A Multifunctional Smart Mirror For Home Security And Daily Updates

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Abstract: A Multifunctional Smart Mirror for Home Security and Daily Updates depicts the design and development of a smart mirror that offers an elegant interface for displaying essential information while also functioning as a thief detection system in a home environment. This smart mirror operates as a traditional reflective surface but is enhanced with the capability to display real-time data, including the current date, time, temperature, and weather details. A two-way mirror is used to seamlessly integrate the display and hide the webcam, allowing for a clean and modern look while still capturing footage for home security. The Raspberry Pi connects web usage to an IoT device via a Wi-Fi module, enabling the mirror to receive and display real-time data. Additionally, the webcam and IR sensors are employed for detecting unauthorized entry, ensuring home security when the occupants are away. This innovative solution combines aesthetic appeal with practical functionality, making it an ideal addition to modern smart homes.

Index Terms - Raspberry Pi, Smart Mirror, Internet of Things (IoT), Wi-Fi Module, Webcam, IR Sensor, Two-Way Mirror, Home Security, Real-Time Data Display, Aesthetic Interface, Thief Detection.

I. INTRODUCTION

Smart home technology is an ideal definition of progress through a combination of many smart mirror functionality and beauty appeal. It is a regular mirror and smart interface, which reflects real -time data such as date, time, temperature and seasons. Mirror runs on Raspberry Pi and IOT to support efficient connectivity and smooth functioning of information. Its two-way mirror minimum design hides hidden parts, providing a smooth and smooth appearance that suits contemporary interiors.

In addition to its daily practical use, the smart mirror also increases domestic security with a Web camera and an IR sensor that detects unwanted speeds.Once it detects a potential intrusion, it takes the video and sends real-time notification to the owners of the house, which are immediately addressed. This new product enhances safety and ease and today is an efficient feature in homes as it meets the increasing requirement of technology-operating solutions.

II. LITERATURE REVIEW

1."Smart Mirror for Smart Life", "Muhammad Muizudin Yousri, Shahrin Qasim, Rihayati Hasan", 2017

In this research, writers introduce an intelligent mirror with IOT technology to easily manage daily activities and automate homes. The intelligent mirror displays essential information such as time, weather and traffic and can operate home appliances using voice through Sonas Voice Library. The development of evolutionary prototype methods leads to end-user feedback so that there is frequent improvement.

2."IOT-based smart Mirror","Dr.M.V.Vijaya Saradhi, A. Nikita, D. Bhavana Reddy", 2023

This paper responds to the development of a smart mirror that provides real -time temperature, news and weather information. An internet-enabled raspberry PI microcontroller and an LCD display with Wi-Fi module that is placed behind a two-way mirror, which provides the facility of internet access, not renouncing reflective

appearance. Network dependence and energy consumption is also discussed as concerns in paper for the purpose of providing direct information without smartphone distraction.

3. "Smart Mirror: A reflective interface to maximize productivity", "Piyush Maheshwari, Maninder Jeet Kaur, and Sarthak Anand", May 2017

This study applies an internet smart mirror with facial identification and personal performance. Depending on the Raspberry Pi 3 and API-based web services, it is capable of extracting and displaying data such as daily routine, weather conditions and reminders. The study increased its ability to increase the productivity of individuals by integrating the necessary information in daily life without any hindrance.

4. "Development for Smart Home Environment: Empowerment of three user interfaces","Tea. Koskela, S. Vanon-Venio-Mastilla", 2004

This research examines the inclusion of smart mirrors in the home automation network, with the research energy management, device control and information focusing on information access. Its purpose is easily and ad hoc interface design for final convenience. System integration, privacy issues, and interoperability challenges are covered, smart mirrors are placed as command centers for smart homes.

5. "The Smart Mirror: A multimodal interactive mirror designing for home", "A. Biachi, I.Okle,D.S.Kovon",2007

This article describes a multimodal intelligent mirror with voice, touch and visual response to improve interaction with the user. It offers the management of daily schedule, weather performance and smart home equipment operations without renouncing natural appearance. Hardware compatibility issues, data synchronization and interface adjustment issues are resolved, which demonstrates synergy between beauty and functionality in the mirror.

