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Assistive Device for Alzheimer's Patients

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ABSTRACT: Alzheimer's disease is a progressive neurological disorder that causes the brain to shrink also destroy memory and other important mental function. Alzheimer's disease is the most common cause of dementia, a continuous decline in thinking, behavioural and social skills that affects a person's ability to function independently. Key symptom of Alzheimer's disease is memory loss. Early symptoms included difficulty in thinking and understanding. When the disease progress more symptoms are developed. This project aims to improve a person's ability to do things in day-to-day life. It mainly helps the patients with mild Alzheimer's Disease. This wearable assistive device for Alzheimer's patients and their caretakers to improve the quality of life. This device will assist patient to an extent, including problems in identifying family members and friends, location tracking, reminder for daily activities. The peculiarities of this project include face recognition, location tracking using RFID, reminder for daily activities and wearable device with lock system.

KEYWORDS:.. face recognition, location tracking using RFID, reminder for daily activities

I. INTRODUCTION

There have been several design interventions to make well Alzheimer's patients. In the modern era, technology-based interventions have attempted to ease the lives of Alzheimer's patients and their caretakers. After performing a comprehensive literature review, the bio-engineering devices could be grouped in four different categories as location tracking using RFID, face recognition, day to day activity reminder and incorporating lock system in the device. Assistive devices help to maintain a person's ability to do things in everyday life. This project aims to help the patients with mild Alzheimer's Disease. Patients have difficulty in memorizing relatives and friends due to brain cell damage. A possible solution for this is the face recognition by using a camera, it detects the image and using machine learning algorithm the output sends an audio with name and relationship between the person and the patient. Wandering away is a serious issue for people with Alzheimer's. This can be solved by fixing RFID location tags in patients. Everyday activities reminder is also important for AD patients which can be reminded in the form of audio. Mostly, there is a very limited chance for the AD patients to wear such devices so by implementing a lock in the system, this issue can be solved to an extent.

II. RELATED WORK

Dementia is a chronic disease that involves intensive loss of cognitive and functional abilities and is related to significant risk of morbidity and mortality. Dementia is not considered as a specific disease but can be perceived as an acquired syndrome resulting from multiple neurological and psychological conditions. Conditions like, frontotemporal lobe degeneration or a tumour in the language cortex, Alzheimer's disease and Parkinson's disease are examples of health conditions that could lead to progressive dementia. The prototype comprises of EM18 RFID Module, Bluetooth Transceiver HC-05 TTL Module, 3.7V 160mAh Li-Po Rechargeable Battery, Arduino Nano ATmega328P, and TP4056 - Li-ion Battery charger Module. The RFID module can communicate with an RFID tag within the proximity of 15 cm, which enables the device to mount on any existing smartwatch or other wearable smart devices. The android application is installed on the caretaker's smartphone and preferably on the patient's as well, with customized options for both the patient and the caretaker. The daily routines such as timely



intake of medicines and food, brushing teeth,taking a shower, going for a walk and other recreational activities are prompted in the form ofalarms and notifications on both the versions of the application.

III.METHODOLOGY

A real time clock (RTC) is a digital clock to keep accurate track of time. It is in the form of audio for day-to-day activities remind. Getting lost can be prevent by using RFID location tracking system. When a person put his RFID tag to RFID reader, then RFID reads tag’s data and send it to microcontroller and then microcontroller compares this data with pre-defined data. If it coordinates, then the buzzer sound Reminder for daily activities includes taking food, medicine andhaving sleep on proper time is informed to the patient. Without caretaker’s concern patient can’t remove the device because of the incorporated lock in the system. MOSFET is helps to operate it. A camera is used to recognize relatives and friends who are nearer to patient. It can detects the image and using machine learning algorithm the output send as an audio with name and relationship between person and the patient. DF mini player can play music at particular intervals of time.

IV.EXPERIMENTAL RESULTS

The following figures shows the main block diagrams of the assistive device.

