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Enhanced Task Automation through IoT and ChatGPT Integration in Personal AI Companions

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Abstract

A new breed of clever, likable, and natural-sounding personal AI companions could be produced by integrating ChatGPT with IoT gadgets. The Internet of Things (IoT) and artificial intelligence (AI) are developing at a rapid pace, which has created exciting new opportunities for the creation of intelligent and personalized companions. The goal of this suggested system is to improve user experiences by offering a flexible AI-driven assistant. It does this by investigating the design, development, and deployment of a Personal AI Companion that is seamlessly linked with Chat-GPT. The pre-trained transformer algorithm is the one employed in the suggested system. Neural network architectures known as transformer algorithms are excellent for applications involving natural language processing, including question answering, text summarization, and machine translation. With the use of a transformer algorithm, ChatGPT, a sizable language model trained on an enormous corpus of text and code, can produce text, translate between languages, produce various forms of original content, and provide insightful answers to queries.

Keywords: Personal AI Companion, Chat GPT, ESP32, microphone, speaker, battery, IR sensor, Google Cloud for speech to text conversion, artificial intelligence, machine learning, generative pre-trained transformer model, micro controller, embedded systems, voice interaction, portability, versatility, privacy-focused

INTRODUCTION

The combination of artificial intelligence (AI) and the internet of things (IoT) has brought in a new paradigm of intelligent and interactive experiences in the age of digital transformation and technological growth. The creation of a Personal AI Companion that is smoothly connected with Chat-GPT and is intended to be an important part of our everyday lives is one amazing example of this convergence in action. Voice assistants (VAs) are becoming more and more commonplace in people's daily lives. An interesting potential to construct a dynamic and adaptive AI-driven assistant is presented by the combination of OpenAI's Chat-GPT, a cutting-edge conversational AI model, with IoT technologies. Aside from being integrated into smartphones, smart speaker sales are strong and are expected to continue rising in the future. Tenzer (2021), for example, estimates that 205 million smart speakers would be sold globally by 2025 [1]. Understanding the voice assistant phenomena is crucial because, for many, it represents or will represent their first exposure to speech-based human-machine interaction, which will shape their attitudes, expectations, and behavior regarding this technology. In order to accomplish a greater variety of tasks, the companion will be able to learn the user's habits and preferences over time. It will also be integrated with other AI services, like facial recognition and natural language processing. With the help of this project, consumers' lives could be enhanced by a useful and cutting-edge product that offers them a wise and individualized friend. The following situation could make use of the personal AI companion: After leaving work, a user is entering their house. When the buddy notices that the user is there, it welcomes

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them home. The user asks their companion to play their preferred music and turn on the lights. After a demanding day, the user can rest and decompress when their companion cooperates [2–5]. Afterwards, when preparing dinner, the user asks their companion for a recipe. The user receives a recipe from the companion customized to fit their diet. Additionally, the companion can guide the user step-by-step through the recipe and offer support as needed. The user asks their companion to tell them the weather forecast for the following day while they are watching TV after dinner. The user can arrange their day based on the forecast that the buddy delivers. Other applications for the personal AI companion include learning new things, organizing tasks, and financial management. This research has the potential to produce a very wise and beneficial friend for people of all ages. In order to accomplish a greater variety of tasks, the companion will be able to learn the user's habits and preferences over time. It will also be integrated with other AI services, like facial recognition and natural language processing. With the help of this project, users' lives could be enhanced by a useful and cutting-edge device that offers them a smart and individualized companion. The following situation could make use of the personal AI companion: After leaving work, a user enters their house. When the buddy notices the user is there, it welcomes them home the user asks their companion to play their preferred music and turn on the lights [6–9]. After a demanding day, the user can rest and decompress when their companion cooperates. Afterwards, when preparing dinner, the user asks their companion for a recipe. The user receives a recipe from the companion customized to fit their diet. Additionally, the companion can guide the user step-by-step through the recipe and offer support as needed. The user asks their companion to tell them the weather forecast for the following day while they are watching TV after dinner. The user can arrange their day based on the forecast that the buddy delivers. Other applications for the personal AI companion include learning new things, organizing tasks, and financial management. With this project, people of all ages could have a really intelligent and useful friend.

