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Unknown Person Identification and Alert system for Blind people using face Recognization

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Abstract: This project entitled "Unknown Person Identification and Alert system for Blind people using face Recognition " is developed using Python programming language. Security is a very important term because most crimes are taking place in cities rather than in rural areas. So it is compulsory to appoint a watchman or security guards, which is not affordable for everyone. IOT-based security and technological substitutions have easy but much costlier maintenance requirements. The primary goal of this project is to develop a software application that will help identify intruders using Opencv. Computer vision and OpenCV have mitigated this problem through the proposed system. The system can detect and recognize a person based on the data previously provided to it. The proposed system is capable of face detection and reorganization of a person to identify whether the person in the frame is a known person or an intruder. Haar-cascade models are used for detecting human face. This portion of a face is then given for recognition through a model trained on LBPH. The model returns the probability of recognition in the frame for each person. Furthermore, the system can trigger the alarm when it comes to finding any intruder concerning human beings. This can be integrated into any kind of video monitoring like safety to banks, burglar movement monitoring applications, etc. The system will definitely require some kind of initial training to learn what is normal and then an intruder. The development of this system is mainly to make it user-friendly and by that, reduce the amount of manual monitoring work possible.

Keywords: Face Recognition, Computer vision, Haar-cascade, Local Binary Pattern Histogram (LBPH)

I.INTRODUCTION

The hindrances that make it difficult for the visually impaired to recognize people around them are really big hurdles in their social engagements, safety concerns, and independence. They do not require only face recognition like normal individuals. Unlike sighted people, blind individuals cannot instantly recognize the familiar face. They have to identify this through different methods, like voice recognition, physical touch, or sometimes help from others. But these methods have limitations, more specifically, in dynamic and unfamiliar environments. The most widely accepted solutions are guide dogs, human assistants, and voice-based mobile applications that provide some degree of assistance but are not often efficient and real-time usable. Guide dogs require extensive training and maintenance, human assistance is not readily available, and mobile applications necessitate manual insertion of data, making them impractical in situations requiring immediate identification. With advancements in artificial intelligence, machine learning, and computer vision, opportunities can now be leveraged to develop a system that assists with the identification of known and unknown persons by visually impaired individuals in real time within their surroundings.

This paper, based on Face Recognition and application of computer vision and AI-oriented face recognition, describes a wearable technology-based system that helps solve the above problems by helping blind users recognize people easily. Thus, real-time facial inputs could be processed using OpenCV and machine learning algorithms. The implementation of this facial detection is done on Haar-cascade models, which quickly and accurately detect human faces in real-time, and the result gets input to the facial recognition model trained using the Local Binary Pattern Histogram (LBPH) algorithm to check for a match with the already stored database of known individuals. Then the system identifies the person through audio output. Where it fails to link the detected face to any previously stored data, the system identifies the person under consideration as an unknown person or intruder, then gives an audio alert to keep the user informed and secure.

The most salient facility given to this system is that it works in real time; hence there will be low latency and maximum accuracy assuring it would be an excellent implement for the visually challenged. In contrast to traditional security

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systems, as in, say, CCTV cameras or getting IoT based surveillance again which must be monitored manually or needs expensive maintenance, this system would be low-cost and portable. It does not depend on any type of complicated infrastructure or outside security personnel, thus very much suitable for personal security, home monitoring, or public safety applications. Proposed successfully developed system using Python, OpenCV and MySQL for database management so that data can be stored and retrieved effectively. It is equipped by additional functions including up.

The full version of visual impairment concerns remains always recognized to make the person memorable. The hardest part of life which remains hidden for any of the persons with impairment even blindness is especially recognizing people. Simply put, face recognition can be defined as one of the true recognitions possible without feeling the need for eyes. Recognition of face in a simple way based upon voice, touch, or even coordination is done by organizing the whole procedure in order that the best possible mean would be gained. Face recognition for people with impaired vision is in its infancy. In the near future, if technology expands, there will be many applications concerning people with visual impairments.

