

SMART MIRROR(End-sem report)

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1 Abstract

This report presents the complete development process and implementation details of the Smart Mirror Project, which focuses on creating an innovative smart mirror system incorporating facial recognition technology and leveraging the Raspberry Pi platform. The project covers hardware selection and setup, facial recognition implementation, software integration, and completed enhancements to deliver a sophisticated and user-centric smart mirror experience.

2 Introduction

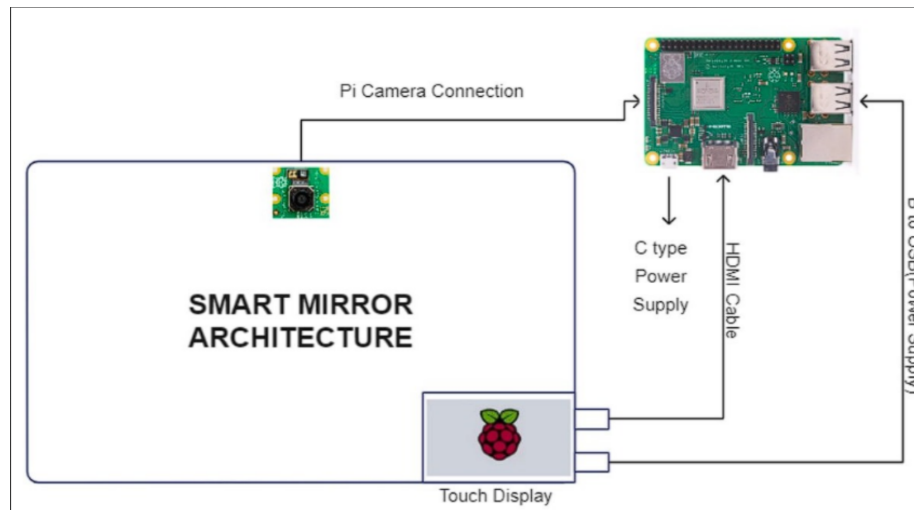


Figure 1: System architecture

The Smart Mirror Project aims to revolutionize daily routines by integrating technology seamlessly into everyday objects. This report

provides an overview of the project's objectives and highlights the comprehensive development process from inception to completion.

3 Project Objectives

The primary objective of the Smart Mirror Project was to create a sophisticated smart mirror system incorporating facial recognition technology. Key goals included selecting hardware components, implementing facial recognition algorithms, and integrating software solutions for enhanced functionality.

4 Hardware Selection and Setup



Figure 2: Smart mirror

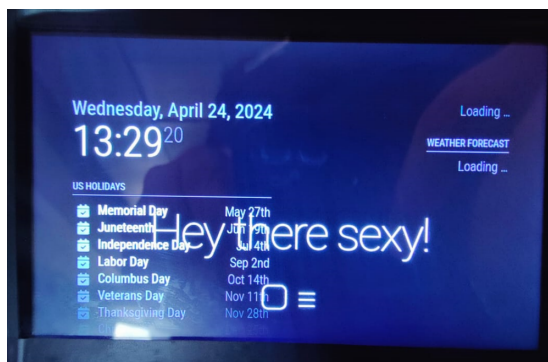


Figure 3: Personalized display

The Raspberry Pi 4 was selected as the central processing unit for its cost-effectiveness, performance, and community support. Additional components such as the Pi Camera module, HDMI cables, and converters were procured for seamless integration. Hardware setup involved connecting the Raspberry Pi to the Pi Camera module and configuring software settings for optimal performance.

5 Facial Recognition Implementation

Facial recognition technology played a pivotal role in personalizing user experiences with the smart mirror. The implementation utilized the Eigenfaces algorithm, known for its simplicity and efficiency on resource-constrained devices like the Raspberry Pi. The algorithm preprocessed facial images, extracted relevant features, and performed classification tasks to accurately identify users.

6 Software Integration

The transition to Magic Mirror software for remote access and user interaction marked a significant enhancement in the project. Magic Mirror offers a versatile platform for displaying customizable modules, including weather updates, calendar events, and news headlines. The integration of Magic Mirror streamlined user interaction and added new functionalities to the smart mirror system.

7 Completed Enhancements

All planned enhancements, including the integration of a dedicated Raspberry Pi display and embedding a webcam into the mirror design, have been successfully implemented. These enhancements have improved functionality and aesthetics, enhancing the overall user experience.

8 Benefits

1. **Personalized Information:** Displaying personalized data such as weather forecasts, calendar events, and news updates tailored to individual users' preferences and schedules.
2. **Health and Wellness Monitoring:** Providing health-related information such as fitness tracking, step counts, and reminders for medication or hydration, promoting overall well-being.

3. Virtual Try-On: Allowing users to virtually try on clothing, accessories, or makeup, enabling informed purchasing decisions without the need for physical try-ons.
4. Home Automation Control: Integrating with smart home devices to control lighting, thermostats, and other connected appliances, enhancing convenience and energy efficiency.
5. Entertainment and Media: Streaming music, videos, or podcasts, providing entertainment options while getting ready in the morning or winding down in the evening.

9 Internal architecture

1. Hardware Components: Raspberry Pi as the CPU, Camera Module for image capture, and Display for user interaction.
2. Software Components: Operating system, Facial Recognition Algorithm, and Magic Mirror Software for UI management.
3. Communication Protocols: GPIO for hardware communication, and Wi-Fi/Internet for remote access.
4. Data Flow: Image Capture, Facial Recognition, User Interaction, and Remote Access functionalities are integrated for seamless operation.

10 Conclusion

The Smart Mirror Project represents a successful integration of technology and practicality, aiming to redefine smart home solutions. Through meticulous hardware setup, implementation of advanced algorithms, and integration of Magic Mirror software, we have developed a sophisticated smart mirror system that enhances everyday living experiences. The completion of all planned enhancements marks a significant milestone in shaping the future of smart home technology.