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Echotron: Voice Controlled Personal Assistant

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ABSTRACT: Echotron boasts a diverse array of functionalities, encompassing online content access, phone call placement, and household device management, all operable via intuitive voice commands. While traditionally regarded as a helpful assistant, our initiative aimed to transcend conventional virtual assistant capabilities, drawing inspiration from the concept of computer companions. Our journey commenced with the disassembly and modification of the Echo device, facilitating rapid response upon activation. The integration of animatronics and a TFT LCD module heightened both interactivity and visual appeal. Driven by an Arduino microcontroller and servos, the animatronics endowed the character with lifelike movement and expression, thereby augmenting engagement and realism. This iterative process culminated in the development of Echotron, a sophisticated embodiment of advanced virtual assistant technology.

I. INTRODUCTION

Echotron, hailed as a multifaceted voice-controlled personal assistant robot, epitomizes versatility in its functionality. Echo/Alexa, positioned as an Intelligent Personal Assistant (IPA), is reputed for its proficiency across a wide array of functions, spanning from playing music to delivering information, setting reminders, and managing smart devices. In recent years, there has been a significant increase in interest regarding Intelligent Personal Assistants (IPA) like Alexa and Google Home. Amazon Echo, in particular, has garnered widespread acclaim as a virtual assistant, extending its reach to households and businesses alike. Leveraging Amazon Echo's capabilities, users seamlessly execute diverse commands through voice interactions, offering a glimpse into a futuristic lifestyle. However, lacking in distinct personality, modifications to the Amazon Echo circuitry were instituted, integrating animatronic eyes, TFT LCD, and assorted components to instill it with a robotic persona. This project unfolds across three distinct tiers

Level 1-Animatronic eyes:

This review emphasizes the significance of social eye gaze, which encompasses any gaze conveying communicative intent or serving a purpose beyond mere observation. To achieve this, animatronic eyes were employed. The choice of eye movements in human-robot interactions depends on the specific context and objectives of the interaction. Utilizing animatronic eyes not only enhances visual appeal but also offers a straightforward mechanism. Throughout the project, we gained insights into mechatronics. The fabrication process involved 3D printing the necessary components, followed by sanding for smooth functionality. Subsequently, the parts were assembled, incorporating servo motors controlled by an Arduino Mega2560 and a 16-channel servo driver. This approach enables the robot to convey its mental states and intentions through its gaze.

Level 2- the user's First Movement of contact:

Echotron, equipped with artificial intelligence (AI) and utilizing the digital voice technology known as 'Alexa', serves as the voice interface of the device. Recognizing the pivotal importance of the initial interaction between user and machine in establishing a meaningful relationship, we endeavored to create a compelling first impression. To achieve this, we meticulously programmed a "wake" sequence triggered by the user calling the creature's name. This sequence orchestrates the transition from a dormant state, characterized by closed eyes, to an active one where the creature blinks to life, surveys its surroundings, and promptly establishes eye contact with the user. While the Alexa platform offers a limited selection of predefined "wake words," we opted to customize the wake word from "Alexa" to "Echo" to personalize the interaction. Although complete customization of wake words remains elusive with the current capabilities of the Alexa platform, we aimed to enhance the user experience through this modification. The positioning of the device within the home has sparked debate and yielded diverse preferences.

Studies suggest that while the bedroom emerges as a popular choice, other locations such as the kitchen and living room are also favored. Additionally, understanding how children interact with Echotron within the household context

becomes crucial. Echotron's voice recognition proficiency undergoes continuous refinement via data collection. With artificial intelligence adept at natural language processing, the device captures user queries and requests, aiding in grasping language intricacies such as accents and dialects. Leveraging the cloud-based Alexa Voice Service by Amazon, all gathered data securely resides on Amazon servers, enriching the device's evolving functionalities.

