FORMAT FOR A REVIEW PAPER

Title page:

TITILE: A COMPREHENSIVE REVIEW ON AI BASED SMART SECURITY SYSTEM

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Abstract: In recent years the technologies are coming more popular, people want good security system. That's why we have developed a cool system that uses artificial intelligence (AI) along with the Internet of Things (IOT). This project introduces an AI-based smart security system. It comes packed with features like motion detection, facial recognition, and sentence recognition. our goal? To create a smart way to keep your home safe!

This system always watches the surroundings using things like motion sensors, cameras, and microphones. If there's any movement, it jumps into action! It quickly activates its facial and sentence recognition to know who's around.

The face recognition system takes the photos of persons faces and compares them with a database of known faces. This helps in confirming the person who they are. Meanwhile, the sentence recognition listens to spoken words to double-check the person's identity. By adding different layers of checking's for to increases the

more accuracy of the system's and it reduces the false alarms by checking with more layers of securities.

Also, you get real-time alerts on your smartphone's That way, you can keep an eye on things even when you’re not at home and respond quickly if anything goes wrong.

To make everything work great, the system uses different techniques for blending data together, like data fusion and edge computing. This keeps communication smooth and helps process information from various sensors easily.

The security system doesn’t just make smart homes safer—it fits well in offices or public places like lockers etc... By mixing AI technologies with IoT product's, this project shows how far the security systems can increase safety and peace of mind for everyone in our connected world today.

Keywords: smart security, motion detection, facial recognition, sentence recognition, security alerts, CNN

Introduction:

In today's world, security has become a paramount concern for homeowners and businesses alike. With the rapid advancements in technology, traditional security systems are evolving into more sophisticated, intelligent solutions. This project focuses on developing an AI-based smart security system designed to enhance the safety of smart homes by combining various state-of-the-art technologies.

Our system integrates motion detection, facial recognition, and sentence recognition to provide a comprehensive and multi-layered

approach to security. Unlike conventional systems that rely on simple alarms or basic surveillance, our solution uses motion sensors to detect any movement in the monitored area. When movement is detected, the system activates its facial recognition module to identify individuals based on their facial features. Additionally, a sentence recognition feature analyze spoken words to further verify the identity of the person.

By combining these advanced technologies, the AI-based smart security system not only enhances the accuracy of threat detection but also reduces the chances of false alarms. Users receive real-time alerts and can monitor their homes remotely through a mobile app, ensuring they are always informed and in control. This intelligent system is designed to provide peace of mind by protecting against unauthorized access and enhancing overall safety in smart homes. As technology continues to advance, integrating AI into home security systems represents the future of home protection, making our living environments safer and more secure.

Literature review:

Body (Subtopics being addressed):

1.System Architecture:

The system architecture of our AI-based smart security system is designed to provide comprehensive security by integrating multiple technologies seamlessly. At the core of the system are two primary components: PIR (Passive Infrared) sensors for motion detection and a Convolutional Neural Network (CNN) for facial recognition.

The architecture begins with the PIR sensors, which are strategically placed around the monitored area to detect any movement. These sensors are highly sensitive to infrared radiation emitted by warm objects, such as humans, making them effective at detecting motion in their field of view. When motion is detected, the PIR sensors send a signal to the central processing unit (CPU), triggering the next phase of the security protocol.

Upon receiving the signal from the PIR sensors, the system activates its camera module to capture images of the person in the detected area. These images are then processed by the CNN, an advanced AI algorithm specifically designed for image recognition tasks. The CNN analze the facial features captured in the images, extracting unique identifiers that can distinguish one individual from another. The extracted features are then compared against a pre-existing database of authorized individuals. If a match is found, the person is recognized as authorized, and the system allows access or proceeds with standard monitoring.

To enhance security further, the system also incorporates a sentence recognition module, which uses natural language processing (NLP) techniques to verify the spoken words of the individual. If the face is recognized but additional verification is required, the system prompts the person to speak a specific sentence. The spoken sentence is then analysed for authenticity, adding another layer of security to prevent unauthorized access.

The entire process is supported by robust data integration and processing capabilities, including edge computing, which ensures that data from sensors and cameras is processed locally and quickly, reducing latency and improving the system’s response time. The system is also capable of real-time data fusion, combining inputs from different sensors and modules to make accurate and timely security decisions.

