CARING COMPANION: EMPOWERING ALZHEIMER PATIENT'S ASSISTANCE USING IOT AND AI

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Introduction

Alzheimer's is a progressive neurodegenerative disease affecting memory, cognition, and behaviour. It poses significant challenges for both individuals diagnosed and their dedicated caregivers. Impact on Individuals and Caregivers is that the individuals experience memory loss, confusion, and difficulty in daily activities where as the caregivers struggle with increased responsibilities, emotional stress, and the need for continuous support. The technological interventions enhance quality of life. Technology offers innovative solutions to alleviate daily challenges faced by Alzheimer's patients, promoting independence and comfort. Alzheimer's disease, a progressive neurodegenerative disorder, presents profound challenges for individuals diagnosed with the condition and their caregivers. As the global population ages, the prevalence of Alzheimer's disease continues to rise, highlighting the urgent need for innovative solutions to support those affected by this debilitating illness. In response to this growing demand, we introduce AlziCare, a pioneering web platform that harnesses the power of IoT, AI, and web technologies to provide comprehensive care and support for Alzheimer's patient.

Objectives

- AlziCare represents a paradigm shift in Alzheimer's care, moving beyond traditional approaches to offer a holistic and personalized experience.
- AlziCare leverages IoT devices such as Raspberry Pi-based solutions to enhance safety and management for both patients and caregivers.
- The inclusion of a lost item tracker and a medicine dispenser controlled by servo motors and piezo buzzer, AI voice assistance offers practical solutions to common challenges faced by individuals living with Alzheimer's disease, promoting independence and peace of mind.
- The AI capabilities of AlziCare further elevate its functionality, providing

personalized recommendations and adaptive assistance tailored to each patient's unique preferences and interactions.

- Through its intuitive web interface, AlziCare facilitates seamless communication and coordination between patients, caregivers, and healthcare professionals. Appointment scheduling with doctors and other healthcare providers is streamlined, enabling timely access to medical assistance and support.

Methodology

A. Smart Medicine Dispenser

A smart medicine box was developed to keep track of the pill intakes by the patient. Whenever it is time for the patient to take medicine, the medicine box will automatically open. Also, a buzzer will make sound to remind the patient that it is pill intake time. If the patient still does not take medicine, then an alert message will be sent to patient's caregiver. After the patient takes medicine, the box will be closed again. It will again open when the next pill intake time will come. An OLED display is also attached with the medicine box that displays the time remaining for next pill intake.

B. Lost Item Tracker

Alzheimer's sufferers find it difficult to remember where they put their wallet, keys, or glasses. Accordingly, a tracker is fastened to their essential accessories so that, in the event that they misplace something, they may locate it by using a smartphone programme that will sound an alarm to that particular item using buzzer and Raspberry Pi. Alzheimer's patient loses their belongings very easily. The object finder helps the patient to find the lost items. If the lost items are at Wifi range of Their Mobile and the Application.

C. AI Voice Assistance

Developing an AI system to assist Alzheimer's patients with personal information involves prioritizing privacy and security. The implementation should adhere to data protection regulations, such as GDPR and HIPAA, and employ encryption and access controls. Personal data should be minimized and, when possible, anonymized or de-identified to reduce privacy risks. User transparency is crucial, necessitating clear communication on how personal information will be used, stored, and protected. Regular security audits, ethical considerations, and collaboration with legal and healthcare experts are essential for creating a trustworthy and effective AI system for Alzheimer's care.

