MARK42: The Secured Personal Assistant using Biometric Traits Integrated with Green IOT

1M.Gayathri, 2C.Malathy, 3Siddharth Singh

1Assistant Professor, Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India. E-mail: gayathrm2@srmist.edu.in.
2Professor, Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India. E-mail: malathyc@srmist.edu.in.
3Student, Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India. E-mail: siddharthsingh_ra@srmuniv.edu.in.

Abstract

Ongoing advances in Artificial Intelligence and Machine Learning have made a domain for creating clever individual aide bots verified with biometric characteristics. Mark42 is an endeavour to utilize Artificial Intelligence with picture acknowledgment for making it verified and play out the errands as requested by the Human. The venture is completely founded on computerized reasoning, machine learning and biometric attributes like facial acknowledgment incorporated with OpenCV. The innovation AIML is utilized for example coordinating of discourse, picture acknowledgment for facial acknowledgment. It can be integrated with green IOT (Internet of Things) and Machine Learning to make it further developed in the field of innovation. Digitization conveys new potential outcomes to facilitate our day by day life exercises by methods for assistive innovation. Google assistant, Alexa, cortana use machine learning, common language preparing and different incitation components to detect and impact nature. Mark42 is a push
to use by counterfeit methods smart voice-empowered PC bots with picture acknowledgment making it verified and play out the assignments as requested by the client. The technology AIML is used for pattern matching, image recognition for facial recognition. It aims to integrate with green IOT (Internet of Things) and Machine Learning to make it more advanced in the field of technology. So, by joining all the modules, we built up a personal assistant which can perform any functions ordered by individual and is fully secured.

**Keywords:** Artificial Intelligence, Voice Recognition, Personal Assistant, AIML, Green IOT.

1 **Introduction**

Mark42 is an attempt to use Artificial Intelligence with image recognition for making it secured and perform the tasks as ordered by the human. The work is fully based on Artificial Intelligence and biometric traits like facial recognition integrated with python. Tech giants like Google and apple have developed assistant bots like google assistant and siri, which performs activities given by the user. But these assistant bots are not secured. So to overcome this problem, our CV is secured through Biometric verification and recognition. The task is completely bolstered AI and biometric attributes like biometric distinguishing proof coordinated with the work of python. The innovation AIML is utilized for example coordinating, picture acknowledgment for biometric distinguishing proof. It means to incorporate with IOT (Internet of Things) and Machine Learning to frame it moreover progressed inside the field of innovation. It is easy to used and easy to be programmed. The main feature of AIML which pattern matching makes it easier to perform functions. Sphinx technology which is used for speech recognition technique makes it friendlier as sphinx can used to incorporate many languages. Image recognition helps it in making more secure as the other person may not be able to access it without biometric traits; it becomes a personal assistant which is more secured and reliable.

1.1 **Green IOT**

Energy consumption is an important factor when integrating the components with the personal assistant and household things. Energy efficient IOT technique has been developed in order to improve the performance level of personal bots when integrated with the home appliances, switching on the lights, television, open the doors, switching on air conditioners and many more. Green sensors are utilized in integrating our bots when operating with IOT technologies. Mark42 can switch off the
lights when commanded by the owner because assistant can perform the action after checking the verification of the owner by voice and image recognition. It can be used in the field of robotics making the robots more intelligent and can be used to understand the feelings by pattern matching AIML techniques. It can be applied in the field of army by giving orders to robots connected with persona assistant to perform operations in border. Energy consumption during the development of sensors during Design, production, recycling phase should be reduced to attain the sustainable development. [1].ambient assistant living domains integrated with IOT is under progress for assistance of elderly persons [14].

2 Literature Survey

Naz Albayrak designed chatbot application which helps the telecommunication industry. He reviewed about various bots which used artificial intelligence that can help the customer support and banking sector.[2]. S. J. du Preez, proposed the intelligent web based voice (IWBV) chatbot using the web services and Xml processing. It includes the applet management and speech recognition part, AIML file intelligent framework. This helped in management of sites [3].web based personal assistant called Donna was developed to handle the meetings, schedule the mails. It used the google API, Gmail API and calendar API and pattern matching techniques [4].Human aided bots, which involves the human intelligence. Their limitations involves about the less amount of training data, limitation of response template etc. are discussed by Pavel Kucherbaev[5].voice controlled bot was developed and it was operated using the smart phone. Speech commands were converted into text and instructions were understood by robot and its arms performed the task given. These robots were used in manufacturing sectors of industry under the WIFI network.[6].