2. Motion Detection Using PIR Sensors:

Motion detection is a fundamental component of our AI-based smart security system, and it is achieved through the use of Passive Infrared (PIR) sensors. PIR sensors are widely used in security systems for

their reliability and efficiency in detecting motion. These sensors work by detecting infrared radiation (IR) emitted by objects in their field of view. Every object emits some level of IR radiation, which varies based on its temperature. The PIR sensors have a pair of pyroelectric elements that can detect changes in IR radiation levels. When a person or object moves within the sensor's range, there is a sudden change in the amount of infrared radiation reaching the sensor. This change is detected by the pyroelectric elements, generating a small electrical signal that indicates movement.

In our system, PIR sensors are strategically placed to cover key areas of the environment. When motion is detected, the sensor sends a signal to the central processing unit, activating other components of the system, such as the camera for facial recognition and the microphone for sentence recognition. This approach ensures that the system is energy-efficient, as the cameras and recognition modules are only activated when necessary, rather than running continuously. Furthermore, PIR sensors are effective in various lighting conditions and do not require any direct contact or visible light, making them ideal for 24/7 monitoring. Their ability to quickly detect motion with a minimal false alarm rate makes them a critical part of our smart security solution, ensuring prompt and reliable detection of any unauthorized access.

3. Facial Recognition Using CNN:

Facial recognition using Convolutional Neural Networks (CNNs) is a powerful technique that leverages deep learning to identify and verify individuals based on their facial features. CNNs are particularly well-suited for image-related tasks due to their ability to automatically learn and extract features from images through multiple layers of processing. Here's a detailed breakdown of how facial recognition using CNN works in your AI-based smart security system:

A.Overview of Convolutional Neural Networks (CNNs)

What is a CNN: A Convolutional Neural Network (CNN) is a type of deep learning model designed specifically for processing data that has a grid-like topology, such as images. CNNs are composed of several layers, each of which transforms the input data (an image) in ways that enhance certain features and suppress irrelevant ones.

Key Components:

Convolutional Layers: These layers apply a series of filters to the input image, capturing local features such as edges, textures, and patterns.

Pooling Layers: These layers reduce the dimensionality of the data, preserving important features while minimizing computational complexity.

Fully Connected Layers: These layers are used at the end of the CNN to combine all the extracted features and make the final prediction.

B.How CNNs Work for Facial Recognition: Step-by-Step Process:

1. Image Capturing: When motion is detected by the PIR sensors, the camera captures an image of the individual. This image serves as the input for the facial recognition process.

2. Preprocessing: The captured image is preprocess to standardize the input data. This may include resizing the image, converting it to grayscale, normalizing pixel values, and applying filters to reduce noise.

3. Feature Extraction:

The image is passed through multiple convolutional layers, each designed to detect specific features such as edges, textures, and facial landmarks (eyes, nose, mouth).

As the image moves through these layers, the network learns to recognize more abstract features that define the uniqueness of each face.

4. Pooling: Pooling layers reduce the spatial dimensions of the feature maps, retaining only the most significant features. This helps in reducing the computational load and in achieving translation invariance (i.e., recognizing a face regardless of its position in the image).

5. Flattening and Fully Connected Layers:

The output from the final convolutional and pooling layers is flattened into a single vector.

This vector is then passed through fully connected layers that combine the features to produce a final prediction, indicating whether the face matches an entry in the database.

6. Classification: The final layer of the CNN is typically a soft layer, which provides probabilities for each class (recognized individual). The highest probability class is chosen as the output, indicating the recognized individual.

C. Training the CNN

Dataset Preparation: The CNN is trained on a large dataset of label facial images, where each image corresponds to a known individual. The dataset must include a diverse set of images to account for variations in lighting, angles, expressions, and occlusions (e.g., glasses, hats).

Training Process: During training, the CNN learns to minimize the difference between its predictions and the actual labels (the identity of the person in the image). This is done using backpropagation and optimization algorithms like Stochastic Gradient Descent (SGD).

Model Evaluation and Tuning: After training, the model is evaluated on a separate validation set to measure its accuracy and robustness. Hyperparameters (e.g., learning rate, number of layers, filter sizes) are fine-tuned to optimize performance.

C. Advantages of Using CNNs for Facial Recognition:

High Accuracy: CNNs can achieve high accuracy in facial recognition due to their ability to learn complex patterns and features from large datasets.

Robustness: CNNs are robust to variations in lighting, facial expressions, and angles, making them ideal for real-world applications where conditions are not always ideal.

Scalability: CNN models can be easily scaled to accommodate larger datasets or more complex recognition tasks, such as recognizing multiple faces in a single image.

Real-Time Processing: With optimized hardware and software, CNNs can perform facial recognition in real-time, making them suitable for security applications that require quick responses.

D. Integration with Your Smart Security System:

System Workflow: When the PIR sensors detect motion, the camera captures an image that is immediately sent to the CNN for processing. The CNN identifies whether the individual is authorized or not by comparing the facial features to those stored in the database.