III. METHODOLOGY

1. **System Bootsup:** Raspberry Pi Boots started the OS and forced mandatory services. It then establishes an internet connection via Wi-Fi, which offers convenient access to information and remote login.
2. **Data Collection:** System API receives real-time data such as season, date and time. Data collected for convenient and systematized operation on mirrors gets processed and synchronized.
3. **Display Output:** A display screen kept at the rear of a two-way mirror still shows data acquired and is even reflective. GUI gets dynamically updated in such a way that information is delivered in real time without any interruption to users.
4. **Motion Detection:** Web camera and IR sensor constantly look for any movement of the mirror. On detecting the movement, the system itself begins video recording to record videos of the accident.
5. **Security Alert:** On illegal agitation, the system will send an alert via email or telegram. The email or telegram sends a timist and captured photo that provides instantaneous safety alertness to the user.
6. **Continuous Monitoring & Updates:** The mirror provides ongoing updates at regular intervals. In the meantime, it is in safety mode, with 24/7 motion detection and home protection.

IV. PROPOSED SYSYTEM

The proposed system is an innovative smart mirror designed to increase home security with various characteristics including real-time updates. It has a two-way mirror that incorporates a performance to show essential information such as date, time, temperature and weather forecasts. At its core, the system uses raspberry pi equipped with Wi-Fi modules to bring and introduce real-time data. The safety includes a Web camera to capture the footage, while the infrared (IR) sensors detect the intruders, which increases the security of the house. In addition, integration with smart home devices ensures uninterrupted connectivity, making it an ideal extra for modern smart homes.
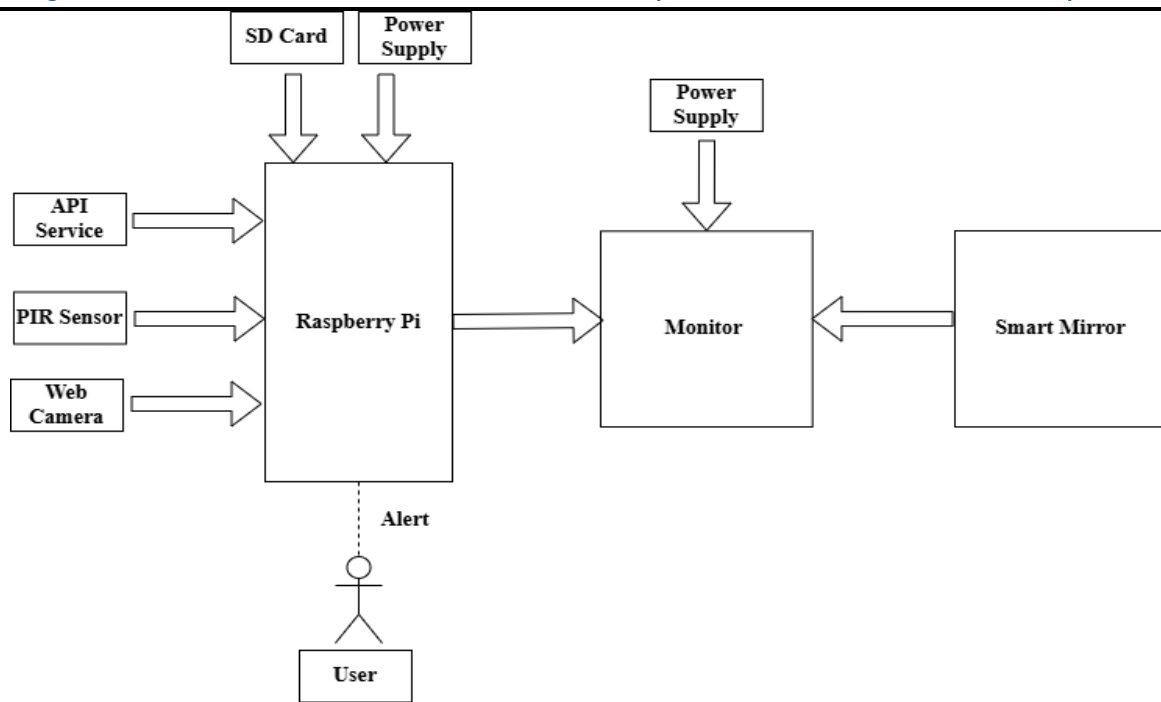
Fig 1:Architecture

