effectiveness of the application.

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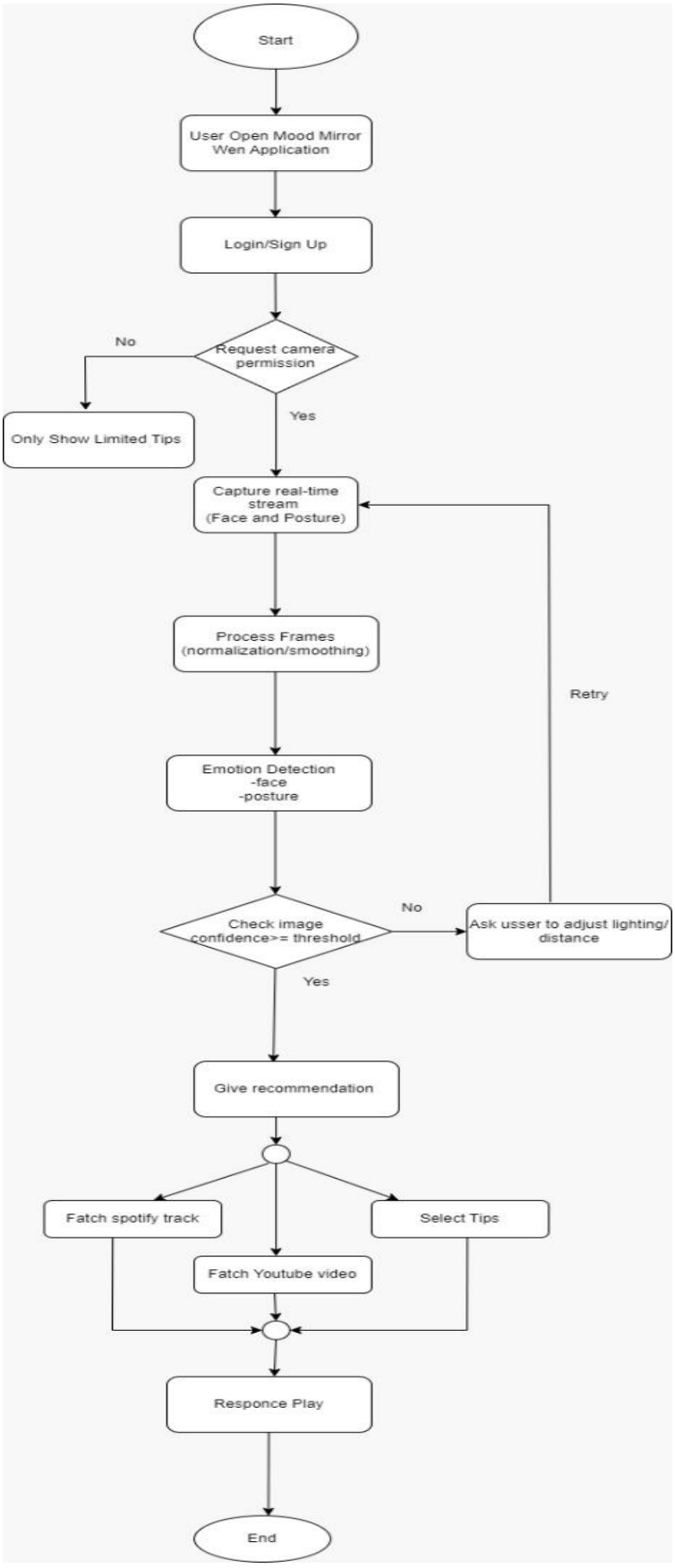
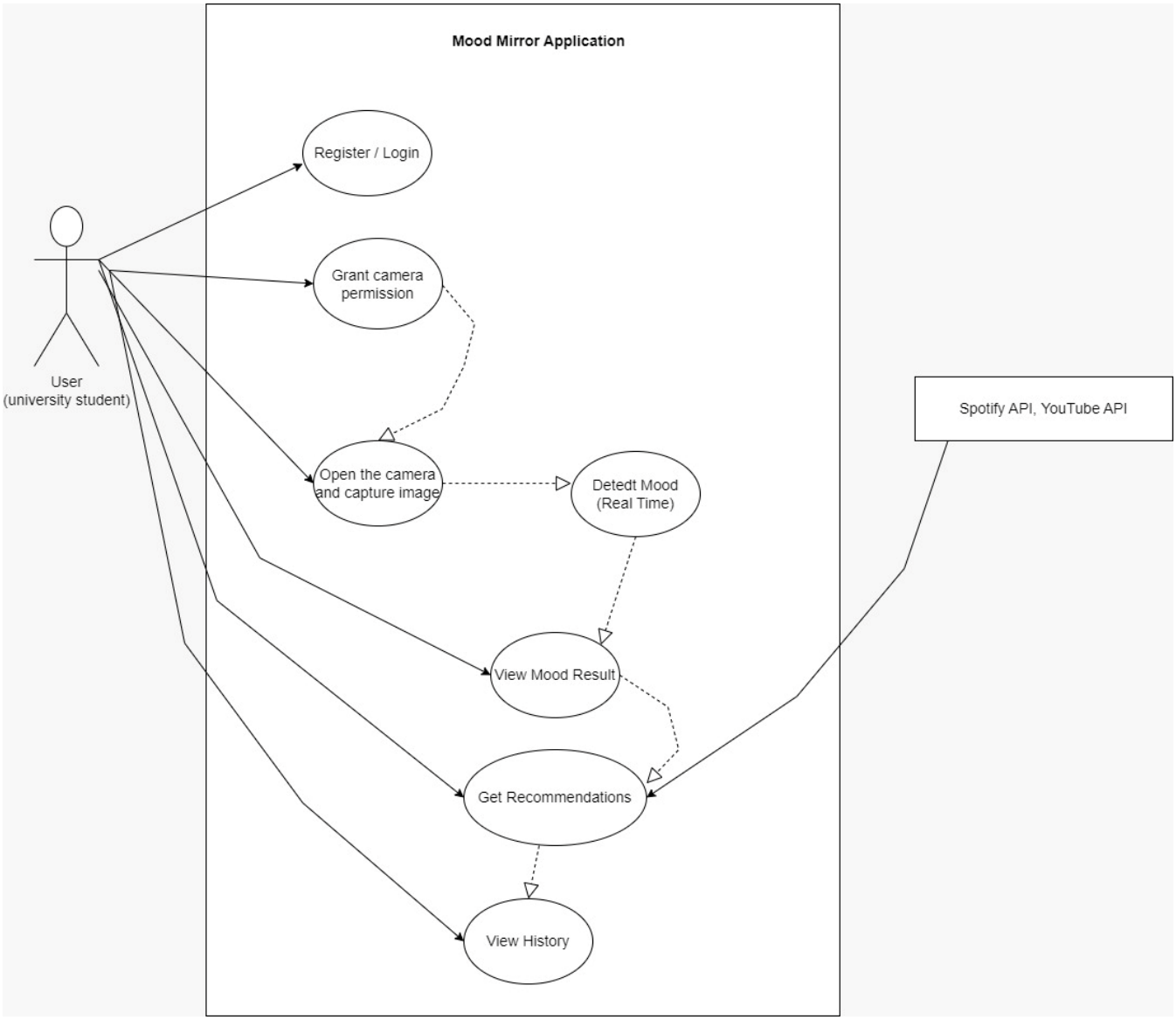
Real-time mood detection	Accuracy depends on lighting/camera quality	Extend to mobile apps	Privacy concerns with camera use
Combines entertainment with wellness	Dependence on third-party APIs	Introduce chatbot counseling	API limitations
Easy-to-use web interface	Cannot replace professional care	Expand to corporate wellness	Possible user hesitation