Alert and Response: If the face is recognized, the system may allow access or proceed to further verification steps, such as sentence recognition. If the face is not recognized, the system triggers an alert to notify the user or security personnel.

4.Sentence recognition:

Sentence recognition also known as sentence-based speech recognition, is a process that involves identifying and spoken sentences to determine their content or meaning. In the context of an AI-based smart security system, sentence recognition plays a crucial role in adding an extra layer of security through voice authentication or command recognition.

1. What is Sentence Recognition:

Sentence recognition refers to the ability of a system to accurately understand and process spoken sentences. Unlike simple keyword detection, sentence recognition involves understanding the full context of a spoken phrase, including the sequence of words, the grammar, and the semantics. This capability is achieved using advanced natural language processing (NLP) techniques combined with machine learning models.

2. How Does Sentence Recognition Work:

The process of sentence recognition involves several steps:

1.Audio Capture:

The system captures the audio input using a microphone. In a security context, this typically occurs after motion or facial recognition triggers the system to listen for specific phrases or commands.

2.Preprocessing:

The captured audio is processed to remove noise and enhance the quality of the speech signal. This may involve techniques like filtering, normalization, and voice activity detection to isolate the speech from background sounds.

3.Feature Extraction:

The system extracts key features from the speech signal that are important for recognizing words and sentences. Commonly used features include Mel-Frequency Cepstral Coefficients (MFCCs), which represent the short-term power spectrum of sound and are crucial for distinguishing different sounds in human speech.

4.Acoustic Modelling:

The extracted features are input into an acoustic model, which maps the features to phonetic units or sounds of the language. This

model is typically trained using large datasets of spoken language to understand the various ways words can be pronounced.

5.Language Modelling:

A language model is used to understand the grammar and context of the recognized words. This model helps the system predict the most likely sentence given a sequence of recognized words, based on the syntax and semantics of the language.

6.Decoding:

The system combines the acoustic and language models to decode the speech into a coherent sentence. This involves finding the most likely sequence of words that matches the spoken input based on both sound and context.

7.Post Processing:

- The decoded sentence is further processed to handle any errors or ambiguities. This may include using additional context, such as the identity of the speaker or the specific security context, to refine the recognition results.

3. Importance in Security Systems:

In an AI-based smart security system, sentence recognition can serve multiple purposes:

Voice Authentication: The system can verify the identity of a person by recognizing a pre-determined sentence or passphrase. This adds a

layer of biometric security that is harder to bypass compared to facial recognition alone.

Command Recognition: The system can recognize specific commands, such as "unlock door" or "trigger alarm," which allows users to interact with the system through voice. This is especially useful for hands-free operation in a smart home environment.

Anomaly Detection: By analysing the content of spoken sentences, the system can detect unusual or unauthorized speech patterns that might indicate a security breach.

4. Technologies Used for Sentence Recognition:

To implement sentence recognition, several technologies and tools are commonly used:

Natural Language Processing (NLP) Libraries: Libraries like NLTK (Natural Language Toolkit), spacy, or Hugging Face Transformers provide tools for parsing and understanding natural language.

Automatic Speech Recognition (ASR) Engines: Engines like Google's Speech-to-Text API, Microsoft Azure Cognitive Services, or open-source alternatives like Kaldi and Mozilla Deep Speech are used to convert spoken language into text.

Deep Learning Models: Recurrent Neural Networks (RNNs), Long Short-Term Memory networks (LSTMs), and more recently, Transformer models, are used to model the sequential nature of speech and improve recognition accuracy.

5.Challenges and Limitations:

While sentence recognition has advanced significantly, there are still challenges:

Noise and Distortion: Background noise and poor audio quality can reduce recognition accuracy.

Accent and Dialect Variability: Different accents, dialects, and speaking styles can be difficult for the system to handle without extensive training data.

Security and Privacy: Storing and processing voice data can raise privacy concerns, especially in sensitive environments.

6.Future Directions:

As technology advances, sentence recognition in security systems is expected to improve:

Better Acoustic Models: More robust models that can handle diverse accents, background noise, and low-quality audio will enhance reliability.

Integration with Other Biometrics: Combining sentence recognition with other biometric data, like facial recognition or fingerprint scanning, will create more secure multi-factor authentication systems.

Edge Computing: Processing voice recognition on the edge (locally on the device) will reduce latency and improve privacy by avoiding cloud-based processing.