Level 3- The Home Automation Circuit using ESP32

The circuit for this ESP32 home automation project is straightforward. We utilized GPIOs D23, D22, D21, and D19 to manage the 4-channel relay module. The switches linked to GPIOs D13, D12, D14, and D27 are employed for manual control of the relay module. Instead of incorporating pull-up resistors individually with each switch, We opted for utilizing the INPUT_PULLUP function within the Arduino IDE. Home automation is integral to modern automation, involving the intelligent monitoring and control of household electronic devices for optimal efficiency. It entails the interconnectedness of household objects and the provision of data for improved functionality. When integrated with the Internet of Things (IoT), home automation offers enhanced flexibility in managing household items on a broader scale. This facilitates the interconnectivity of multiple smart homes, promoting more efficient resource utilization across a larger area. Achieving this goal encompasses leveraging various current technologies. Simplifying the process, Amazon Echo serves as a pivotal tool. It is a voice-enabled wireless speaker created by Amazon, seamlessly connecting to the voice-controlled personal assistant service, Alexa. Alexa responds to its wake word, "Alexa," and executes a multitude of tasks including voice interaction, music playback, task lists, alarms, podcast streaming, and real-time information provision such as weather and traffic updates. Furthermore, it possesses the capability to manage numerous smart devices through its diverse skill set. While controlling smart devices via Alexa is straightforward, converting non-smart devices into smart ones remains financially prohibitive for many. Hence, our product aims to offer an affordable solution for voice-controlled management of non-smart devices. Leveraging Amazon Echo, we develop a skill that interfaces with our circuitry to enable device control, thereby democratizing smart home technology.

Circuit and working-

ESP32 Devkit: The central component of the ESP32 Dev Kit is its ESP32 microcontroller, which seamlessly integrates Wi-Fi and Bluetooth connectivity. With a dual-core processor and a diverse set of peripherals, it is well-suited for a variety of IoT applications.

AMAZON ECH

O DOT: Amazon Echo, often abbreviated to Echo, constitutes a series of smart speakers crafted by Amazon. These devices establish a connection to the voice-activated virtual assistant service known as Alexa, which promptly responds upon hearing the wake word "Alexa."

RELAY MODULE: The Relay module serves as an independent hardware unit designed for remote device management. It enables the remote control of devices via network or internet connectivity. Through Clock Watch Enterprise, commands can be issued over local or wide area networks to remotely power on or off devices. This functionality extends to computers, peripherals, or other powered devices, facilitating control from various distances, whether across the office or around the globe.

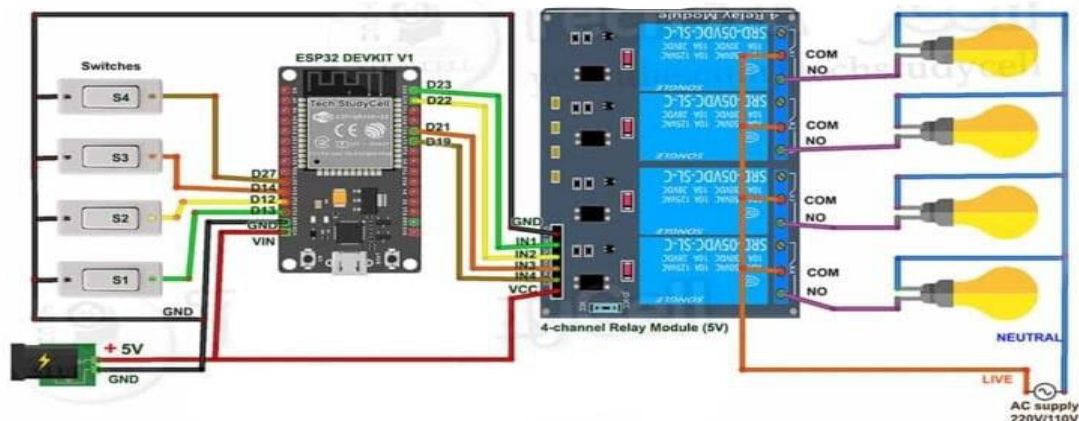


Fig. circuit diagram of home automation

Follow the circuit diagram provided above to connect all the components. Connect the input pins, IN1 and IN2, of the 2-channel relay to the digital pins of the NodeMCU as indicated in the code. Ensure that the ground pin on the NodeMCU and the relay are connected in the same manner, and the Vcc pin of the relay is linked to the Vin pin of the NodeMCU. Additionally, connect the Vcc and GND pins of the NodeMCU to an external 5V DC power supply. For the appliance, connect one terminal directly to the relay's normally open contact, while the other terminal is connected in series with the 220V AC supply and the relay's common pin.