II.LITERATURE REVIEW

Assistive technology has significantly improved the lives of visually impaired individuals by enhancing their ability to navigate and interact with their surroundings. Recognizing people is a crucial aspect of daily life, impacting social interactions, personal safety, and independence. Traditional methods such as guide dogs, walking canes, and human assistance offer support but lack the capability to identify individuals in real time. Advances in artificial intelligence (AI), computer vision, and deep learning have introduced facial recognition technology as a promising solution for assisting blind individuals in identifying people around them. Existing assistive technologies, including voice-based applications like Seeing AI and Be My Eyes, RFID and Bluetooth-based systems, and wearable smart devices such as OrCam MyEye, provide some level of assistance but require active user input, pre-installed infrastructure, or come at high costs, making them impractical for widespread adoption. Facial recognition systems powered by deep learning models like FaceNet, DeepFace, and Local Binary Pattern Histogram (LBPH) have significantly improved recognition accuracy. The integration of edge computing platforms such as Raspberry Pi and NVIDIA Jetson Nano enables real-time processing, reducing the need for cloud-based operations and enhancing speed. Text-to-speech (TTS) technologies, including Google TTS and Amazon Polly, further contribute to accessibility by converting recognition results into instant audio feedback. Despite these advancements, existing facial recognition systems face challenges such as variations in lighting conditions, facial occlusions, privacy concerns, and limited portability, making them less practical for blind individuals.

The proposed Unknown Person Identification and Alert System for Blind People Using Face Recognition addresses these challenges through a combination of computer vision, AI-driven facial recognition, and wearable technology. The system features a lightweight camera integrated with OpenCV-based facial detection using Haar-cascade models and recognition using LBPH algorithms, enabling real-time identification. Audio feedback provided through Google TTS informs users of recognized individuals, while an intruder alert system enhances security by notifying users when an unknown person is detected. Key advantages of the system include real-time processing, hands-free operation, secure data encryption, affordability, and scalability. Future improvements could focus on cloud-based recognition for expanded databases, multilingual voice support, enhanced deep learning models for low-light and crowded environments, and integration into smart glasses for seamless use. This intelligent and cost-effective solution empowers visually impaired individuals to recognize people effortlessly, promoting greater independence, safety, and social engagement while addressing the limitations of existing assistive technologies.

III.DESIGN & IMPLEMENTATION

The design and implementation phase plays a role in converting theoretical knowledge into a highly practically functioning system. This phase defines the system architecture, appropriate technologies to be used, and developing well-integrated modules. The system itself has different designs, such as file design, input design, output design, database design, and code design. File design is intended to develop an efficient data storage and retrieval mechanism (for instance, making it easy to locate information) while maintaining clear structure and logical organization. Input design focuses on user-friendly entry of data with various validation techniques to minimize errors, while output design is focused on delivering meaningful representation of data for making decisions and maintaining records. Database design is yet another important aspect that helps keep the data integrity, security, and efficiency in terms of controlled redundancy and normalization techniques.

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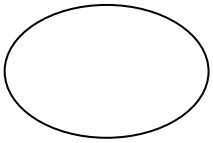
At implementation, the system that has been developed and designed is integrated and tested to reflect how it is to function according to what has been specified in the requirements. A pyere, MySQL backend has formed the groundwork for this current system to enhance usability of its functions without much questioning between the front end of the user interface and the back end of the database. Code designing is largely modular, thus, enhancing reusability, maintainability, and debugging. The systems undergo extensive test phases such as unit test, integration test, and system testing to identify and fix errors present. Implementation is accompanied by user training and hence is smooth. Appropriate documentation concerning enhancements and troubleshooting is maintained. The existing manual system is successfully transitioned to the new automated one. Well-defined strategy of changeover helps in reducing disturbances and operational losses. Evolving this system from its conception to being a full-fledged operational system requires a phenomenal amount of effort. The robustness, scalability, and efficiency of the solution to address the user's requirements as well as productivity will be assured by successful design and implementation.