5. Data integration and preprocessing:

Data integration and processing are critical components of an AI-based smart security system. They ensure that data collected from various sensors and devices is effectively combined, analyzed, and used to make informed decisions in real-time. Here's a detailed breakdown of how data integration and processing work in your project:

1. Data Collection and Sources:

Motion Detection Sensors (PIR Sensors): These sensors detect infrared radiation emitted by objects in motion. When motion is detected, they send a signal to the processing unit, indicating that a potential security event may be occurring.

Cameras for Facial Recognition: High-definition cameras capture images or video streams of individuals when motion is detected. These visual inputs are crucial for the facial recognition module, which uses these images to identify or verify the person.

Microphones for Sentence Recognition: Microphones capture audio, specifically sentences spoken by individuals. This audio data is

used for sentence recognition, adding another layer of verification to the system.

2.Data Integration Techniques:

Data Fusion: This technique involves combining data from multiple sources to provide a more comprehensive understanding of the situation. In your security system, data fusion integrates inputs from motion sensors, cameras, and microphones. This approach ensures that the system can make more accurate decisions based on a holistic view of the environment.

Edge Computing: Data processing occurs close to the source of data generation rather than relying on a centralized server. For your security system, edge devices like Raspberry Pi or NVIDIA Jetson can process data locally. This reduces latency, enhances privacy, and ensures real-time responsiveness, as data does not need to travel to a remote server for processing.

Real-Time Data Streaming: Continuous data streams from sensors and devices are processed in real-time. This capability is essential for security applications, where immediate response to detected threats is crucial. Technologies like Apache Kafka or MQTT can be used for real-time data streaming, ensuring that all data is promptly and acted upon.

3.Data Preprocessing:

Data Cleaning: Before analysis, the collected data is cleaned to remove noise or irrelevant information. For example, in facial recognition, images might be preprocessing to adjust for lighting conditions or remove background noise.

Feature Extraction: Involves identifying key characteristics from the data that are relevant for decision-making. For facial recognition, this

could mean extracting facial landmarks; for sentence recognition, it might involve extracting specific keywords or phrases.

Data Normalization: Ensures that the data from different sensors is standardized and comparable. This is particularly important when combining data from multiple sources to ensure consistency and reliability.

4.AI Processing and Decision Making:

Convolutional Neural Networks (CNNs): Used for facial recognition, CNNs analyses image data to identify and verify individuals. The network processes the image data through multiple layers, extracting features and learning patterns that distinguish one face from another.

Natural Language Processing (NLP): Utilized in sentence recognition, NLP algorithms spoken words to verify user identity. This involves converting audio data into text and then processing the text to identify specific phrases or sentences that match pre-defined criteria.

Decision Logic: The integrated data is processed to make security decisions. If the system recognizes an authorized face and validates the spoken sentence, access is granted. If not, the system triggers an alert and potentially locks down the area.

5.Alerts and Notifications:

Real-Time Alerts: Based on the analysis and decision-making process, the system sends immediate alerts to the user or security personnel if any threat is detected. These alerts can be sent via mobile apps, SMS, or email, ensuring that users are promptly informed of any security breaches.

Remote Access and Monitoring: Users can access the system remotely to view real-time data, check logs, and control security settings. This is facilitated by integrating the system with cloud services or web-based applications, allowing for monitoring and management from anywhere.

6. Data Storage and Logging:

Local and Cloud Storage: Data, including images, audio, and logs of events, can be stored locally on edge devices or uploaded to the cloud for long-term storage and analysis. This allows for historical analysis, which can help in identifying patterns or improving system accuracy over time.

Data Encryption and Security Ensures that all data, whether in transit or at rest, is encrypted to prevent unauthorized access. This is crucial for maintaining privacy and security, particularly when dealing with sensitive information like facial images and audio recordings.

6. Alerts:

The Alerts and User Interaction component of our AI-based smart security system is designed to ensure that users are constantly informed about the security status of their premises and can respond swiftly to any potential threats. When the system detects motion through the PIR sensors and verifies it with facial and sentence recognition, it either grants access or, in the case of an unauthorized attempt, triggers an alert. These alerts are sent in real-time to the user's smartphone or other connected devices via push notifications, SMS, or email. This immediate notification allows the user to take action promptly, such as viewing a live feed from the security cameras, checking logs of recent activities, or remotely activating additional security measures like alarms. The user interface, accessible through a mobile app or web portal, is designed to be

intuitive and user-friendly, providing an easy-to-navigate dashboard that displays all relevant security information at a glance. Users can customize alert settings, review recorded footage, manage authorized users, and adjust system preferences according to their needs. This comprehensive approach to alerts and user interaction not only enhances security by providing timely updates and control but also offers peace of mind, knowing that the security system is constantly monitoring and ready to respond to any situation.