V. IMPLIMENTATION

To apply multifunctional smart mirror, start installing Raspberry Pi with Raspberry Pi OS in an SD card and attach Web camera, IR sensor, monitor and two-way mirror. For the date, time, temperature and weather information obtained from the API, develop a web interface using the python with the flask. Use the GPIO library to apply motion detectors through IR sensors, activate the Web camera to capture the intrusion. OpenCV will handle the camera footage for better image identification. For safety notifications, set SMTP protocol to send email notification or Telpot protocol to telegram notification with a clip captured of unauthorized entry. Use MySQL to log and store settings. Provide trouble-free connectivity through Wi-Fi for immediate updates, thus makes the smart mirror a dynamic and safe component of any smart home.
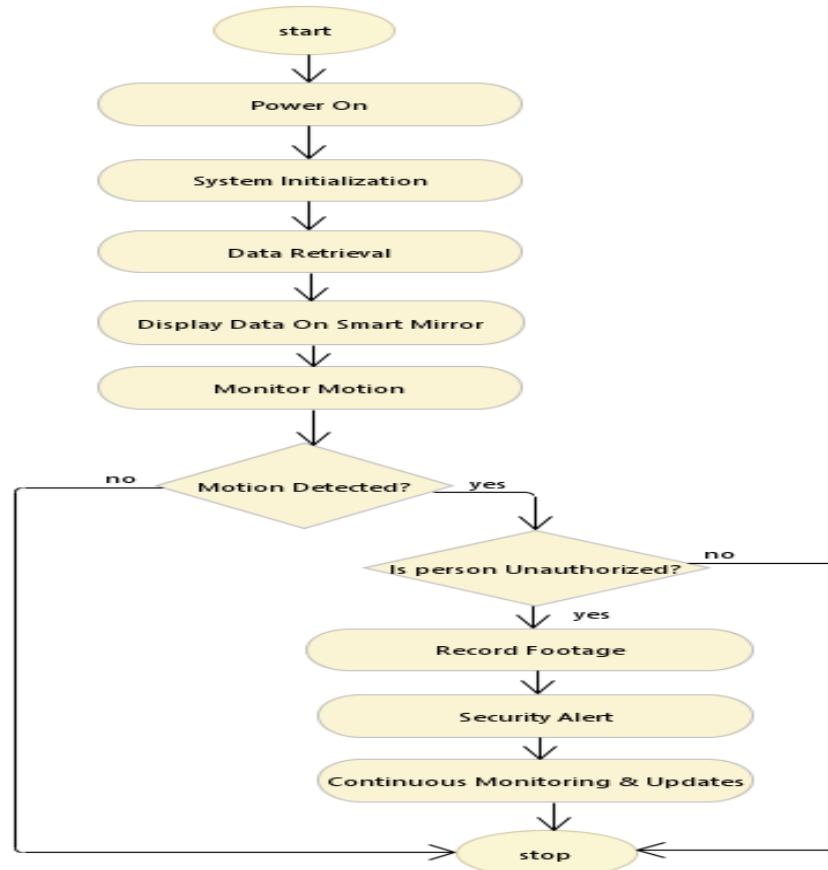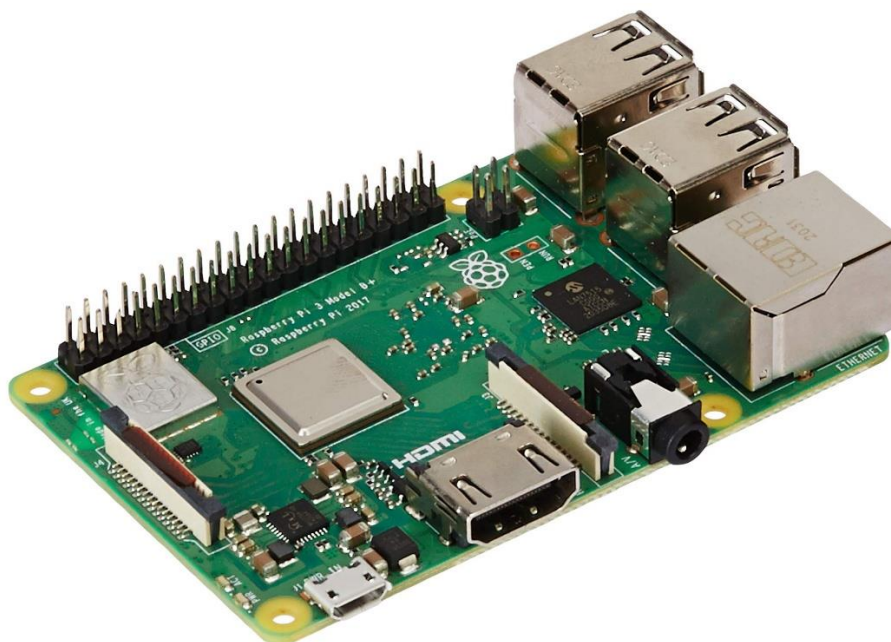