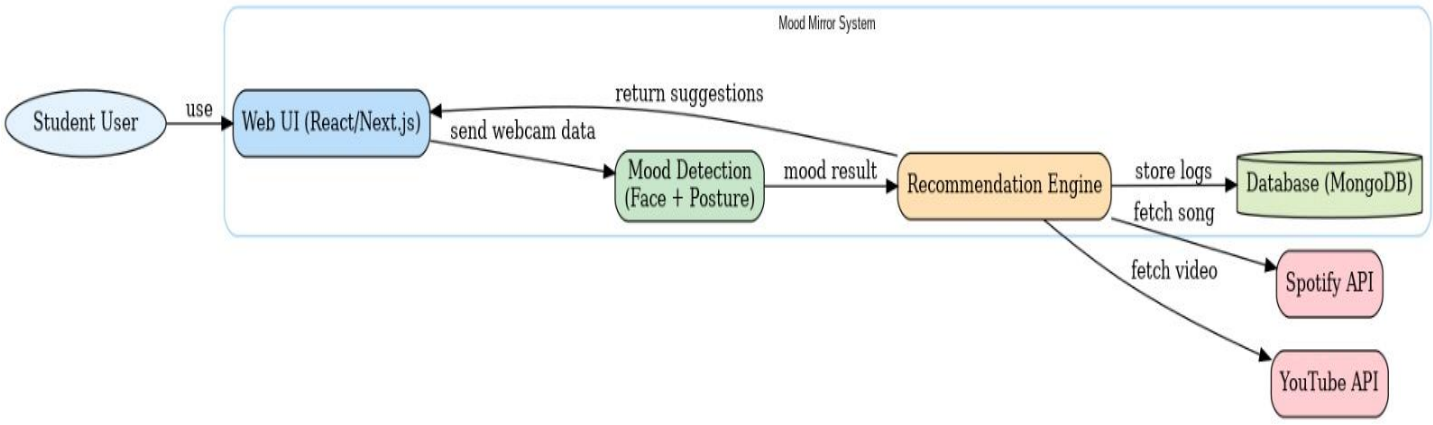
7. List of figures

Our project workflow,



Use case diagram,





8. List of Abbreviations

AI: Artificial Intelligence

ML: Machine Learning

DL: Deep Learning

CNN: Convolutional Neural Network

API – Application Programming Interface

AI – Artificial Intelligent

GUI: Graphical User Interface

9. Introduction and Background

9.1 Introduction

University students often struggle with stress, anxiety, and frequent mood swings caused by academic and lifestyle pressures. Existing wellness apps, such as Calm or Spotify Mood Playlists, provide relaxation but lack real-time mood detection.

Mood Mirror addresses this gap by using face expression recognition and body posture analysis to identify emotions like happiness, sadness, anger, surprise, or neutrality. Based on the detected mood, the system suggests:

- ✓ A Spotify song,
- ✓ A YouTube video,
- ✓ Practical wellness tips

This ensures students receive instant mood reflection and personalized support, helping them manage stress, improve focus, and maintain emotional well-being.

9.2 Background

Apps like Calm and Headspace help with meditation but lack real-time mood tracking.

Spotify and YouTube provide entertainment, but not emotion-based suggestions.

Students need quick, automated support for managing emotions.

Mood Mirror fills this gap with AI-driven mood detection plus personalized music, videos, and tips.

9.3 Aim and Objectives

Aim:

To provide a real-time emotion-aware system that helps university students improve their emotional well-being through personalized recommendations.

Objectives:

- Detect moods using face and posture recognition.
- Provide Spotify-based song recommendations.
- Suggest YouTube motivational/relaxing videos.
- Deliver practical wellness tips (stress relief, productivity).
- Ensure scalable, secure, and user-friendly design.

9.4 Significance

- Provides non-intrusive support for emotional management.
- Enhances student mental health and productivity.
- Combines AI + entertainment + practical guidance in a single platform.

9.5 Future Development

- Extend to mobile platforms (Android/iOS).
- Add wearable device integration.
- Provide chatbot counseling for personalized support.
- Expand to corporate wellness and general users.

10. Business Analysis Process

The successful implementation of the real-time mental health companion system required a comprehensive business analysis process. This process involved understanding the needs and dynamics of the students especially university undergraduates, assessing the potential impact of the technology, and aligning the project objectives with industry goals. Here, we outline the key steps in the business analysis process.