BLOCK DIAGRAM FOR HOME SECURITY SYSTEM:

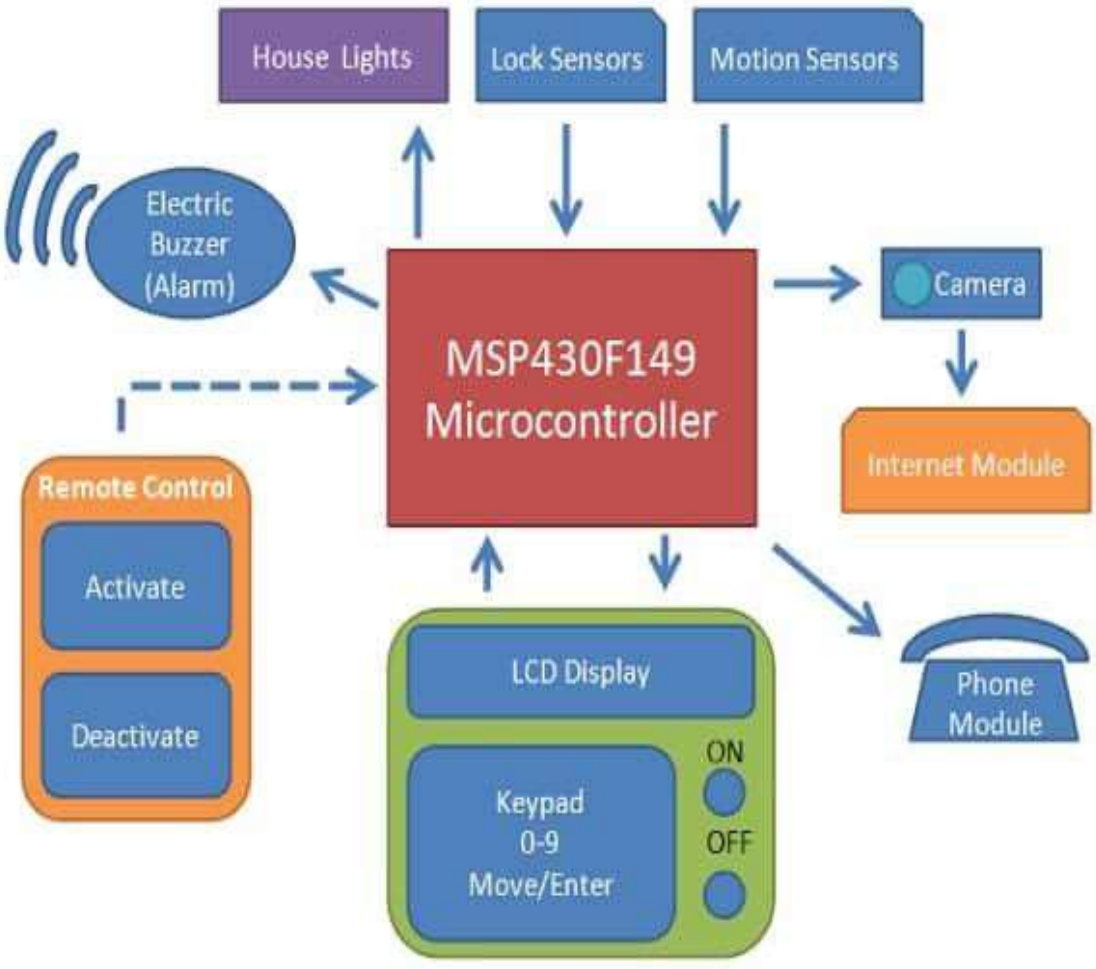
