I'm Here

“Health care & well-being system for Alzheimer's patients to live a better life”

Student / Yassin Ali Salah Ali

Supervisor / Mrs. Bassant Farouk

Index

Index of figures

I'm Here

Abstract: -

Alzheimer's disease is a disease of the elderly. It affects these people and their families negatively, both physically and psychologically.

Therefore, this project aims to create a device in the form of a smart bracelet. One of the most important of these device is that it is water-resistant so that it can be worn throughout its daily life. The device can locate the Alzheimer's patient if he is left unaccompanied and display his location on the mobile phone connected to the device, thus facilitating finding to the person with Alzheimer's disease. And it provides him with other advantages and possibilities that help to save his life by sending an alarm at the time of his medication.

So, this device keeps pace with the sustainable development goals and Egypt's 2030 vision. As it can contribute to achieve sustainable development third goal: good health and well-being and ninth goal: Innovation, industry, infrastructure.

Introduction: -

Today, the world is heavily dependent on technology It has become necessary to take care of its implementation in various fields of life perhaps one of the most important areas in which technology can employ the medical field for its applications in diagnosis, treatment and prevention of various diseases one of the most

important medical achievements of modern times are the various medical applications that try to help people maintain their health the most important of which are applications that calculate calories in food, improve the nature of sleep, and measure heartbeats in addition to the tools that can be used to determine the health status of the user and inform them immediately.

One of the most prominent diseases requiring ongoing care and follow-up is Alzheimer's disease according to the World Health Organization (WHO) definition (2021) the disease is characterized by deterioration in memory, thinking, behavior and the ability to carry out daily activities, primarily affecting the elderly according to the World Health Organization (WHO) there are 47.5 million infected people worldwide.

Perhaps one of the most important technological applications in this case is to raise the level of safety if the person with Alzheimer's disease moves unaccompanied. The current project aims to provide a smart bracelet to make it easier to find the Alzheimer's patients if they leave unaccompanied its innovative design, waterproof that integrates well-being with health care in one way so that the Alzheimer’s patient can live his life better by locating him in the event of his leaving unaccompanied and reminding him of his treatment dates the bracelet also contains a database that stores any data that needs to be added, whether images or texts. Which helps in achieving the economic income for their families and their concentration in their businesses, and then the project works to achieve the innovative, pioneering and humanitarian part of the

sustainable development goals and Egypt’s Vision 2030 to keep pace with the labor market.

Purpose - Problem: -

Alzheimer's disease is a life-threatening disease. It has physical, psychological, social and economic effects on those who care for patients, their families and communities. The disease leads to deterioration in memory, thinking and behavior in people with it, especially the elderly.

One of the most important problems facing Alzheimer's patients and their families is their inability to locate them if they leave the house unaccompanied and not only that, but the bracelet can remind the Alzheimer’s patient of the dates of his treatment, in addition to that it contains a database that can remind him of his family and can provide any data he needs to remember at any time, whether texts or pictures, through a chatbot so as not to affect him psychologically or physically.

This is why the current project aims to provide a bracelet worn continuously by Alzheimer's patients that is water resistant.

Therefore, the questions of the project are:

- What device can be created to find Alzheimer patient if he goes out unaccompanied?
- What's the difficulties which Alzheimer's patients face?
- What is the addition which can make the device multi tasker?

Background Research: -

Alzheimer's disease is a gradual atrophy of neurons in the brain areas responsible for many administrative functions, resulting in a continuous decline in memory and mental abilities, which requires creating an appropriate and supportive environment in the community in order to ensure the provision of services at the highest level of this community.

The number of people infected is expected to increase globally. According to Egyptian statistics, the president of the Egyptian Association of Alzheimer's Patients explained that the number of people with dementia in Egypt ranges from 400,000 to 600,000 patients, 60% of whom suffer from Alzheimer's, and this is expected to reach 1 million, by 2030.

One of the most prominent symptoms of the disease is the difficulty of remembering people and important details such as phone number, home address, university and graduation date, which disturbs them and affects their lives completely, leads them to isolation, confusion and loss of sense of security.

According to a study conducted at the University of South Florida on a sample of 52 people with the disease, 94% did not pass the initial audio logical examination. In another study, researchers showed that people with problems in the hearing center of the brain were diagnosed with Alzheimer's disease after about eight years of follow-up. Researchers have found that the emergence of problems in the analysis of audio speech in the hearing center of the brain may

precede the diagnosis of Alzheimer's disease by several years. The negative effects of age-related hearing loss in the elderly, including depression and cognitive decline, may make it more difficult to diagnose Alzheimer's disease, unless the hearing loss is detected and treated as a separate, unrelated condition. Which indicates that the depression of Alzheimer's disease has a negative and physical impact on him, and the Alzheimer's patient should be comfortable. This category therefore needs to provide a safety device to ensure that they are found if they leave unaccompanied and provide health care and well-being system to live a better life.