IV.DATA FLOW DIAGRAM

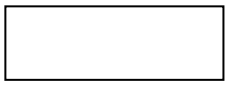
DFD shows how data interacts with the system. DFDs are highly utilized in modeling many aspects of a business function because they systematically differentiate a task into the simpler ones, thereby assisting the analyst in understanding the system which they are trying to model.

In a data flow diagram, a system is modeled using outside entities with which data flows to a processing system, which transmits data and results in the output of data on the outside entities of files. Data may also flow to process as inputs.The symbols appearing in the DFD has been explained below:



- Represents a process

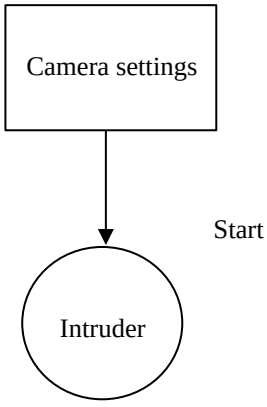
- Which shows data flow



- Designation of the data

- Shows Data source

Level 0



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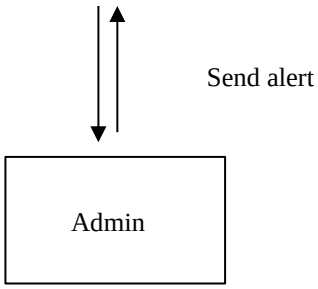
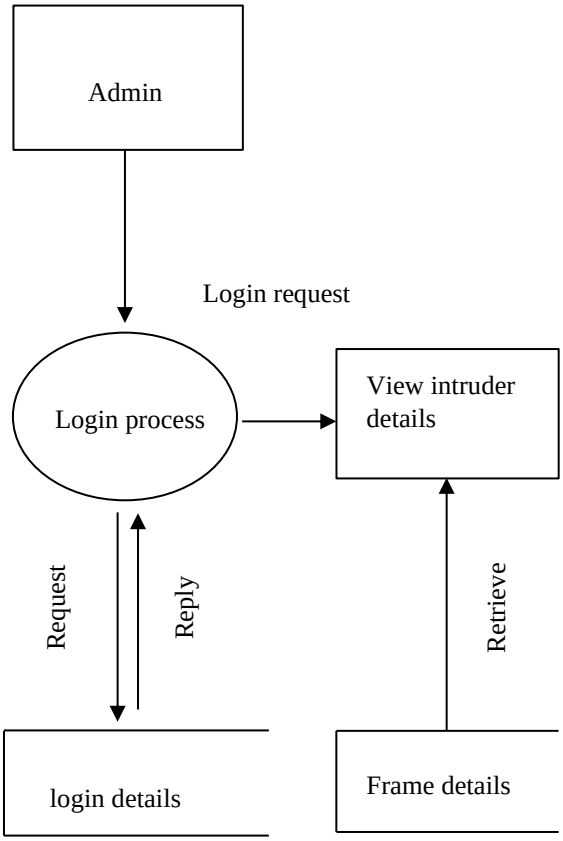


Level 1



V.EXPERIMENTAL RESULT

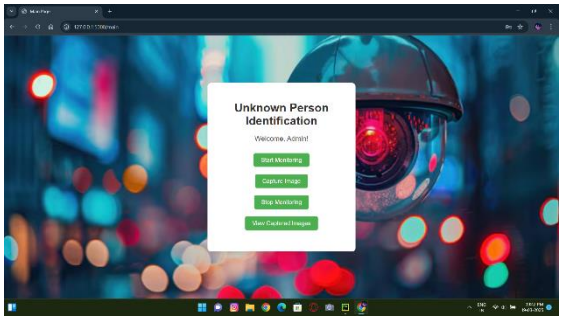


Fig 1:Home page

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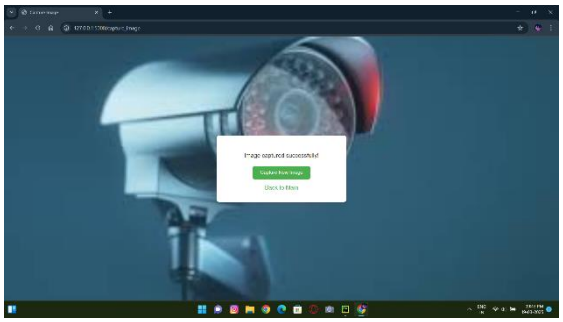