✓ Natural Language Processing (NLP) capabilities for effective communication.
✓ Integration with a knowledge base for providing relevant information.
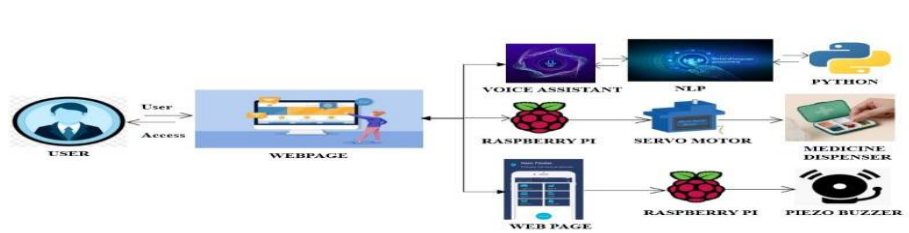
✓ Voice or text-based interaction for user convenience Reminders for daily activities and medication schedules
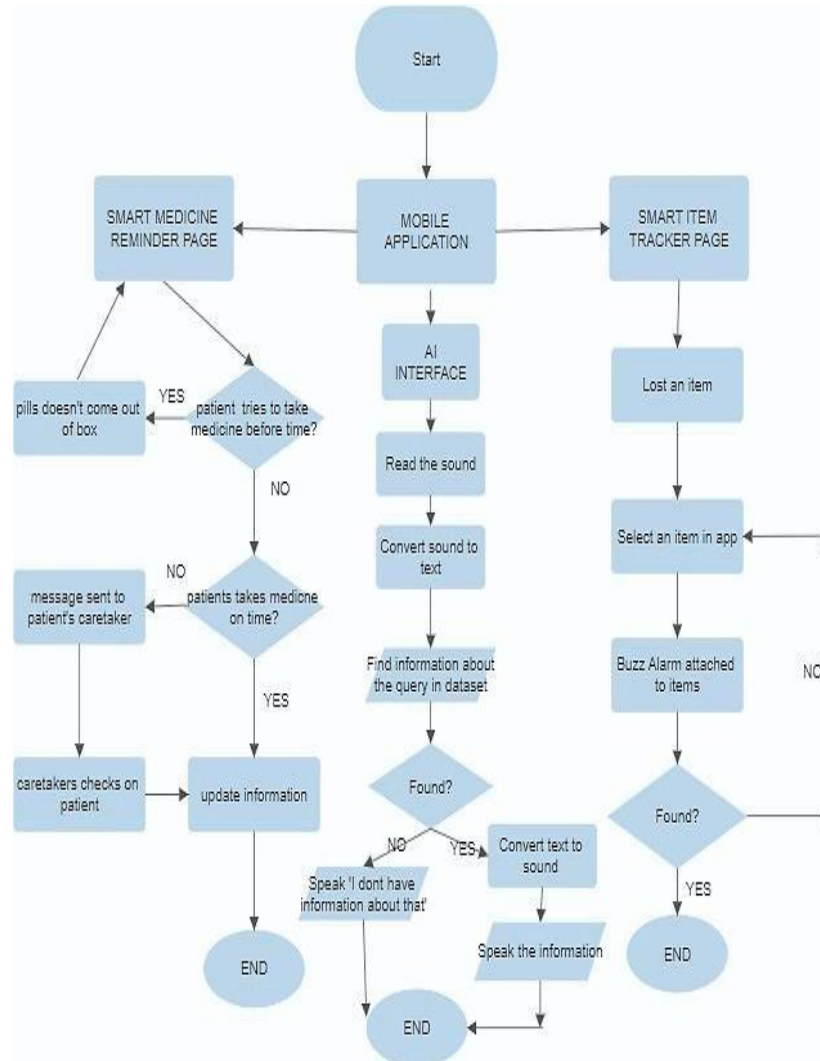
Figure 1: System Architecture Diagram for Caring Companion

Figure 2: Methodology Flow Chart for Integrated Modules

Results and conclusion:
   RESULTS:

Figure 3: Circuit connection of Raspberry Pi with piezo Buzzer and Servomotor
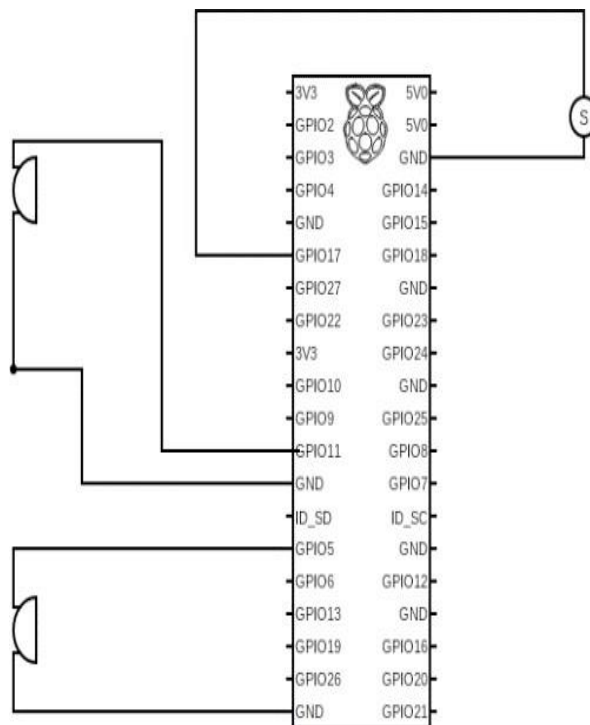
Figure 4: Demonstration of Pin Diagram

The above shown circuit diagram depicts the connection between Raspberry Pi 4 Model B with the Piezo Buzzer and Servo Motor.