An institution in the United States of America deals with devices used by Alzheimer's patients provide a watch for them to wear, this watch has several jobs, it contains GPS locator and can send message about the location of this person. But, this watch is so expensive, it costs more than 450$. The reviews about this watch was not good, users complain about the efficiency of battery and, GPS locator doesn't work in some places.

Because the cost of this watch is not suitable for the economic conditions of most Alzheimer's patients in Egypt. Therefore, the current project aims to develop a smart bracelet they can wear continuously, so we can determine their location easily if the patient leaves unaccompanied and not only that, but the bracelet can remind the Alzheimer’s patient of the dates of his treatment, in addition to that it contains a database that can remind him of his family and can provide any data he needs to remember at any time, whether texts or pictures, through a chatbot.

Material list (Software & Hardware): -

Cost ≈ 740L.E

1- Wires:

Figure (1) Wires

A wire is a single usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals. Wire is commonly formed by drawing the metal through a hole in a die or draw plate. Wire comes in solid core, stranded, or braided forms.

2- NODE MCU ESP.32 as a module wifi by IOT Technology and IOT Applications like (Blynk is a IOT Software) to make an IOT App:

Figure (2) NODE MCU Esp.32

- **Robust Design:**

ESP32 is capable of functioning reliably in industrial environments, with an operating temperature ranging from -40°C to +125°C. Powered by advanced calibration circuitries, ESP32 can dynamically remove external circuit imperfections and adapt to changes in external conditions.

- **Ultra-Low Power Consumption:**

Engineered for mobile devices, wearable electronics and IOT applications, ESP32 achieves ultra-low power consumption with a

combination of several types of proprietary software. ESP32 also includes state-of-the-art features, such as fine-grained clock gating, various power modes and dynamic power scaling.

- **High Level of Integration:**

ESP32 is highly-integrated with in-built antenna switches, RF, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 adds priceless functionality and versatility to your applications with minimal Printed Circuit Board (PCB) requirements.

- **Hybrid Wi-Fi & Bluetooth Chip:**

ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

3- Mobile App: A mobile application or app is a computer program or software-application designed to run on a mobile device such as a phone, tablet, or watch. The current project has IOT app made by blynk app for locate the location of the Alzheimer's patients.

Figure (3) I'm Here app

4- Voltage Regulator 7805:

The 7805 Voltage Regulator IC is a commonly used voltage regulator that finds its application in most of the electronics projects. It provides a constant +5V output voltage for a variable input voltage supply.

Figure (4) Voltage Regulator 7805

- Two lithium batteries with holder
- PCB board
- OLED display (can display the GPS coordinates).
- UBLOX NEO-6m GPS Module
- Wokwi app to analyze (Efficiency of materials) using augmented reality.
- Arduino ide (To make a code program using Arduino C (Programming Language).

Procedures: -

- At first reviewing statistics previous research in the field of Alzheimer's care.

- Reviewing previous devices in other countries used by Alzheimer's patients.
- Planning the initial design of the I'm Here device, which can check the location of the Alzheimer's patient if he goes out unaccompanied.
- Create an application which can send an alarm to the unaccompanied of the Alzheimer's patient, if he moves away from the Wi-Fi at home, and send the geographical coordinates of the patient's location.
- Create an application aims to remind the Alzheimer's patients and his unaccompanied.
- Selecting the device parts according to the job of each part.
- Calculate the initial cost of the components of the device.
- Build and test the prototype.
- Analyze the results.

Build & Test a Prototype: -

Below is the schematic design of the PCB board / circuit for more accurate instead of wires included in the Alzheimer's bracelet "I'm here". The design was drown using "Proteus 8 Program".

This bracelet is expected to send a signal through an app. on the mobile, it shows the location of the person wearing the bracelet.

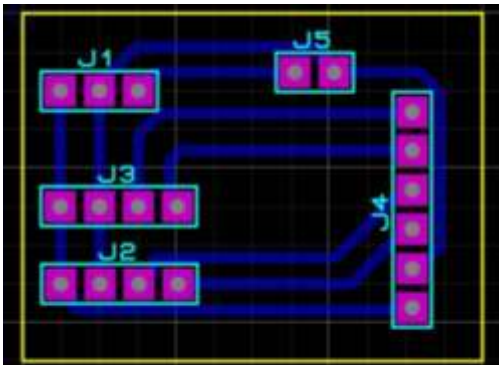

Figure (5) Schematic design of the circuit included in the Alzheimer's bracelet "I'm here"