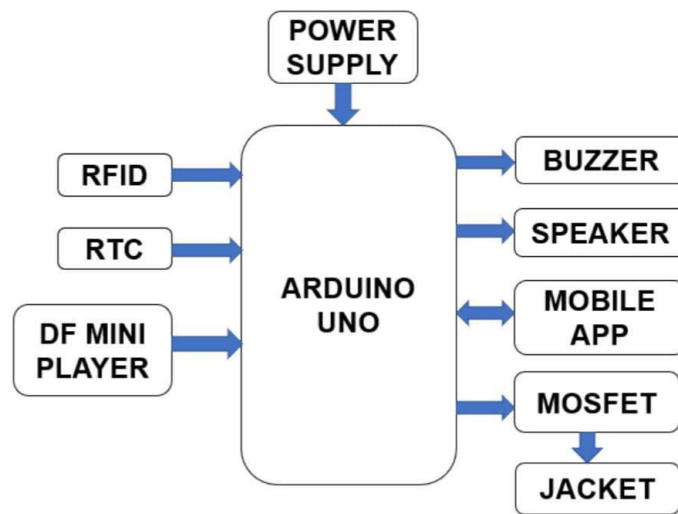


Fig.1.1Main Block Diagram

RFID tags and readers are used to prevent patient from Getting lost or wandering away. Real Time Clock (RTC) is for day-to-day activities reminder which are set in the form of audio. Lock is incorporated in the wearable device so that patient can’t remove it without caretaker’s concern. The lock system is operated using a MOSFET. Caretaker can control the lock using the mobile app.

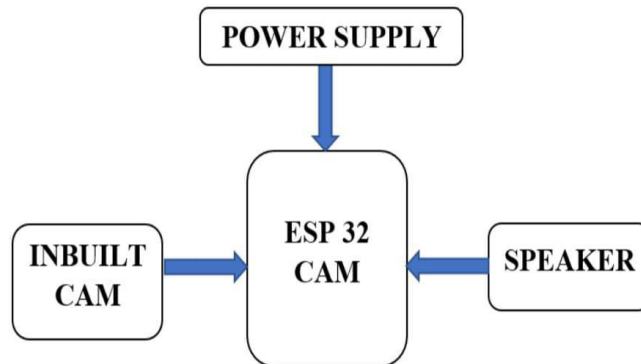


Fig.1.2 Face Recognition System

A camera is used to recognize relatives and friends who approaches the patient. It detects the image and using machine learning algorithm the output sends an audio with name and relationship between person and the patient.

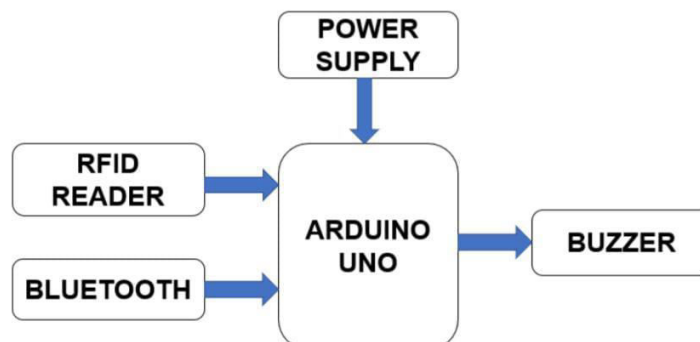


Fig.1.3 Location Tracking Using RFID

When a person put his RFID tag to RFID reader, then RFID reads tag’s data and send it to microcontroller and then microcontroller compares this data with pre-defined data. If it matches, then the buzzer sounds.

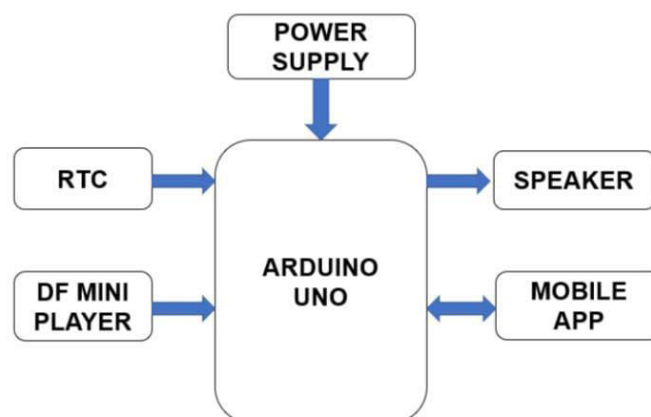


Fig.1.4 Smart Reminder to day-to-day activities



Reminder for daily activities includes taking food, medicine and having sleep on proper time is informed to the patient. A real time clock, RTC is a digital clock to keep accurate track of time. At a particular time intervals music can be play through the DF mini player.

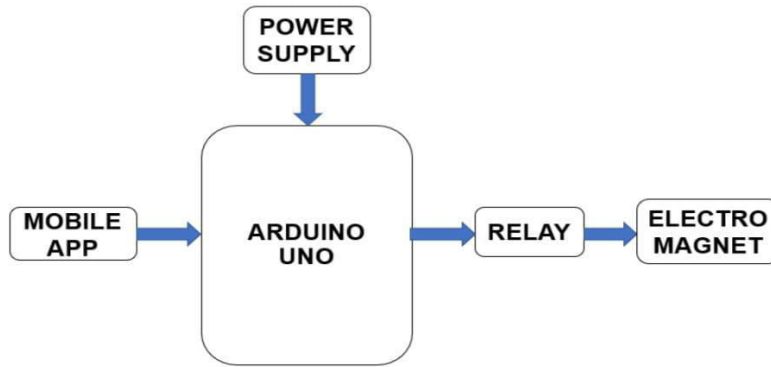


Fig.1.5 Lock System

Lock is incorporated in the wearable device so that patient can't remove it without caretaker's concern .The lock system is operated using a MOSFET. Caretaker can control thelock using the mobile app.