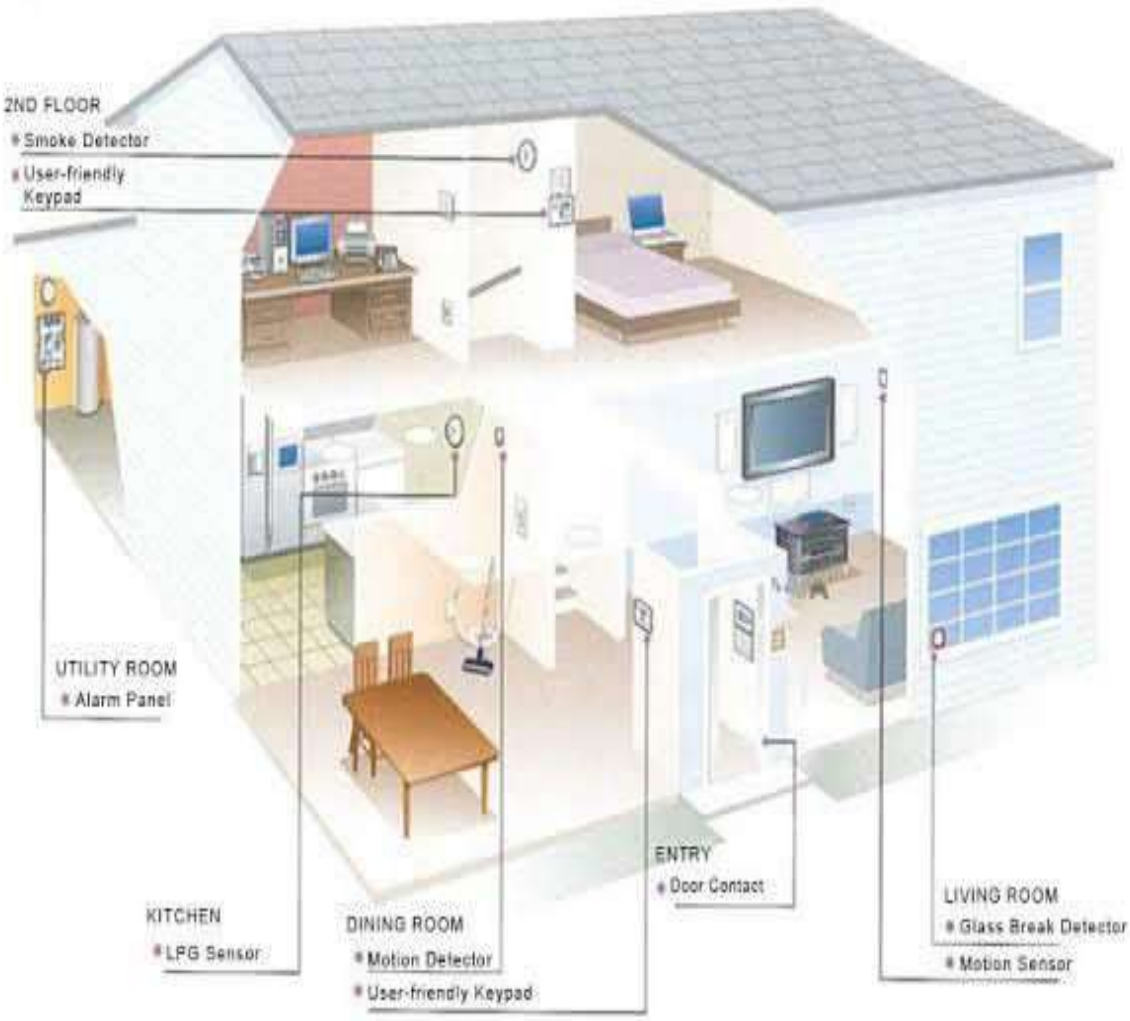
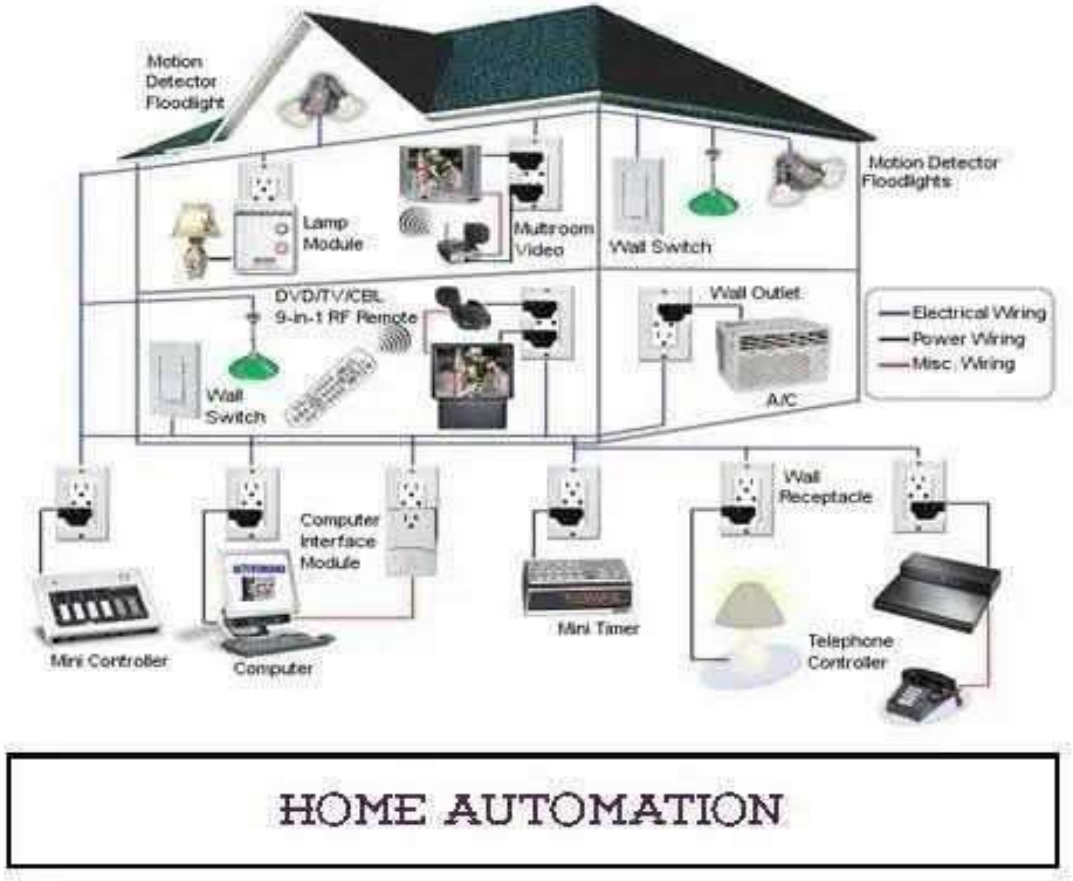