Stakeholder engagement,

The stakeholder engagement is very important thing. We reached students, University counseling units, Faculty members and any other relevant parties.

Requirements:

- Input from webcam (face + posture).
- ML model for classifying emotions (happy, sad, angry, surprised, neutral).
- Spotify API for song suggestions.
- YouTube API for motivational videos.
- Repository of wellness tips.

Expected Benefits:

- Improve emotional awareness.
- Enhance student well-being.
- Boost academic performance.

10.1 Functional Requirements

- User registration/login.
- Real-time camera capture (face + posture).
- ML-based mood classification.
- Spotify and YouTube integration.
- Display of wellness tips.

10.2 Non-Functional Requirements

- Usability: Intuitive UI for students with minimal setup.
- Performance: Real-time detection with low latency.
- Security: Safe handling of personal data, encrypted storage.

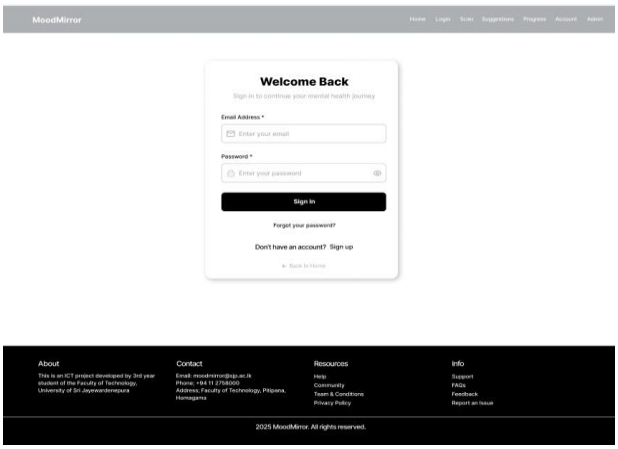
10.3 Technical Requirements

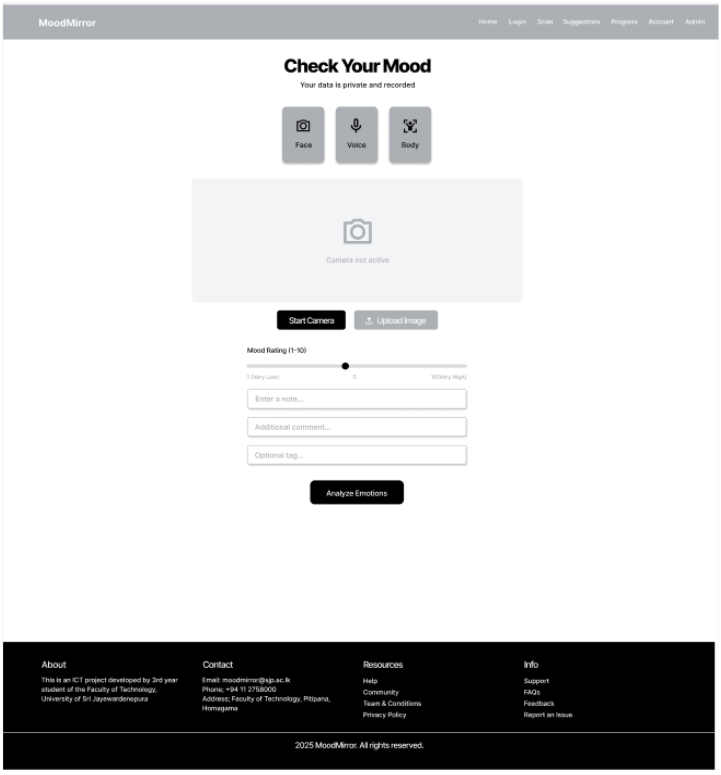
- Frontend: Next.js / React
- Backend: Node.js + Express
- ML Models: TensorFlow\.js / OpenCV (face + posture), FER-2013 dataset
- Database: MongoDB
- APIs: Spotify, YouTube, Google Calendar (for future reminders)

10.4 Interface Design

- Login Page
- Camera Capture Page
- Mood Detection Dashboard (emotion + recommendations)
- Suggestion Page