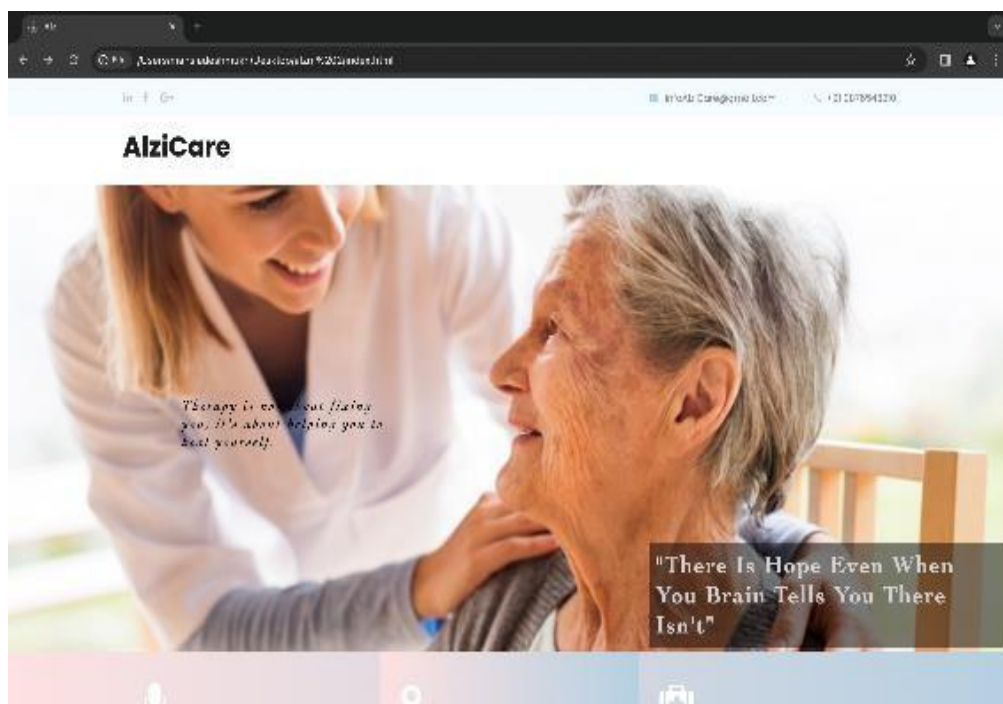The Raspberry Pi's GPIO pin is connected to anode and ground the other side.

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Figure 5: Home Page of personalized Alzheimer Patient Website

The Home Page includes the Patient's photo clicked while having therapy.

Figure 6: Features Page of Alzheimer's personalized website

This section of webpage contains the list of all features that are present in the website. It contains all the features like   Personalized Voice Assistant, Lost Item Tracker, Pill Dispenser, Music therapy, Photo gallery, Mimes, Meditation guide and some mind full games.

Figure 7: Medicine Dispenser Page Of Alzheimer's personalized website

Here the caretaker schedule the pills for the patient so that the medicine dispenser opens at specified time so, that medicine doze is not affected.
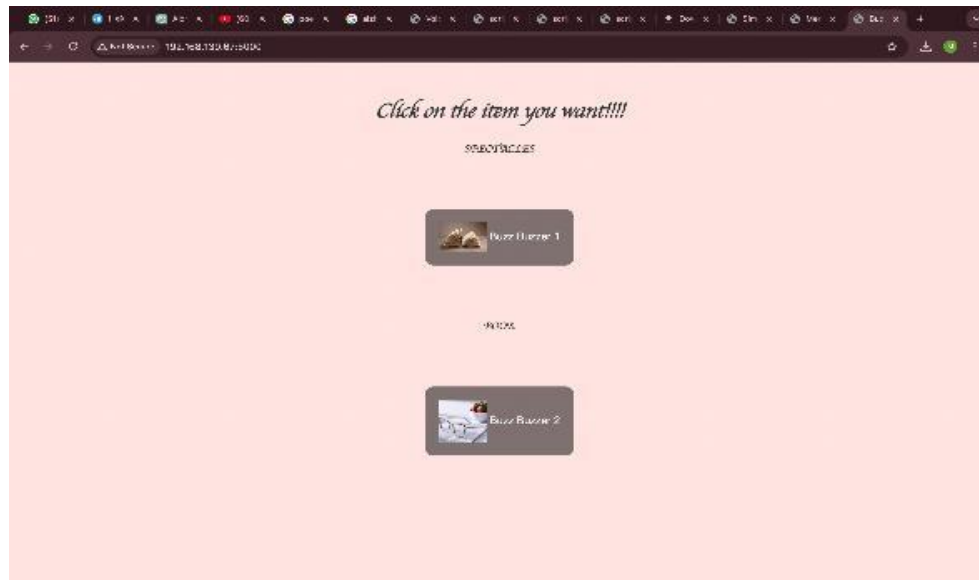
Figure 8: Lost Item Tracker Page of Alzheimer's personalized website