Fig 2:Capturing Images

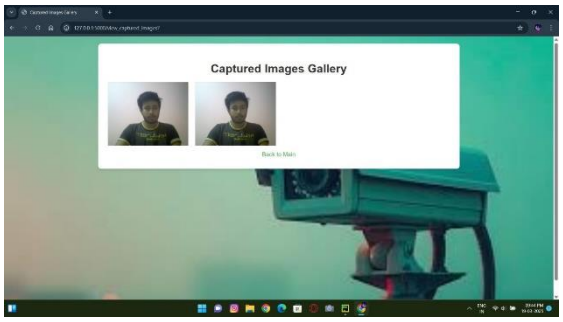

Fig 3:Viewing Captured Images

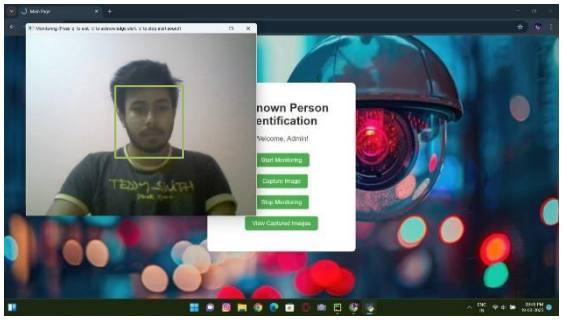

Fig 4:Start Monitoring

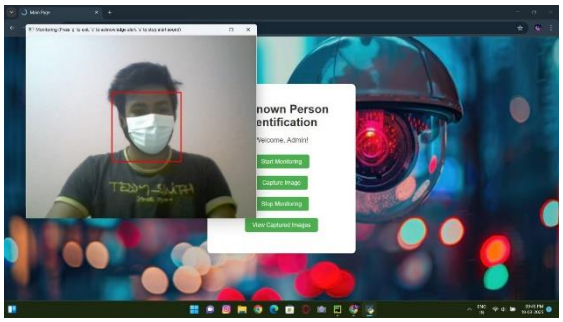

Fig 5:Displaying Red box for the unknown person

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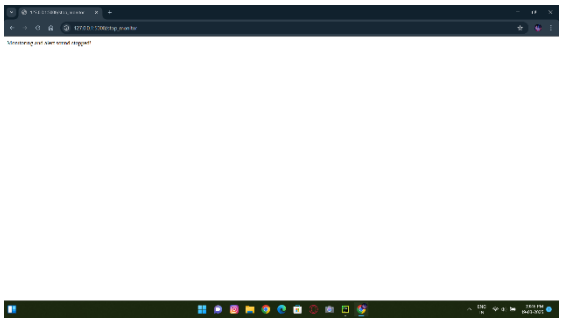

Fig 6:Stop Monitoring

VI.CONCLUSION & FUTURE WORK

All the existing intruder detection systems are good enough to provide real-time monitoring housing. However, it mostly relies on manual reviewing; hence, it becomes inefficient, not to say that it brings about lagging responses. The solution is to integrate AI and machine learning with these systems. It transforms the security assistant into a proactive, real time, and alerting machine instead of just passively viewing. As a result, it improves security in every sector while reducing human error and offering improved response time. Intelligent automation can pave the way toward a better and more secure future with effective surveillance infrastructure.

Future research in an area contains many promising tracks of further improvement in the efficiency and effectiveness of surveillance. Advanced algorithms can be constructed not only to detect intruders but also to identify abnormal behavior patterns of the subjects under observation, for example, loitering or inappropriate access in restricted zones. AI-based models can help distinguish between induced movements of people and movements due to animals or other factors in the environment, thus reducing false alarms. Signing in an additional way of facial recognition and "whitelisting" can further tighten the access control so that only authorized personnel would be permitted during access in an area. Such improvements will make security systems much more intelligent and proactive in being able to prevent security breaches.

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