10.4.1 Wireframe





Check our full project wireframe :
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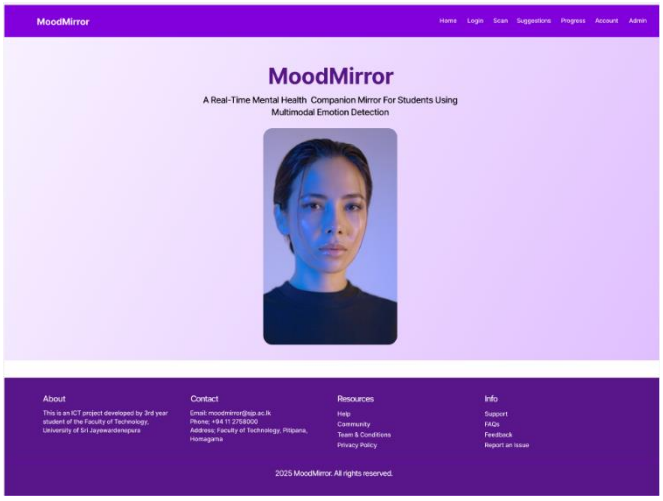
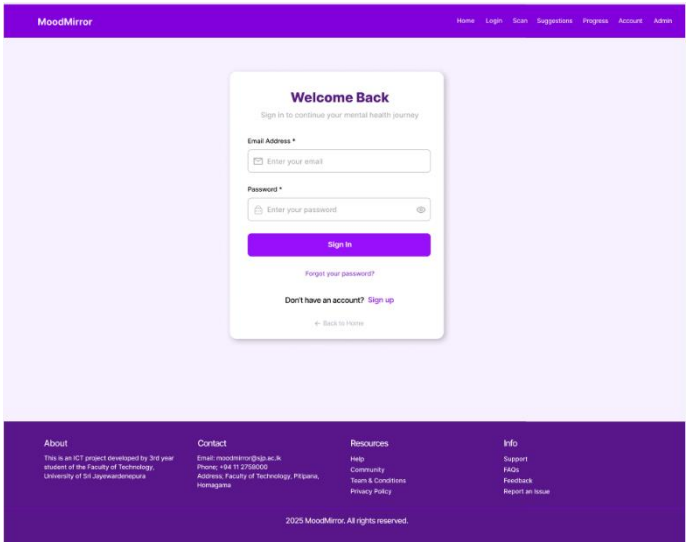
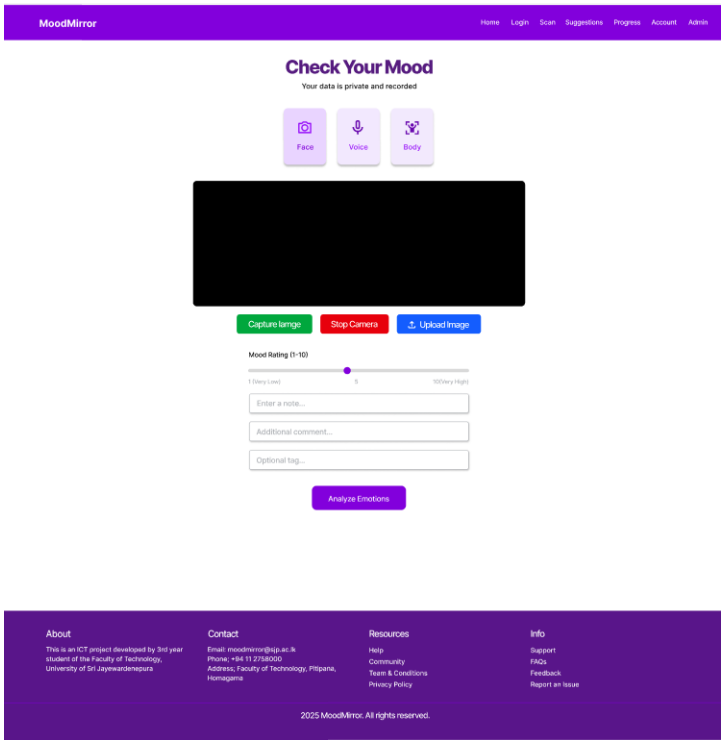
10.4.2 UI







Check our full project wireframe:
https://www.figma.com/design/zwxWXTzoAwqcu60RMMwfpQ/Untitled?node-id=0-1&p=f

10.5 Budget and Cost Estimation

- Development Tools: Free/Open-source (VS Code, Figma).
- Cloud Hosting: AWS / Vercel (initial free tier).
- APIs: Spotify & YouTube (free developer access).
- Estimated Student Project Cost: 0 cost.