II. METHODOLOGY

Our methodology is divided into two primary components: knowledge abstraction and response generation. Knowledge abstraction entails the examination of course content, treated as data. Conversely, response generation utilizes the distinctive attributes of the data obtained from the knowledge abstraction phase, alongside the functionalities of tools such as dialog flow and its varied integrations. Our toolkit includes Arduino IDE 2.2.1 software, 3D-printed animatronic eyes, person sensor, ESP32 module, relay module and an array of additional technologies. These elements collectively facilitate the implementation of our methodology, enabling efficient extraction of relevant knowledge and the generation of appropriate responses in our system. We are using Arduino IDE 2.2.1 (software), 3D printed animatronic eyes, Person sensor and various types of technology such as:

- Arduino mega 2560
- Amazon echo pop device
- Servo motors
- 16 channel servo driver
- 3D printed animatronic eyes parts
- ESP32 DevKIT V1
- 4-channel 5V relay module
- Switches (for manual control)

The Arduino Mega functions as the principal controller for Echotron. Arduino, an open-source microcontroller released in 2005, boasts adaptability through straightforward programmability, enabling swift erasure and reprogramming as required. Tailored for hobbyists, students, and professionals, Arduino facilitates the development of devices capable of interacting with their environment through sensors and actuators. Its implementation involves a development board and the Arduino IDE (Integrated Development Environment) for code creation. Echotron harnesses natural language processing (NLP), a technique involving the conversion of speech into words, sounds, and concepts, forming the cornerstone of its operational framework.

The Echotron work as follow:

Echotron is an advanced speech processing system empowered by robust computational capabilities, aimed at efficient sound interpretation. To optimize this process, speech recordings are transmitted to servers for meticulous analysis, facilitating precise comprehension. Echotron deconstructs commands into individual sound components, cross-referencing them with an extensive database of word pronunciations. Through this meticulous analysis, it discerns the closest matches to the sound combinations, extracting pivotal words essential for task comprehension and subsequent function execution. For instance, upon detecting keywords such as "sport" or "basketball," Echotron activates the corresponding sports application seamlessly. Subsequently, information retrieved from Amazon's servers is relayed back to the user's device, with Echotron potentially providing verbal responses. Any responses generated by Echotron undergo a similar reverse processing mechanism.

Illustrated through a comprehensive flowchart, Echotron operates in alignment with the fundamental principles of home automation and the Internet of Things (IoT). The IoT, propelled by electronic technology advancements, has revolutionized connectivity, enabling diverse devices to seamlessly integrate into interconnected electronic ecosystems. As a pioneering prototype, Echotron embodies the practical implementation of IoT in real-life scenarios, particularly in emulating smart home environments. This innovative leap addresses the dual necessities of comfort and security within households, especially catering to individuals remotely residing from their primary residences. In contemporary industrial landscapes, technological advancements facilitate internet-enabled device communication, facilitating efficient monitoring and control. As technological sophistication continues to evolve, the integration of everyday objects into adaptable networks becomes imperative. This necessitates the establishment of seamless communication channels between humans and machines, thereby augmenting overall functionality and user experience. Echotron

serves as a testament to this paradigm shift, exemplifying the future trajectory of interconnected systems across diverse environments, paving the way for more advanced industrial implementations in IOT.