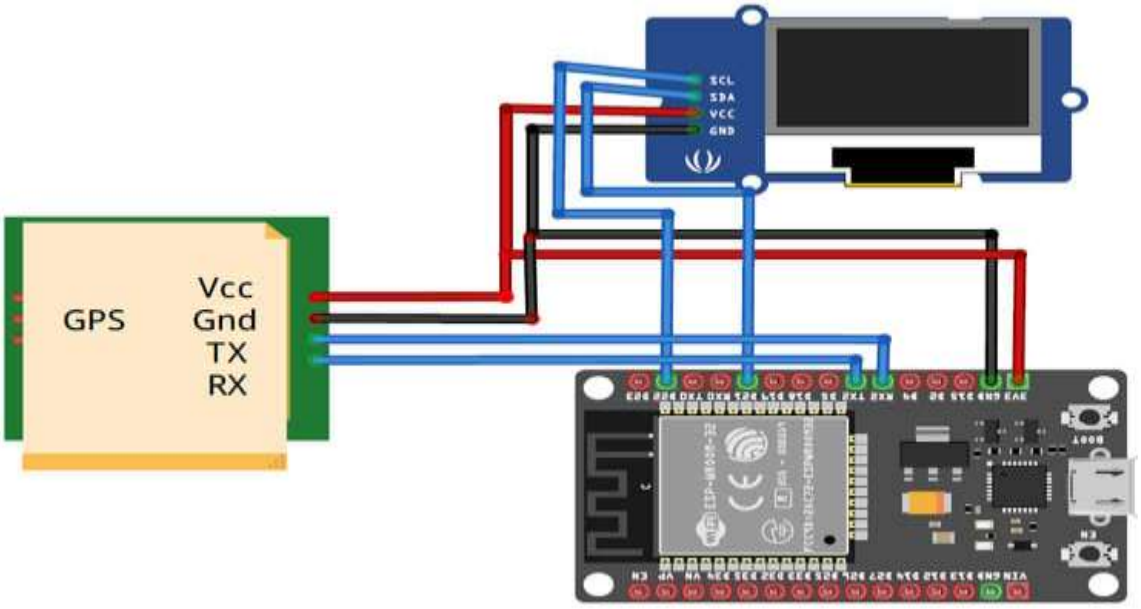

Figure (6) The 3D design of the circuit included in the Alzheimer's bracelet "I'm Here" made by fritzing app.

Data Analysis: -

There are 47.5 million people with dementia worldwide, half of whom (58%) live in low- and middle-income countries. Each year, there are 7.7 million new cases of the disease.

It is estimated that the percentage of people with dementia among the general population aged 60 years and over, at a given time, ranges from 5 to 8 out of every 100 people.

Figure (7)

https://www.elwatannews.com/news/details/4985128

El Watan news

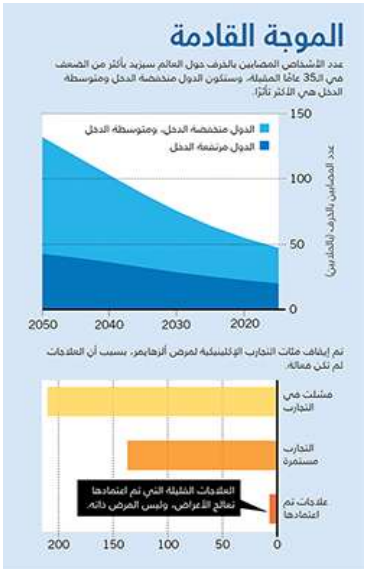

Figure (8)

https://arabicdition.nature.com/journal/2016/12/539156a

Nature magazine website Arabic edition

- As shown in Table (1) The relationship of distance between NODE MCU Esp.32 and the percentage of its efficiency:

D/The distance between NODE MCU Esp.32" and Mobile App	1 - 3m	3 - 5m	5 - 7m	7 - 10m	10 - 12m	12 - 14m	14 - 16m	16 - 20m
P/ The percent of efficiency	100%	100%	100%	100%	80%	80%	30%	0%

Table (1) The relationship of distance between NODE MCU Esp.32 and the percentage of its efficiency

According to the table if the distance increases the efficiency of between NODE MCU Esp.32 will decrease.