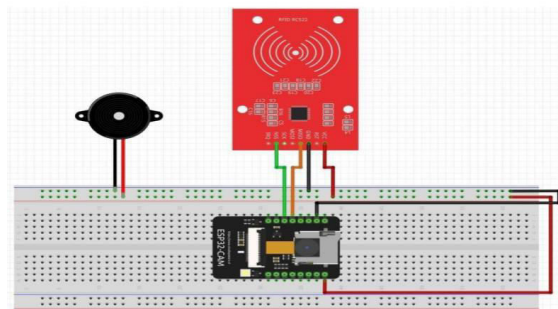


Fig.1.6 RFID Location Tracking

When a person put his RFID tag to RFID reader, then RFID reads tag's data and send it to microcontroller and then Microcontroller compares this data with pre-defined data. If it matches, then the buzzer sounds.

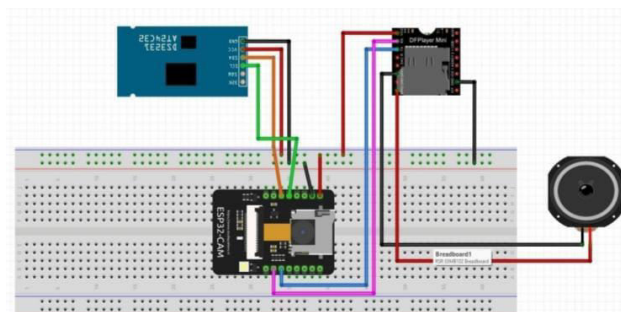


Fig.1.7 Day-to-Day Reminder

Reminder for daily activities includes taking food, medicine and having sleep on proper time is informed to the patient. A real time clock, RTC is a digital clock to keep accurate track of time.

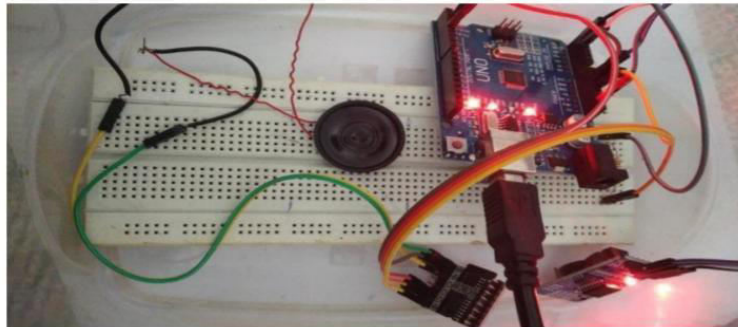


Fig.1.8 RTC and DF Mini Player Activation

The real time clock, RTC is a digital clock to keep accurate track of time that serial and the Arduino programming is Used to play the music that are saved in the SD card using a DF Mini player with in a particular time interval.

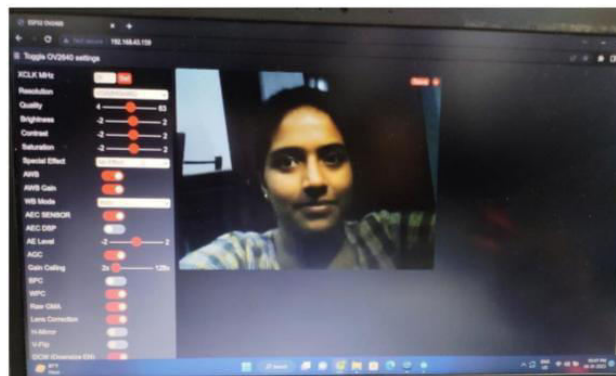


Fig.1.9 ESP32 CAM Activation

The result shows here the activation of ESP32 CAM with Arduino programming. The ESP32 camera host a video Streaming web server that can be access with any device in the same network. ESP32-CAM is also used as a streaming camera tool that is equipped with Artificial Intelligence using specific programming languages or coding programs that can set the output.

VI.CONCLUSION

Incorporated features in this device include person identification using face recognition, location tracking of the patient, reminder for daily activities, Lock system for the jacket. All these features within a wearable jacket made of waterproof material and these features can be controlled and monitored by the caretaker using a mobile app. In the first phase of project reminder for daily activities and enabling of camera module for face recognition have been implemented among the features. Remaining will be implemented in the second phase of the project.

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