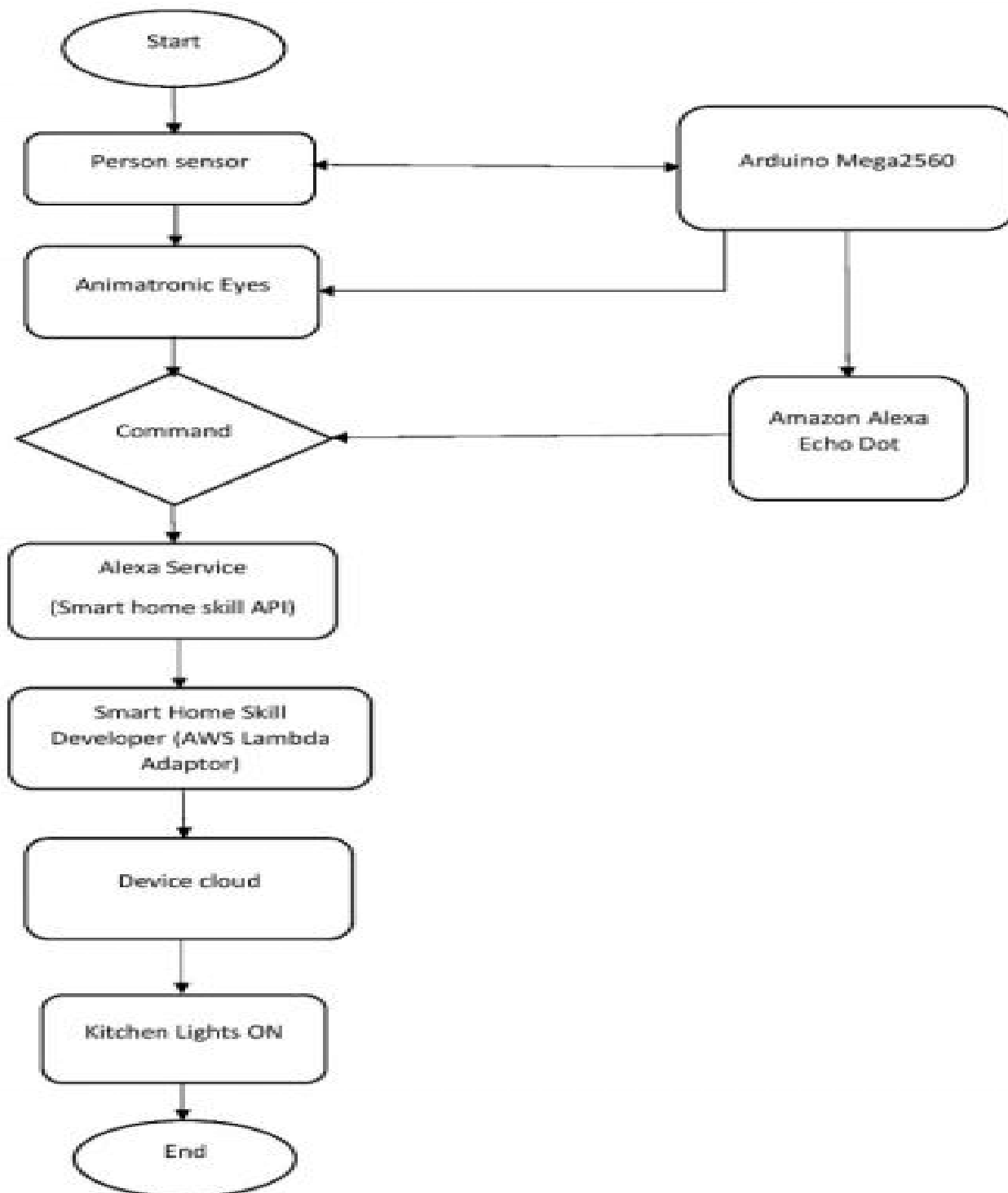


Fig. Flowchart of Echotron

III. PROPOSED SYSYTEM

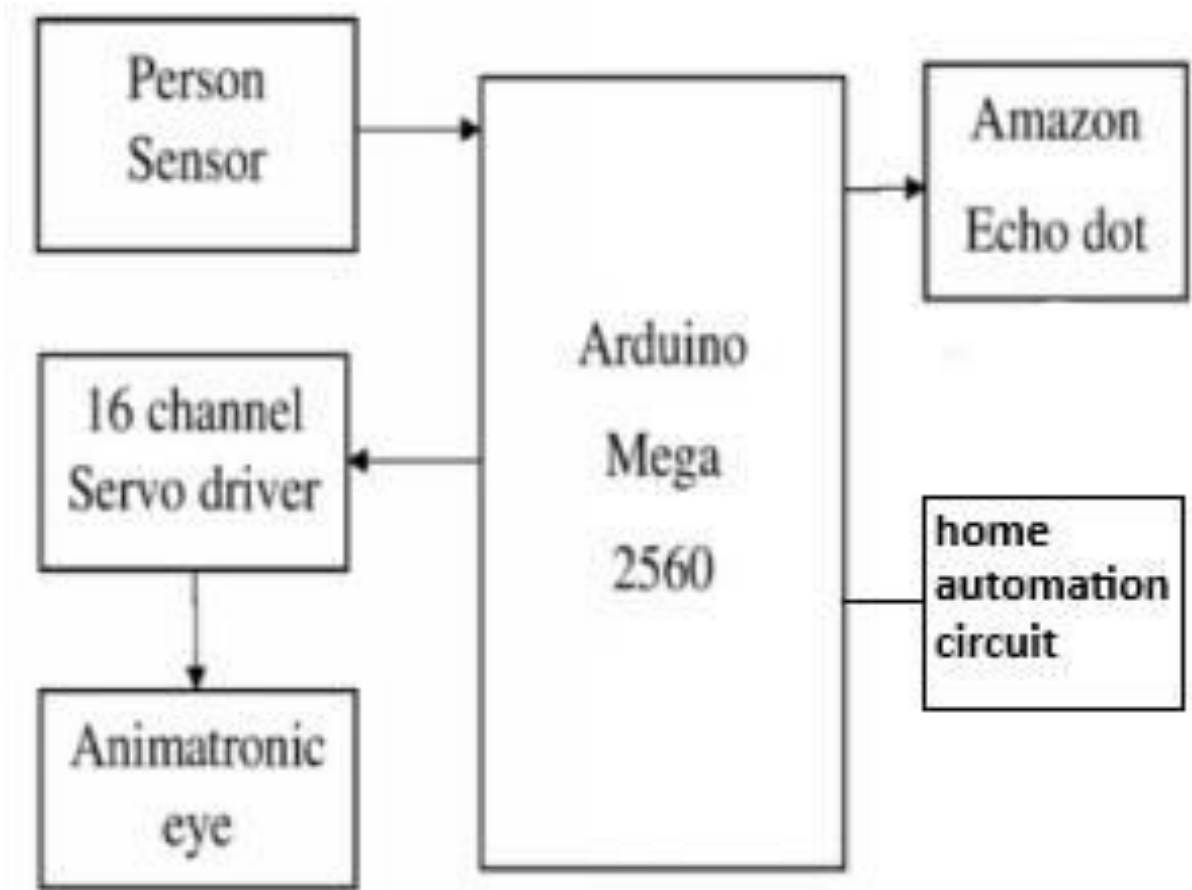


Fig. Block diagam of Echotron

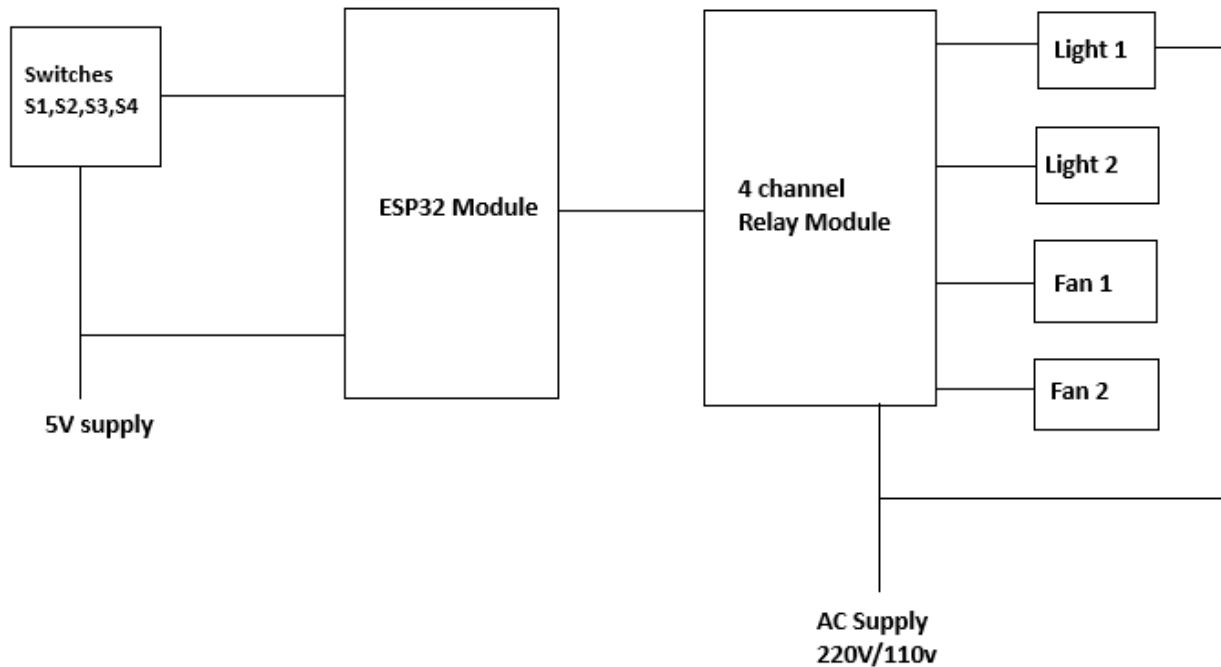


Fig. Block diagram of home automation

Comprising various components such as the Person Sensor, 16-channel Servo Driver, Animatronics Eyes, Arduino Mega 2560, Amazon Echo pop device, ESP32, 4 channel Relay Module, this system orchestrates a cohesive integration of hardware for multifaceted functionality. The Arduino Mega 2560 serves as the central hub, facilitating communication and control between the various peripherals. Connected to the Arduino Mega are the Person Sensor, 16-channel Servo Driver, Amazon Echo pop device, ESP32, 4Channel Relay module each serving specific roles within the system. Upon activation through the voice command "Echotron", the Person Sensor detects human presence and relays pertinent data to the Arduino Mega for processing. The Animatronics Eyes, managed by an Arduino interface linked to the Servo Driver, respond accordingly to stimuli. Interfacing with the Arduino Mega, the Amazon Echo Dot establishes a communication link for interaction and command execution. Home automation circuit works. The relay module activates its corresponding relay when the control pins receive a LOW signal, and deactivates it when they receive a HIGH signal. This setup operates using a 5V 5A DC power supply. The relay module activates its corresponding relay when the control pins receive a LOW signal, and deactivates it when they receive a HIGH signal. This setup operates using a 5V 5A DC power supply. The relay module activates its corresponding relay when the control pins receive a LOW signal, and deactivates it when they receive a HIGH signal. This setup operates using a 5V 5A DC power supply. This intricate system harmonizes the functionalities of its components to fulfill its designated tasks seamlessly.