Christof Ebert has discussed more about the software bots, alexa, siri, IBM Watson. He classified the bots based on the reasoning, autonomy and different platforms[7]. virtual personal assistant kari was developed based on the natural language processing algorithms with the available user data. Various attributes like emotional interaction, support, ownership and organization focus was studied for siri, Watson.[8]. Natural language understanding concepts like entities, intents and context are used to develop customer support bots and payment system support bots. It can assist in setting alarm, booking tickets.[9] Tarun Lalwani, discussed about developing a chat bot for college website embedded with AI and NLP. College website bots will help in getting information about the admission process, facilities and departments available.[10]. Markov chain, Language tricks, classifier and various design techniques of speech recognition and its various applications in e learning, health assistance are given importance[11]. Ankush Bhatia explained more about the memory
storage and its optimization levels and focused on self-evolving bots. [12] Programming challenges with respect to development of chatbots is discussed with different kinds of platforms (Chatfuel, non-programming platform), conversation-oriented bots, and tech giants platforms (IBM Watson) [13]. Designing a creative assistant is discussed for the socio-emotional intelligence of the human learning aspect. [15]. From the survey, we infer that biometric technology is not utilized for the security aspect of bots. Our personal assistant uses the face and voice recognition for the security purpose embedded with AIMA.

### 3 Architecture of Personal Assistant

Architecture diagram of a Secured Intelligent Personal Assistant System (referred as MARK42) by using biometric traits is represented by Fig 1.

![Architecture of Personal Assistant](image)

**Fig 1. Architecture of Personal Assistant**

The personal assistant system includes memory, a processor, an input module, a database, an authentication module, and an assistant module. The memory is configured to store pre-determined rules. The processor is configured to cooperate with the memory to receive and process the pre-determined rules to obtain a set of system operating commands. The processor is one which has microprocessors, to process the data and signals.
based on the given instructions. Among other capabilities, the processor is configured to fetch and execute the set of predetermined rules stored in the memory to control modules of the system. The input module is configured to accept the input from the user. In an embodiment, the user’s input is selected from the group consisting of a random pattern, a fingerprint, a voice command, a signature and a combination thereof. In another embodiment, the input module includes an image capturing module and an image recognition module. The image capturing module is configured to automatically capture at least one image of a user, when the user is in proximity to the system. The image capturing module is further configured to generate a captured image. The image recognition module is coupled to the image capturing module. The image recognition module cooperates with an artificial intelligence module to extract the features of the captured image. The database is configured to store the information corresponding to each of the authorized user. The information includes the pre-recorded pattern, a fingerprint image, a prerecorded voice, pre-stored features, a signature. The authentication module includes a first comparator, a second comparator and an access module. The authentication module is coupled with input module to receive the user’s input from input module. The authentication module is further configured to generate a first authentication signal by comparing the user’s input with the pre-stored information in the database by using the first comparator. The authentication module is coupled to the image recognition module. Further, the authentication module is configured to generate a second authentication signal by comparing the extracted features of the captured image with the pre-stored features of the each of the authorized user by using the second comparator. The access module is coupled to the first comparator and the second comparator. The access module is further configured to receive a first authentication signal from the first comparator and the second authentication signal from the second comparator. The access module is further configured to give access to the user of the assistant module based on the first authentication signal and the second authentication signal.

The present system described here above has several technical advantages including, but not limited to, the realization of a power supply system, that is secured; and is intelligent. The audio processing module is configured to detect the voice commands of the user and further configured to analyze the
voice commands to generate at least one command. The audio processing module may be coupled to the networking module. The network module may be configured to receive the at least one command and fetch the appropriate action from the internet.