LITERATURE SURVEY

1. *"JARVIS" - Artificial Intelligence Voice:* Dalal et al. [1] JARVIS is a virtual embedded voice assistant that uses state-of-the-art gTTS and Python technologies to create a customized helper. By combining the capabilities of AIML with a text-to-speech platform developed by industry leader Google, JARVIS adds both male and female voices to the gTTS libraries powered by the Marvel universe. This is frequently the outcome of using the dynamic basis Pyttsx Pythons that are deemed prudent in consecutive gTTS phases, which facilitate the creation of fundamentally fine-tuned conversations between users and assistant management. In their everyday lives, end users will find it useful for things like ordinary conversation, searching for queries on Google, Bing, or Yahoo, retrieving images, predicting and reminding users of upcoming events and tasks, current weather, and word meaning. The usability of AIML and its capacity to dynamically merge with platforms like Python [pyttsx] and gTTS [Google Text to Speech] lead to the same JARVIS standard structure that exhibits general reusability and nearly zero or no maintainability. This is frequently the only outcome of multiple contributors contributing excessively.
2. *Design and Development of CHATBOT:* Tamrakar et al. [2] present study centers on a recently developed learning-cum-assisted tool for learning via CHATBOT. An artificially made virtual creature known as a "CHATBOT" communicates with users through interactive speech or text capabilities. Using techniques from machine learning and artificial intelligence, this chatbot communicates with users directly. His-Sheng Chou, Ya-Yua Huang, Wei-Chi Lin, Tzu-Chein Li, Jia-Jun Yuan, Patricia Angela R. Abu, Weiyuan chiang, and Shih-Lun Chen, "Missing Teeth and Restoration Detection Using Dental Panoramic Radiography Based on Transfer Learning with CNNs [12]." In order to improve process efficiency, this study proposal combines artificial intelligence with image judgment technology.
3. *An interdisciplinary research agenda for chatbot research:* future directions" Asbjørn Følstad [13]. Effie Lai-Chong Law · Theo Araujo Brandtzaeg, Petter Bae Papadopoulos Symeon Lea Reis·Fabio Catania· Raphael Meyer von Wolff·Christian Hobert·Ewa Luger· Marcos Baez·Guy Laban·Patrick McAllister· Carolin Ischen· Rebecca Wald: Chatbots are becoming more and more significant entry points to digital services and information, being used in areas including job support, education, healthcare, and customer service.

4. *The digital life assistant Jarvis Author:* Shruti Ka Khobragade. In the Iron Man movie, Tony Stark's life aide was portrayed by the character "Jarvis." In the film adaptation of Jarvis, as opposed to the comic book adaptation, Jarvis is a sentient computer that interacts with Stark, keeps an eye on his residence, and assists with the construction and programming of his superhero outfit. Classification of Diseases Using Dental X-ray Images Convolutional Neural Network-based Xiang Yann Lim, See Sang Ho, and Lawrence Y. Deng Applications for Artificial Intelligence (AI), Deep Learning (DL), and Convolutional Neural Networks (CNNs) have become commonplace in a variety of industries, including finance, the military, and healthcare.

Implementation System

Block diagram of flow of information through proposed system is shown in Figure 1.

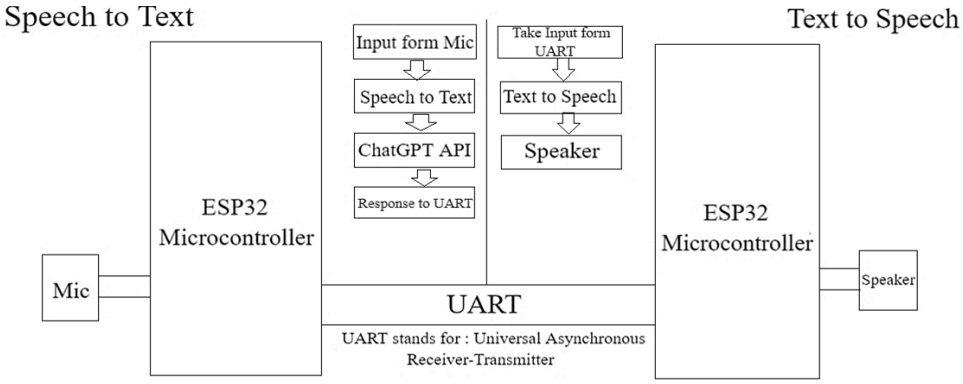

Figure 1. Personal AI companion with IoT and ChatGPT.