IV. RESULTS



Fig. Animatronic eyes(a)



Fig Animatronic eyes (b)

V. CONCLUSION

Echotron is easy to handle and control.

It is convenient because of its size, it can be carried anywhere.

Echotron simplifies the day to day life tasks such as:

Make phone calls (basically, landline calls)

Control your smart home

You can ask Echotron for news and general knowledge

Gives reminder for a schedule or for a medicines

Echotron Supports multiple languages

Train Echotron to do practically anything else and it can work with the internet and it can also work without the internet to control your all smart home appliances.

Echotron is a interactive and user friendly personal assistant, very much a Comfortable and easy solution to operating all the devices.

Echotron has some limitations such as it has limited Range and limited devices can be controlled at a time.

REFERENCES

[1] Social Eye Gaze in Human-Robot Interaction: A Review Henny and Brian Scassellati Department of Computer Science, Yale University

[2] Working Principle of Arduino and using it as a toll for study and research Leo Louis1 Department of Electronics and Communication

Engineering, Gujarat Technological University, Ahmedabad, India

[3] Sanjana Gautam. 2018. In Alexa, We Trust. Or Do We? : An analysis of People's Perception of Privacy Policies. Proc. ACM Meas. Anal. Comput. Syst. 37, 4, Article 111 (August 2018), 11 pages. <https://doi.org/10.1145/1122445.1122456>

- [4] Connecting the Echo Dots: An Exploratory Ethnographic Study of ‘Alexa’ in the Classroom Richard Cook