11. Software Development Process

The development of the real-time mental health detection system required a meticulously planned software development process. This process involved various stages, from initial design to the deployment of a fully functional system. Here, we outline the key steps and methodologies involved in the software development process.

The project follows Agile methodology with iterative sprints and a Layered Architecture for scalability and maintainability.

Layered Architecture

❖ Presentation Layer (Frontend):

Built with React/Next.js; captures real-time inputs and displays moods, songs, videos, and tips.

❖ Application Layer (APIs):

Handles communication between frontend and backend; manages REST APIs.

❖ Business Logic Layer:

- Emotion Detection Module – CNN-based face recognition and posture classification.

- Recommendation Engine – Integrates Spotify & YouTube APIs; fetches wellness tips.

❖ Data Access Layer:

Uses MongoDB to store user profiles, moods, and history with secure access.

12. Software Testing Process

The testing process was carried out to ensure that the MoodMirror application met all functional and non-functional requirements effectively. To provide a more insightful view of our software testing journey, let's delve deeper into the specific aspects of our testing approach.

So far, we have completed:

Unit Testing: Verified camera access, login, and face expression detection functions.

Component Testing: Checked whether the face detection and mood classification modules integrate correctly with the application.

Future testing will include:

- Integration Testing – Testing the full workflow (input → detection → recommendation).
- User Acceptance Testing – Gathering student feedback.
- Performance Testing – Measuring API response and detection speed.

13. Software Deployment Process

The deployment process of real-time mental health detection system involved a meticulously planned process, ensuring the seamless integration of our software into the emotional detection and quality control workflow.

Deployment Steps:

1. Push code to GitHub with CI/CD pipeline.
2. Build frontend (React) and backend (Node.js).
3. Deploy ML models with TensorFlow\.js on the client for performance.
4. Secure API keys with environment variables.
5. Database hosted on MongoDB.

Error Handling: User-friendly error messages for camera issues or API failures.

Backup & Recovery: Database backups stored weekly on MongoDB cloud.

14. Discussion

The Mood Mirror project shows how AI can be used to support student mental health by detecting emotions in real time. By combining Spotify, YouTube, and wellness tips, the system delivers a personalized and practical approach to well-being.

Strengths

- Real-time mood detection.
- Combines entertainment with wellness.
- Easy-to-use web interface.
- Scalable layered architecture.

Weaknesses

- Accuracy depends on lighting/camera quality.
- Dependence on third-party APIs.
- Cannot replace professional care.

Opportunities

- Extend to mobile apps.
- Introduce chatbot counseling.
- Expand to corporate wellness.

Threats

- Privacy concerns with camera use.
- API limitations.
- Possible user hesitation.

Summary: Mood Mirror is an innovative solution for student wellness. With improvements, it can grow into a comprehensive emotional support platform.

15. Appendix

This section includes additional material that supplements the primary substance of our project report. Appendices include technical data, code snippets, and graphs to provide a thorough knowledge of our project.

Appendix A:

- Datasets Used – FER-2013(Kaggle) for emotion detection
- This project implements a real-time facial emotion detection system using a pretrained Vision Transformer (ViT) model from Hugging Face. The system classifies expressions into **Angry, Disgust, Fear, Happy, Sad, Surprise, and Neutral**.

Appendix B

- Code Snippets – Spotify API call, YouTube integration, TensorFlow\.js functions.

Appendix C:

- Project Tools – Next.js, Node.js, MongoDB, Figma, GitHub.

Appendix D:

- User Feedback (Pilot) – Students found real-time feedback useful; requested dark mode and multi-language support.