Fig 2: Flow Chart
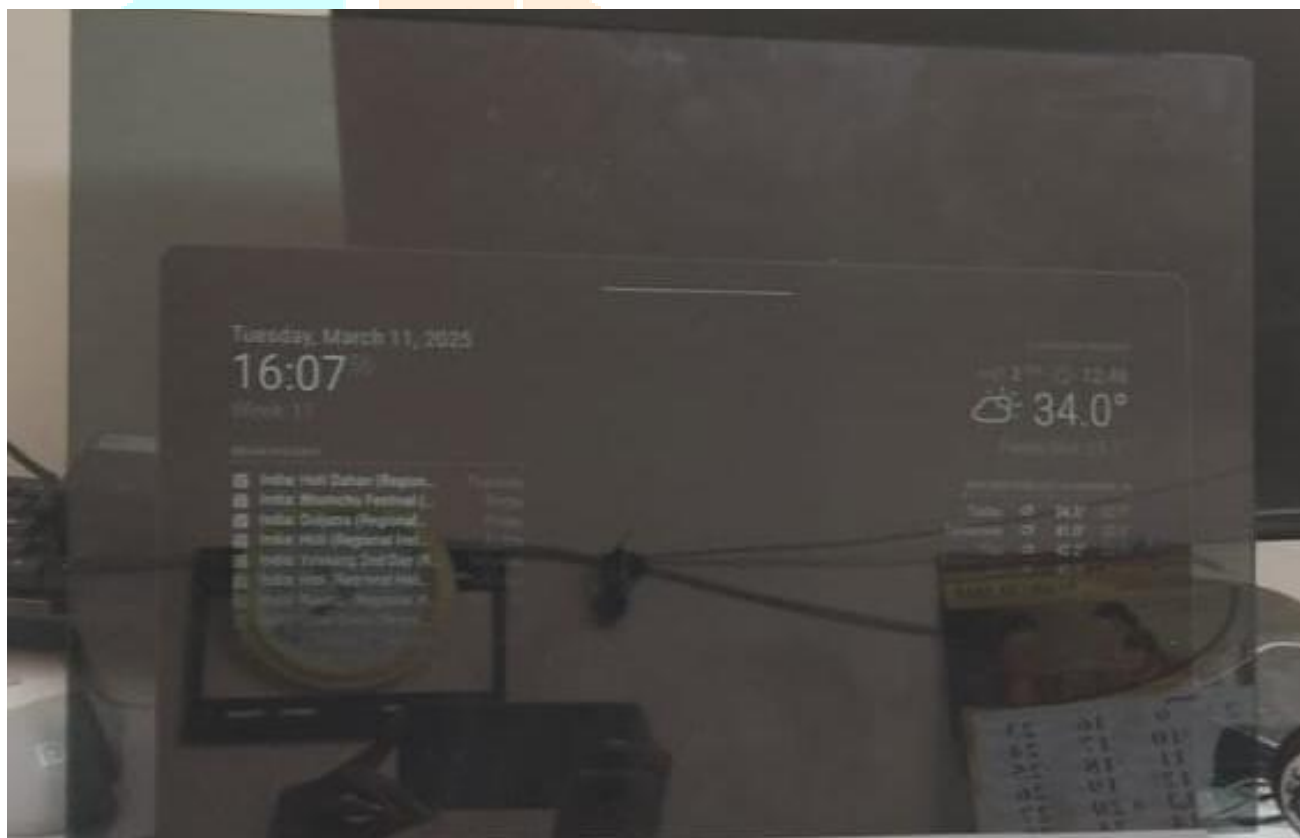
Fig 3: Raspberry Pi 3B+