- [5] A survey on security analysis of Amazon echo devices Surendra Pathaka,* , Sheikh Ariful Islama , Honglu Jiang b , Lei Xuc , Emmett Tomai a Department of Computer Science, The University of Texas Rio Grande Valley,USA b Department of Computer Science and Software Engineering, Miami University, USA c Department of Computer Science, Kent State University, USA
- [6] Liu, C.T.. (2008). Revolution of the TFT LCD technology. Display Technology, Journal of. 3. 342 - 350. 10.1109/JDT.2007.908348.
- [7] Research Making Prototype IOT Smart home for Smart City with Arduino Mega 2560 using Blynk application Marastika wicaksono aji bawono 1 Mastert of Information Technology, Swiss German University, Tangerang 15143, Indonesia
- [8] Prototype of Warehouse Automation System Using Arduino Mega 2560 Microcontroller Based on Internet of Things ,Yusuf Kurnia¹, Jeksen Li Sie² ,¹² Buddhi Dharma University Jl.Imam Bonjol No. 41 Karawaci Ilir, Tangerang, Indonesia
- [9] Home Automation System Using Esp32 and Alexa Niraj Patil¹ , Anant Nimbalkar² , Gaurav Pawar³ , Sulekha Shardul⁴ 1,2,3Under Graduate Student Bachelor of Engineering, Department of Computer Engineering, Shatabdi Institute of Engineering and Research, Agaskhind, Nashik, 422502 (M.S.), India. 4Assistant Professor, Department of Computer Engineering, Shatabdi Institute of Engineering and Research, Agaskhind, Nashik, 422502 (M.S.), India.
- [10] Haris Isynto AjibSetyo Arifin Muhammand Suryanegra “Design and implementationof IOT based smart home voice commands for disabled people using google Assistant”, conference on smart technology and applications(ICoSTA),2020,publisher:IEEE.
- [11] Mr. Malav Vaibhav, Mr. Raushan Kumar Bhagat, Mr. Rahul Saini and Mr. Mamodiya Udit Conference 2019, Research paper on bluetooth based home automation using Arduino



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