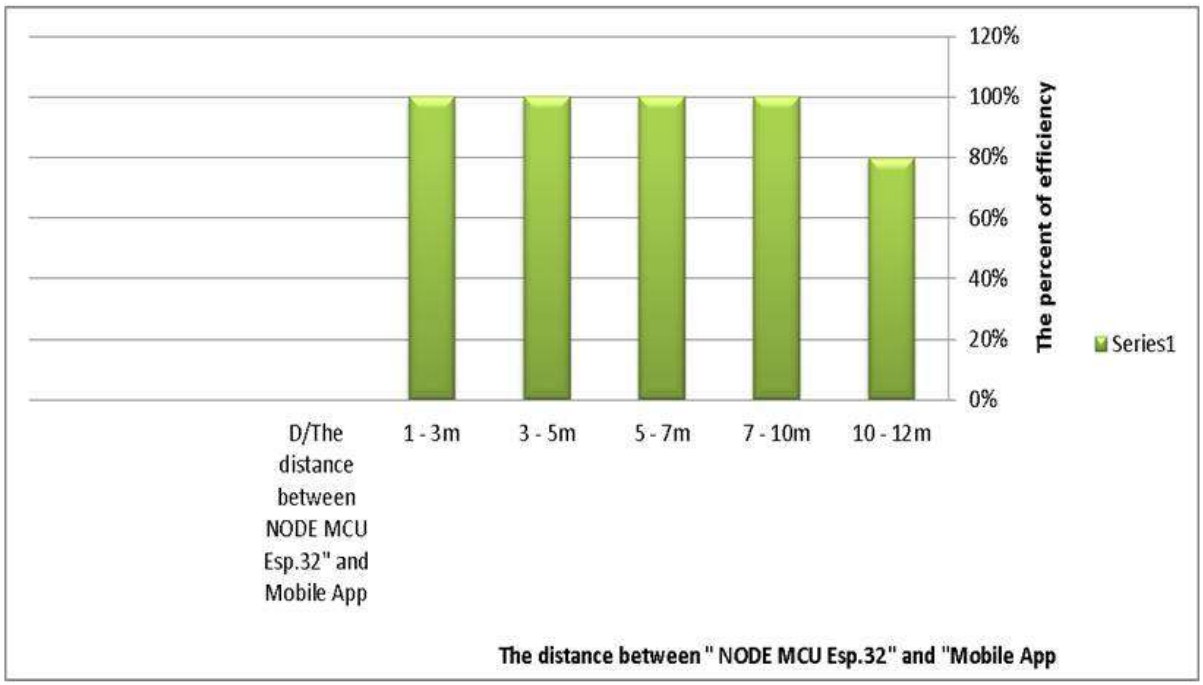

Figure (9)

Results: -

- After testing the prototype of "I'm Here", the design was successfully implemented.
- While testing the device it succeeded to send the location of the person how used it and another one received the location using mobile app.
- The battery works for 2 hours, suggested to replace it with solar panel to save energy.
- The device works for a range of 20 meters because the range of Bluetooth is 10 meters, so it was replaced it with NODE MCU Esp.32 to increase the range of the device.

Conclusion: -

- The prototype of "I'm Here", the design was successfully implemented.
- The device succeeded to send the location of the person how used it and another one received the location using mobile app.
- The battery works for 2 hours, suggested to replace it with solar panel to save energy.
- The device works for a range of 20 meters because the range of Bluetooth is 10 meters, so it was replaced it with NODE MCU Esp.32 to increase the range of the device.
- The device can send an alarm to the patient's unaccompanied when he moves away from the Wi-Fi range, which means he is far away than 20 meters.
- The device can send an alarm at the time of his medication.

Applications: -

This project is helping to develop a bracelet for an Alzheimer's patient to wear when they go out unaccompanied. This bracelet (affordable price – water proof) helps to find the patient using GPS via mobile app and provide health care & well-being system to be a sustainable project.

Future Research: -

After testing the prototype of "I'm Here", It is suggested to add techniques to enhance the performance of the bracelet in the future, including: -

1. Use of GPS Indoor locator in detail.

2. Replacing Two lithium batteries with solar battery to improve the efficiency of battery and to be more sustainable.

3. Adding a "SIM" module to send a message on the phone to an Alzheimer's patient companion in an emergency situation such as fainting due to low / high blood sugar ratio, fast or slow heart rate and other factors, or lack of a Wi-Fi network. Or use (NRF board) radio waves in the absence of a Wi-Fi network.

4. Adding some techniques to the bracelet, such as knowing the percentage of oxygen in the blood and heart rate through the oximeter sensor.

5. Replacing the ESP 32 with the ESP 8266 because it has a larger range, better performance and lower cost.

6. Adapting artificial intelligence techniques and machine learning to detect Alzheimer's disease if it is present in the brain.

Research sources

1. https://www.who.int/ar/news-room/fact-sheets/detail/dementia

2. https://www.moh.gov.sa/HealthAwareness/EducationalContent/Health-of-Older-Persons/Pages/001.aspx

3. https://www.mayoclinic.org/ar/diseases-conditions/alzheimers-disease/symptoms-causes/syc-20350447

4. https://www.nhs.uk/conditions/alzheimers-disease/

5. https://alz.org.sa/?page_id=2120

6. Alexandria library

7. https://www.elwatannews.com/news/details/4985128

8. https://arabicdition.nature.com/journal/2016/12/539156a

9. https://news.un.org/ar/story/2021/09/1082492