Flow of Proposed System

System working

1. The person uses the microphone to talk.
2. The Google Cloud speech to text conversion service is used by the ESP32 microcontroller to transform the voice input to text.
3. The text output is sent to ChatGPT by the ESP32 microcontroller.
4. A response to the user's inquiry is generated by ChatGPT.
5. The speaker receives the response from ChatGPT via the ESP32 microcontroller. The method can be applied to many different tasks, including video captioning, voice activation, and speech dictation. Here's an illustration of possible usage for the system:
   - A user asks, "What is the weather forecast for today?" into the microphone.
   - The speech to text conversion is done by the ESP32 microcontroller, which then sends the text generated by the voice input to Google Cloud.
   - The text is converted to text by Google Cloud and sent back to the ESP32 microcontroller.
   - The text output is sent to ChatGPT by the ESP32 microcontroller.
   - ChatGPT responds to the user's inquiry with a message like, "Today is predicted to be sunny with a high temperature of 75 degrees Fahrenheit."
   - The speaker receives the response from ChatGPT via the ESP32 microcontroller.

ESP32 Microcontroller

Espressif Systems developed the low-cost, low-power system-on-a-chip (SoC) microcontroller known as the ESP32. It features integrated Wi-Fi and Bluetooth connectivity and is based on the dual-core Xtensa LX6 CPU. Because of its many features, low cost, and low power consumption, the ESP32 is a popular choice for many embedded and Internet of Things applications [10,11].]

Specifications

- *CPU:* Xtensa LX6 dual-core processor (32-bit), operating at up to 240 MHz
- *Memory:* 448 KB of ROM, 520 KB of SRAM, 16 KB of RTC SRAM
- *Wireless connectivity:* Wi-Fi (802.11 b/g/n), Bluetooth 4.2, BLE

- 34 × programmable GPIOs, 12-bit ADC, 2-channel DAC, SPI, I2C, I2S, UART, SDIO, IR receiver, touch sensor, and hall sensor are examples of peripheral interfaces. Completely Linked (FC) Layers: The network usually terminates with one or more completely linked layers, following a number of convolution and pooling layers. These layers use their knowledge of how to integrate features from earlier levels to carry out categorization tasks. With each neuron belonging to a distinct class, the output of the fully connected layer(s) can indicate the likelihood of various dental disorders for tooth problem identification. Softmax Activation: To transform the network's unprocessed output into probability scores, the last layer frequently employs the softmax activation function. The class that shows the existence or absence of a certain dental issue is deemed to be the predicted class with the highest probability.
- *Security:* IEEE 802.11 standard security features all supported, including WPA, WPA2, WPA3 (depending on version) and WLAN Authentication and Privacy Infrastructure (WAPI) Secure boot
- Power management: Internal low-dropout regulator
- Dimensions: 24 × 24 mm Information:
- The ESP32 microcontroller is a powerful and versatile platform that can be used for a wide range of applications. It is particularly well-suited for IoT and embedded applications, due to its low cost, low power consumption, and wide range of features.
- The ESP32 is supported by a large and active community, which means that there are many resources available to help you develop applications with the ESP32. There are also a number of development boards available for the ESP32, which makes it easy to get started with development.
- Here are some examples of applications that can be built with the ESP32 microcontroller:
- Smart home devices
- Wearable devices
- Industrial automation devices
- Environmental monitoring devices
- Robotics
- Home security systems
- Asset tracking systems
- Point-of-sale systems
- Medical devices

RESULT

Numerous practical and creative applications can be made with this kind of Personal AI Companion. It could be utilized, for instance, to make a: An assistant for your smart home that can manage your thermostat, lighting, and other appliances. A personal assistant who can assist you with managing your calendar, booking reservations, and sending emails. A learning aid that can assist you in expanding your knowledge. A companion for entertainment that can read stories, play music, and tell jokes. Upper view of designed model of personal ai companion is shown in Figure 2.