4 Existing Technologies

Google personal assistant, Cortana, Siri, and Alexa are a number of the prevailing models. However, they're not secured since they track user knowledge and additionally anyone in possession of the phone will use the private assistant. Current systems need correct net connections for voice recognition. They’re not secured by any biometric traits. Additionally, the correct positioning of mic is needed. Currently existing personal assistant system employs a voice recognition technique along with an internet connectivity to perform activities given by a user. The existing personal assistant system is capable to perform the activity commanded by the user, however such system is not secured as any unauthorized user may provide commands to the system. At an event, there is a chance of access of the personal assistant by the unauthorized user. Hence, the existing personal assistant system is easily accessible by the unauthorized user and fails to provide security from the unauthorized user. There is, therefore, felt a need for a secured personal assistant system that alleviates the above mentioned drawbacks of the existing system. An object of the present disclosure is to provide a personal assistant system which is intelligent. Another object of the present disclosure is to provide a personal assistant system which is secured.

5 Algorithms Employed by Existing Models

5.1 Eigenfaces Face Recognizer

This method considers that not all components of a face are equally crucial or valuable for face recognition. In reality, once you take a photograph of someone, you understand that individual by his features (eyes, nose, and cheeks). In outcome, lights and shadows are grabbed by Eigen Faces. The intelligent computer bots Siri will be found as customary on Apple mobile devices currently and is taken into account a core element on these devices.

5.2 Fisherfaces Face Recogniser

This is the increased rendition of the eigen faces. As we tend to more discover, EigenFaces takes a group in the slightest degree the preparation
countenances of the extensive range of people on the double and discovers key Components from each one of them joined. By doing that, it doesn't focus on the highlights that segregate one individual from another. Accurately, FisherFaces recognizer calculation removes central segments that separate one individual from the others. In this sense, a person's components don't rule (turn bent be additional helpful) over the others

6 Proposed Methodology of Mark42

It is an endeavor to design an innovation which is all the more amicable to Human and can comprehend the people as given by them and furthermore making it more secure by utilizing picture recognition to recognize the face of the client. It can be utilized in workstations of the client with the goal that every one of the applications or any errand can be executed just by giving a discourse direction. Additionally, it very well may be synchronized with the home apparatuses precedent turning off the lights just by saying when integrated with the green IOT components. Mark42 is anchored utilizing Face recognition. LBPH confront acknowledgment is utilized which as it gives high exactness. Face recognition can be utilized in too brilliant or dull conditions. Our own aide can work in when disconnected.

6.1 Tools Used

- Speech recognition.
- AIML (Artificial Intelligence Markup Language).
- Text to speech converter.
- Speech to text converter.
- Kernel for making the brain for the bot. OpenCV for image recognition.
- PyAudio for microphone input.
- Alsaaudio for volume control available in Linux only.

6.2 Local Binary Patterns Histograms (LBPH) Face Recognizer

Eigenfaces and Fisherfaces are both influenced by light and, all things considered, we can't ensure immaculate light conditions. LBPH confront recognizer is an enhancement to defeat this disadvantage. The thought with LBPH isn't to take a gander at the picture in general, however rather, endeavor to locate its nearby structure by contrasting every pixel with the neighboring pixels. Firstly, take a 3 × 3 matrix window and keep over face. At each move (every nearby piece of the image), look at the pixel at the
inside, with its encompassing pixels. After you read these 0/1 esteem under the 3x3 window in a clockwise request, you will have a paired example like 11100011 that is neighborhood to a specific zone of the image. When you wrap up this all in all pictures, you will have a rundown of neighborhood parallel examples. Fig 2 depicts the general workflow for face recognition.

6.3 Workflow of Mark42

The workflow of the Mark42 bot is carried out in following phases, Fig 2 explains the workflow of mark42

1. Face Recognition
2. Voice Recognition
3. Kernel
4. Natural Language Processing

6.3.1 Face Recognition

Facial acknowledgment is a biometric processing application to recognize an individual by extracting the facial features and comparing the features with the registered template. With the end goal of face recognition, we right off the bat get to the web camera. After getting to the web camera, we take consistent photos of the client for the reason for recognition. According to the states of the face, the measure of pictures varies. If it is under the dull condition, 30-40 continuous pictures are required, on the off chance that conditions are great, even 5 pictures are sufficient with the end goal of recognition. After catching pictures, preparing is done to catch the interesting examples with the goal that acknowledgment of the face should
be possible in any environment. In preparing, histograms are produced and acknowledgment is finished by it. After preparing, the recognizer part comes in which ceaseless photographs are taken and histograms at that point formed are taken into if all the histogram coordinates then the client is allowed to utilize the application else it isn't conceded.