DIAGRAM FOR HOME SECURITY SYSTEM PLAN:



Sensor Positioning - Burglar Alarm System



Conclusions:

This AI-based smart security system represents a significant advancement in home and building security, combining the latest in artificial intelligence and IoT technology to deliver robust, real-time protection. Throughout the development of this project, we have integrated various cutting-edge technologies, including PIR sensors for motion detection, Convolutional Neural Networks (CNNs) for facial recognition, and natural language processing for sentence recognition. Each component works in tandem to provide a multi-layered security approach that significantly enhances the system's accuracy and reliability.

The use of PIR sensors ensures efficient detection of motion, activating the facial recognition module when necessary, which conserves resources and enhances system responsiveness. The implementation of CNNs allows for precise identification of individuals by analyses facial features, offering a high level of accuracy and reducing the chances of false positives. The additional layer of sentence recognition further strengthens the system by verifying identities through voice commands, ensuring that access is only granted to authorized users.

Data integration techniques, such as edge computing and real-time data streaming, are crucial to the system's functionality, enabling seamless communication between various sensors and processing units. This ensures that all data is processed quickly and accurately, allowing for immediate decision-making and timely alerts. The user interface is designed to be intuitive and accessible, providing users with real-time alerts, remote monitoring capabilities, and easy management of security settings through a mobile app or web portal.

Overall, this project demonstrates the potential of integrating advanced AI technologies with traditional security measures to create a smart security system that is both effective and user-friendly. By enhancing the accuracy of threat detection and providing comprehensive monitoring capabilities, this system not only improves security but also offers peace of mind to users. The adaptability and scalability of the system make it suitable for a wide range of applications, from residential homes to commercial buildings and public spaces. As technology continues to evolve, this project lays the groundwork for future innovations in smart security solutions, paving the way for even more sophisticated and reliable systems.

Literature Cited:

**Paper 1: "Home Automation Security System Based on Face Detection and Recognition Using IoT"

Authors: [Sana Ghafoor, Muhammad Rizwan Tahir]
Journal/Conference: [ResearchGate]
Year: [2020]

Summary:
In this paper the smart security systems reveals a focus on integrating facial recognition with IoT to enhance home automation security. The system's reliability is increased by combining face detection with IoT, allowing for real-time monitoring and alerts. Advances in AI and machine learning have significantly improved the accuracy of facial recognition, making it a viable solution for smart home security. Recent studies highlight the importance of optimizing algorithms for low-power devices, ensuring the system's efficiency and responsiveness

**Paper 2: "Enhancing Smart Home Security with Face Recognition using Deep Learning"

Authors: [Asif Rahim , Yanru Zhong , Tariq Ahmad]
Journal/Conference: [International Journal for Research in Applied Science & Engineering Technology (IJRASET)]
Year: [2023]

Summary:
Recent advancements in deep learning and IoT have significantly influenced facial recognition systems for smart home security. Research by Salim et al. developed a system with high accuracy but limitations in recognizing watermarked or tilted images. Ouanan et al. utilized CNN models for facial recognition in uncontrolled environments, achieving promising results despite ongoing challenges. Integration with IoT platforms, as explored by Hussain et al., enables real-time authentication with high accuracy.