VI. RESULTS

Fig 4: Smart Mirror

Fig 5: If Authorised person is arrives in front of the mirror then there is no actions were done by Smart Mirror.
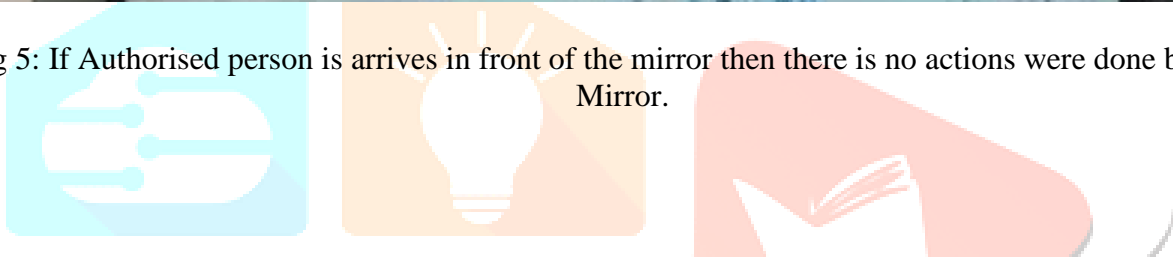

Fig 6: If UnAuthorised Person is arrives then record the actions of that person by Smart Mirror.
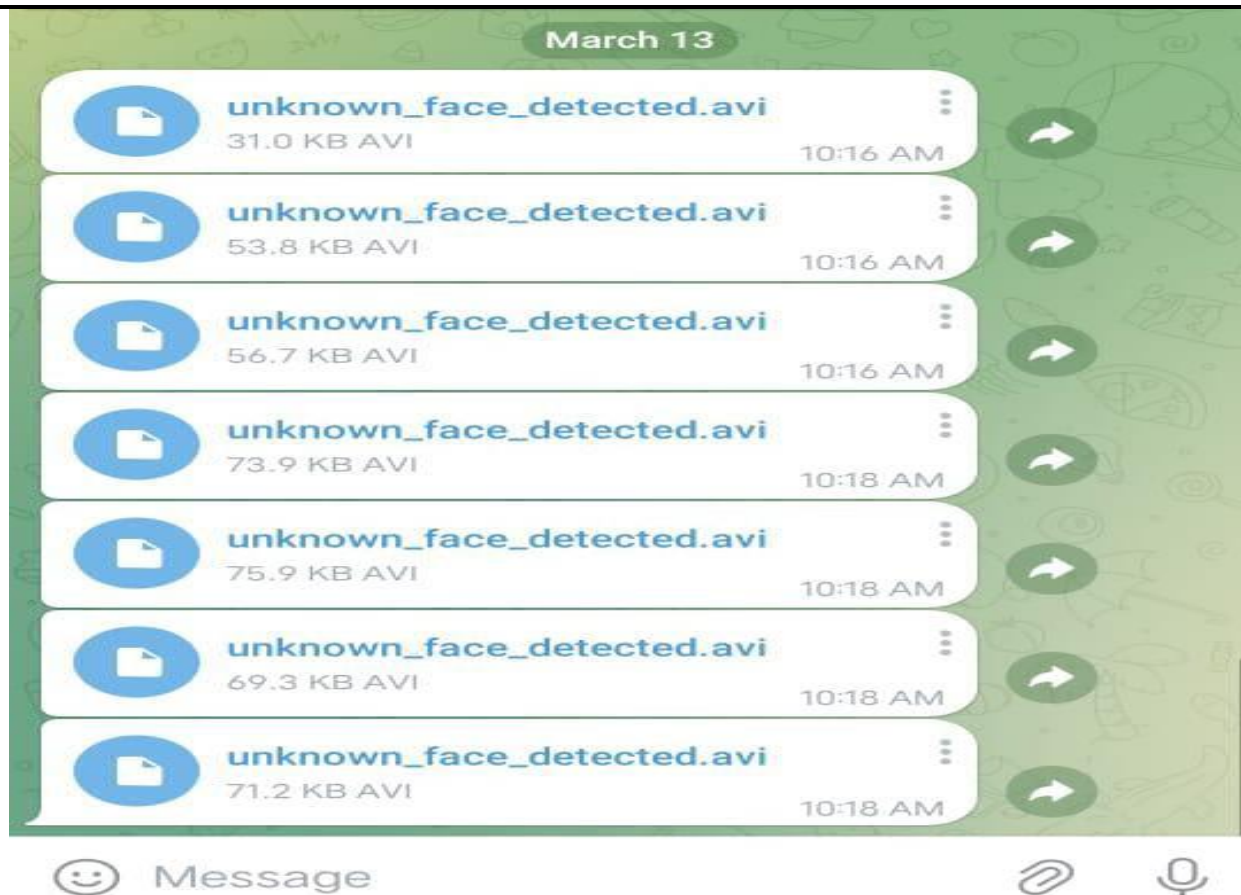
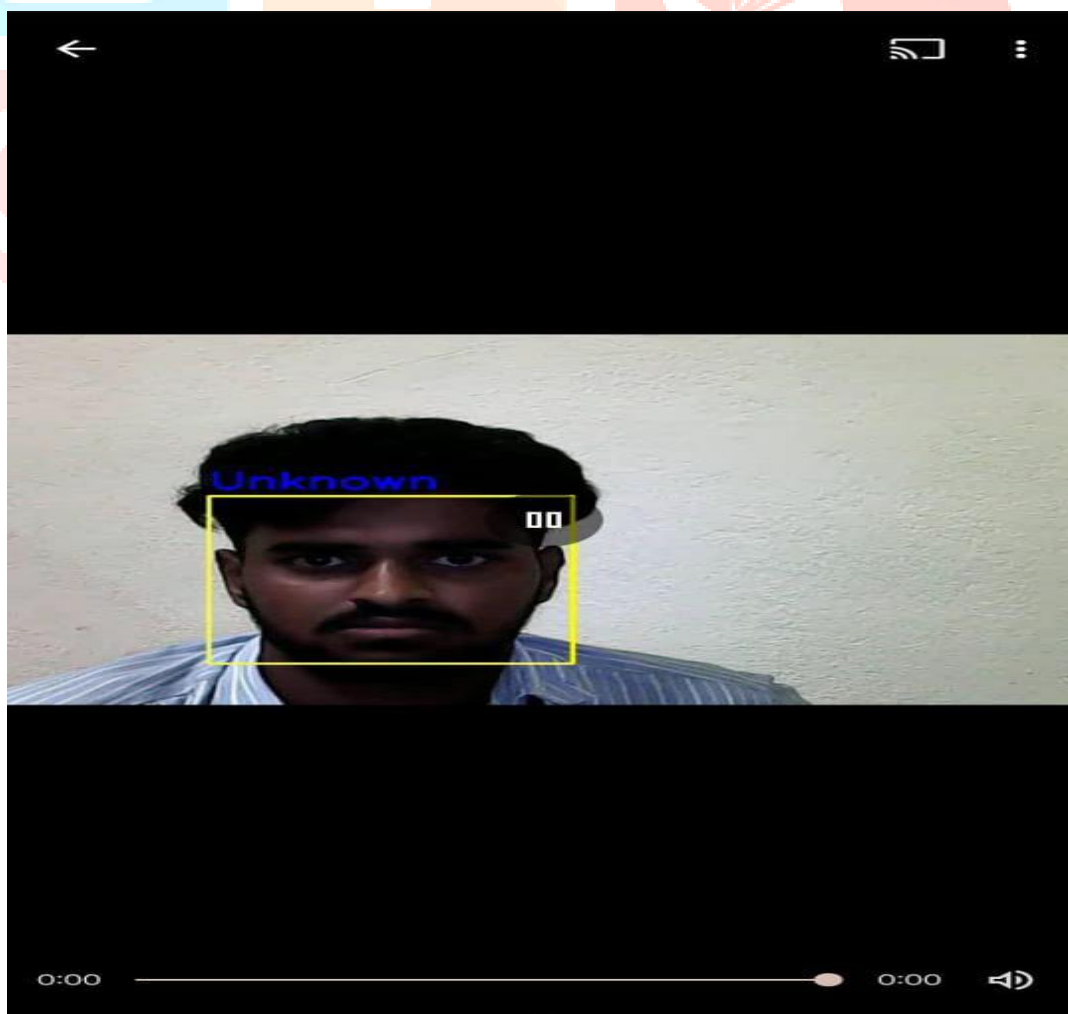Fig 7: Security Alert through Telegram along with video footage of intrusion.

Fig 8: Video footage of Unknown entry in Home.

VII. CONCLUSION

Multifunctional smart mirror is an innate mixture of IOT technology and smart home functionality, offering real -time updates and advanced security features. By integrating a raspberry pi, two-way mirror, API services and motion detection, it offers a modern, user friendly experience. The system not only enhances daily feature, such as updates, time, weather and temperature, but also explore infiltration and also promotes home safety by sending cautious information along with recorded footage. This innovative design gives an example of the ability of smart techniques to convert traditional home systems into intelligent, skilled and aesthetically pleasing solutions.

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