6.3.2 Voice Recognition

With the end goal of voice acknowledgment, mic present in the PC framework is utilized. Sound module present in python is utilized for inciting and empowering the mic to be used. The voice caught is additionally handled and changed over into content for understanding the inquiry of the user. PYTTSX (Python content to discourse) module present in python is utilized to change over the content into voice. The Internet is utilized to further comprehend the inquiry and improving voice recognition. Speech acknowledgment module present in python is utilized to break down the voice with the goal that the voice can be perceived in any of the given condition and environment. Voice test is temporarily put away with the goal that it doesn't build the utilization of storage. AIML is utilized for coordinating the inquiry by the user. A bit otherwise called bot mind is created to comprehend the inquiry.

6.3.3 Kernel

A kernel(botmaster) runs the program and makes or alters a visiting robot with the program's graphical UI (GUI). The individual is in charge of pursuing the exchanges, investigating the reactions, and making new answers for the examples distinguished by program. Botmasters are specialists, website admins, designers, publicists, craftsmen, Editors, architects, and any other individual inspired by making an individual visit robot. The most intriguing reactions from ALICE emerge then it says something startling or assembles reactions in manners the botmaster never intended. The way to visit robot advancement is log record examination. The program stores customer exchanges in a record called "dialog.txt" (except if you change this default name). The "Arrange" catch initiates a standard that examines the discourse document and reports how frequently every class is initiated. The preparing may take a few minutes, contingent upon the size and scope of the exchange document picked. The outcome shows up as a table in the Edit View window. The program shows the classes arranged by initiation tally.
6.3.4 NLP

Natural Language processing is subset of information engineering. PC program to to understand the human language as it is spoken. NLP is a part of artificial intelligence which makes the system to understand the natural language and interact to perform certain task. The improvement of NLP applications involves testing PCs to expect people to talk to them in their own regional language, including slang, territorial vernaculars. Nowadays more data is available in social Medias and different characteristic human languages. In any case, progresses are made in recognizing the speech, understanding the language and generating the language based on the available data. Mark 42 uses this NLP to learn the language and perform the requested task with the help of artificial intelligence. Recently deep neural networks are utilized in the NLP processing for modeling and parsing. Bots can be trained in their own regional language to perform their desired task. Sample Screenshots of command issued to personal assistant are given in fig 3 and 4.

Fig 3. Command prompt opened for user commands to Personal Assistant

Fig 4. Command issued to personal assistant to go to the folder named siddharth
7 Conclusion

Numerous commands like open chrome type GST, open facebook account, switch off lights in room etc can be given to our Personal Assistant Mark 42. Our work studied many research papers identified with individual assistant bots. With this we can see that broad research has been done in this field as this subject is an essential theme in light of automation integrated with the green IOT, which is a standout amongst the most needed advancements. Consequently, we can say that best colleague bots incorporated with biometric attributes can be produced utilizing AIML. Yet, there is dependable an extent of enhancement to the field of security for green cloud applications.

References


Biographies

Gayathri. M is an Assistant Professor in Department of Computer Science and Engineering S.R.M Institute of Science and Technology, Kattankulathur campus, Chennai, India. Currently she is pursing Ph.D (CSE) in S.R.M Institute of Science and Technology, Chennai. She has over eight years of experience in Teaching. Her research interest is Security and Privacy in Biometrics, Network Security, Internet of Things and Cryptography.
C. Malathy is a Professor in Department of Computer Science and Engineering, S.R.M Institute of Science and Technology, Kattankulathur campus, Chennai, India. She earned Ph.D. in Computer Science & Engineering from S.R.M Institute of Science and Technology, Chennai. She has over Twenty-eight years of experience in Teaching and Research. Her areas of interest are Image processing, Data Mining and Computer architecture. She has published research papers in many international conferences and refereed journals.

Siddharth Singh is a student at SRM Institute of Science and Technology in the Department of Computer Science and Engineering, Kattankulathur campus, Chennai, India. Currently, he is pursuing B.Tech in Computer Science Engineering at SRM Institute of Science and Technology. He has a vast experience in the field of Natural Language Processing and UNL (Universal Network Language).