**Paper 3: "Artificial Intelligence based Home Security System"

Authors: [Prashant Katiyar, Satish Singh, Ankit Kumar, Mr. Gautam Kumar]
Journal/Conference: [International Journal For Technological Research In Engineering(ISSN)]
Year: [2021]

Summary:
Recent studies on AI-based home security systems emphasize the integration of IoT, machine learning, and biometric technologies to enhance security. Katiyar et al. highlight how AI-driven systems, including smart cameras and sensors, significantly improve home security by recognizing faces, detecting intrusions, and automating responses. These systems also offer advanced features such as remote monitoring and control via mobile devices, making them more accessible and effective. The incorporation of AI in these systems addresses both security concerns and user convenience, demonstrating a significant advancement in smart home technology.

**Paper 4: "Home Security System with Face Recognition Based on Convolutional Neural Network"

Authors: [Nourman S. Irjanto , Nico Surantha]
Journal/Conference: [International Journal of Advanced Computer Science and Applications(IJACSA)]
Year: [2020]

Summary:
Recent advancements in AI-based smart security systems focus on facial recognition due to its accuracy and non-intrusive nature. Convolutional Neural Networks (CNN), particularly the AlexNet architecture, have shown significant improvements.Challenges such

as performance under varying lighting conditions remain, but future research aims to optimize data augmentation and enhance hardware capabilities. Applications extend beyond home security to include office access systems, demonstrating the versatility and potential of facial recognition technology.

****Paper 5: "A Smart IoT Security System for Smart-Home Using Motion Detection and Facial Recognition"**

Authors: [AKM Jahangir Alam Majumder] Journal/Conference: [ResearchGate/ 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC)] Year: [2020]

Summary:
The literature on IoT-based smart security systems emphasizes the integration of motion detection and facial recognition technologies to enhance home security. Motion detection serves as an initial alert mechanism, identifying unusual activities, while facial recognition offers precise identification of individuals, thus reducing false alarms. Studies have demonstrated that combining these technologies improves the accuracy and efficiency of home security systems, particularly in smart homes. The system's ability to distinguish between familiar and unfamiliar faces adds an additional layer of security, making it a robust solution for modern home safety concerns .

****Paper 6:”SMART HOME SECURITY SYSTEM”**

Authors: [Nourman S. Irjanto , Nico Surantha] Journal/Conference: [International Journal of Advanced Computer Science and Applications(IJACSA)]
Year: [2020]

Summary:

The literature on smart home security systems highlights the integration of advanced technologies to enhance residential safety. A notable study by Sharma and Goen (2018) discusses a system utilizing the Arduino Uno microcontroller, GSM module, and solenoid locks. This setup offers dual-layer security with passwords and mobile-based authentication, ensuring only authorized access. The system also features a temperature sensor to detect potential fire hazards. The proposed solution demonstrates efficiency in securing homes, banks, and institutions by preventing unauthorized entry and promptly notifying owners and authorities in case of emergencies (Smart home).

****Paper 7:"FACE RECOGNIZATION SECURITY SYSTEM"**

Authors: [Sana Ghafoor, Muhammad Rizwan Tahir]
Journal/Conference: [ResearchGate]
Year: [2020]

Summary:

The literature on face recognition security systems highlights the growing importance of biometric technologies in enhancing security. These systems use algorithms to detect and recognize faces, comparing captured images with a database to identify authorized individuals. Notable methods include 3D facial recognition, which captures the shape of the face, and skin texture analysis, which uses skin patterns for identification. While face recognition offers non-intrusive surveillance, it faces challenges such as variations in lighting and facial expressions, necessitating continuous improvements in algorithmic approaches (Face Recognition Security…).

****Paper 8:"IMPLEMENTATION OF AI BASED SAFETY AND SMART SECURITY SYSTEM"**

Authors: [Nourman S. Irjanto , Nico Surantha] Journal/Conference: [International Journal of Advanced Computer Science and Applications(IJACSA)]
Year: [2020]

Summary:

The paper reviews AI and IoT's role in enhancing safety and security in smart cities. It discusses how AI can be integrated into urban infrastructure for predictive analytics, surveillance, and disaster management. The literature cited includes studies on probabilistic security models, UAV (unmanned aerial vehicle) applications, and energy management in smart cities. The proposed system architecture combines AI with IoT, smart drones, and intelligent CCTV to provide real-time monitoring and rapid response, aiming to improve urban safety and efficiency.

Reference:

1. Sana Ghafoor, Muhammad Rizwan Tahir.(2020). ResearchGate.
https://www.researchgate.net/publication/341261991

2. Asif Rahim , Yanru Zhong , Tariq Ahmad. (2023). International Journal for Research in Applied Science & Engineering Technology (IJRASET).
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