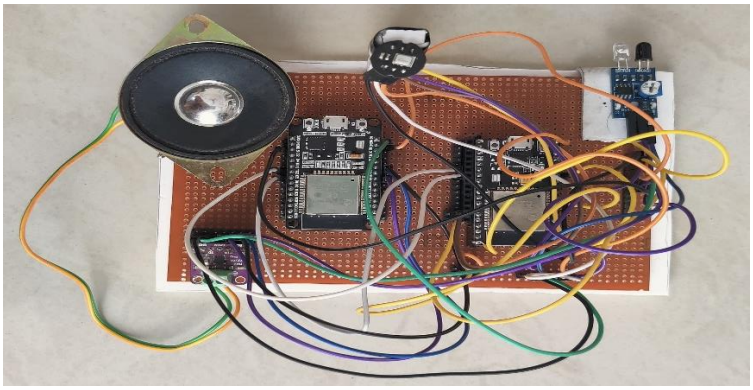

Figure 2. Upper view of designed model of personal ai companion.

DISCUSSION

This kind of Personal AI Companion can be made using Chat GPT mostly because it is a generative pre-trained transformer model that has been trained on a sizable text and code dataset. This means that it can compose various forms of creative material, translate between languages, generate text, and provide you with helpful answers to all of your questions—even the odd, difficult, or open-ended ones. An additional benefit of utilizing the ESP32 micro controller is its affordability and low power consumption, making it an excellent choice for embedded applications. This implies that a compact, light-weight, and portable Personal AI Companion might be made. When a human is detected using the IR sensor, the Personal AI Companion can be programmed to speak or carry out additional functions.

The user's speech can be converted to text using the Google Cloud Speech-to-Text API, and Chat GPT can then process the text to produce a response. All things considered, a Personal AI Companion with Chat GPT, ESP32, microphone, speaker, battery, IR sensor for person detection, and Google Cloud for speech to text conversion is a strong and adaptable gadget that might completely change the way humans communicate with computers. The following are some possible obstacles to overcome in the creation and implementation of this kind of personal AI companion:

Cost: For certain customers, the price of the parts and cloud services may be a deterrent to adoption. Privacy: Since the system will require the collection and archiving of audio recordings of the user's voice in order to function, some users could be worried about the privacy of their data. Accuracy: A key element in assessing the system's overall usability will be the precision of the Chat GPT responses and the speech to text conversion.

Robustness: The system must be able to withstand a wide range of environmental factors, including changes in lighting and noise. Notwithstanding these difficulties, I think Personal AI Companions have a chance to catch on as a popular product soon. A greater spectrum of users will be able to afford and utilize Personal AI Companions as technology advances and component and cloud service costs decline.

CONCLUSIONS

In addition, the Personal AI Companion is safe, economical, practical, and privacy-focused. People of all ages and abilities can use this always-available, hands-free tool. In addition, building it may be done very cheaply and with security and privacy in mind. A personal artificial intelligence companion has a wide range of possible uses. It can serve as a personal assistant, smart home assistant, companion for education, entertainment, and healthcare as well as a customer service assistant. We may anticipate seeing even more creative and practical uses for Personal AI Companions as the technology advances. In the near future, personal AI companions may become widely available products.. Numerous jobs can be performed by Personal AI Companions, including information provision, question answering, gadget control, and companionship. AI Personal Companions are adaptable, practical, reachable, cost-effective, privacy-conscious, and safe. Personal AI friends have a wide range of possible uses, including smart home assistants, personal assistants, educational and entertainment companions, healthcare and customer service companions, and companions for education. Personal AI Companions can improve our lives, in my opinion. They can assist us in becoming more knowledgeable, effective, and productive. They can also make our lives more fulfilling and help us maintain relationships with our loved ones.

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