The lost item tracker enables the person's reduction in anxiety and frustration related issues in lost possessions, thereby improving patient autonomy.
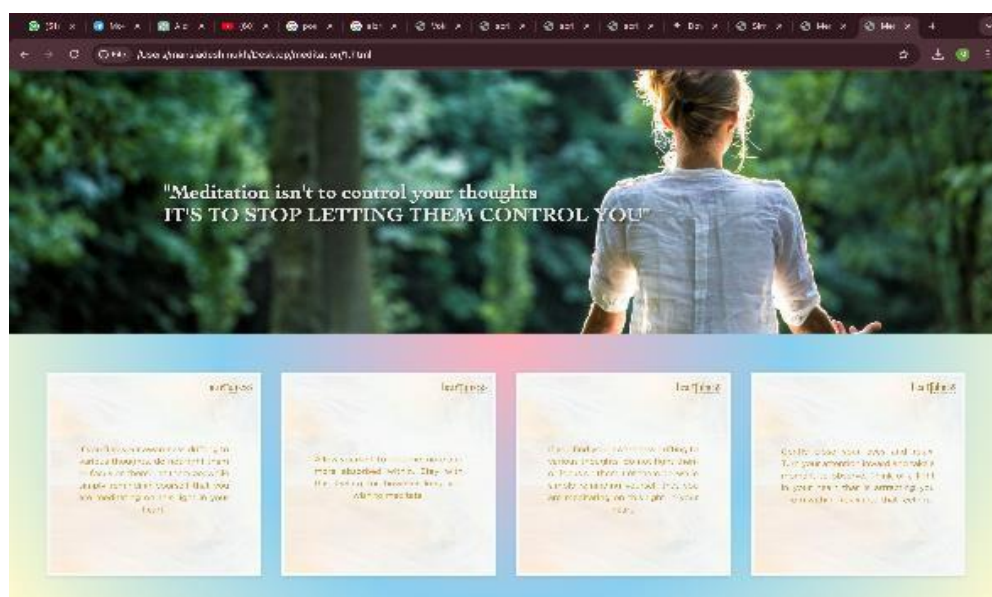

Figure 9: Meditation Guide Page of Alzheimer's personalized website

The person's mind is main focus for healing. Hence, a complete guided meditation technique is included. Thus, helps in reducing stress and neurological health.

Conclusion:

In conclusion, this IoT project has successfully integrated a Raspberry Pi with peripheral devices like a servo motor and piezo buzzer to create a versatile system aimed at improving the quality of life for Alzheimer's patients. The project demonstrates the potential of IoT solutions in healthcare by providing features such as a voice-activated personal assistant, a timely medicine dispenser, and a lost item tracker, all of which collectively enhance patient independence while reducing caregiver burden.

Innovation In the Project:

By integrating a diverse range of features, including mind games, music therapy, mime performances, access to e-books, guided meditation sessions, and a personal voice assistant, AlziCare addresses the multifaceted needs of patients, catering to their cognitive, emotional, and practical requirements.

By harnessing the power of machine learning algorithms, AlziCare continuously learns and adapts to the evolving needs of its users, ensuring a tailored and responsive experience.

Scope For Future Work:

Looking to the future, there are several avenues for enhancing this project. One potential improvement could involve incorporating advanced AI algorithms to further personalize the interaction between the system and its users, enabling the system to adapt to changes in the patient's behavior or needs over time. Additionally, integrating more sophisticated sensors could enhance the system's ability to monitor health vitals, thus providing caregivers with critical real-time health data. Another area for development could be the implementation of a more robust network solution that ensures continuous operation even in the event of internet outages. This could involve using mesh networking to provide stronger and more reliable connectivity.

By continuing to evolve and incorporate new technologies, this project can better meet the complex needs of Alzheimer's patients and their caregivers, driving significant improvements in care and quality of life. Each enhancement will also broaden the system's applicability and effectiveness, making it a more integral part of healthcare solutions for the elder.