PROJECT REPORT

PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT

Team ID: PNT2022TMID21393

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CONTENT

1. INTRODUCTION
1.1. Project Overview

Sometimes elderly people forget to take their medicine at the correct time. They also forget which medicine He / She should take at that particular time. And it is difficult for doctors/caretakers to monitor the patients around the clock. To avoid this problem, this medicine reminder system is developed. An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IBM IoT platform. The device will receive the medicine name and notify the user with voice commands. Here Node-red connects the Web UI, Cloudant DB and IBM Watson IoT platform.

1.2. Purpose

The major purpose of this project is to help the elderly people who can assist themselves with the help of an voice alarm to take medicine at correct time. This avoids the irregular intake of medicine and keeps their body healthy. Some elderly people have oblivion to take medicine at right time but they can assist themselves in all other works these type of elderly people will make of this project to their best. This method of medicine alerts also avoids the need of personal care assistance expenses and man power.

2. LITERATURE SURVEY
2.1. Existing problem

The aging of population is a global issue all over the world and as the people start aging it is a common problem of getting diseases such as cholesterol, diabetes, blood pressure, etc. It is not possible to assist elderly people with our presence with them to take medicine at correct time, some elderly people have a problem in taking medicine at correct time and get confused to take which medicine due to aging, this leads to severe health issues for elderly people. To avoid this Existing problem new method is proposed to help elderly people to get voice messages to take which type of medicine at what time as an alert

2.2. References

a) Wong, Population Aging and the Transmission of Monetary Policy to Consumption, 2015, https://economics.stanford.edu/sites/default/files/arlene_wong_jmp_latest-2g9f9ga.pdf.
b) B. Ma, The Monitor System of Elderly People Living Alone Based on the Comprehensive Computer Vision, Zhejiang University of Technology, 2014.
c) Y. Bai, J. Li, and J. He, "The design of the fall detection system based on embedded video monitoring," Television Technology, vol. 38, no. 15, 2014. View at: Google Scholar
d) L. Liu, E. Stroulia, I. Nikolaidis, A. Miguel-Cruz, and A. Rios Rincon, "Smart homes and home health monitoring technologies for older adults: a systematic review," International Journal of Medical Informatics, vol. 91, pp. 44–59, 2016. View at: Publisher Site | Google Scholar

e) A. Jacobsson, M. Boldt, and B. Carlsson, "A risk analysis of a smart home automation system," Future Generation Computer Systems, vol. 56, pp. 719–733, 2015. View at: Publisher Site | Google Scholar

f) C. D. Kidd, R. Orr, G. D. Abowd et al., The Aware Home: a Living Laboratory for Ubiquitous Computing Research International Workshop on Cooperative Buildings, Springer, Berlin Heidelberg, 1999.

2.3. Problem Statement Definition

Personal Assistance for elderly people for alerting them to take medicine on time is designed for helping the seniors who are self - reliant. The alerting mechanism also includes the medicine details for specific users so that it will be easy for them to find their medicine and take it at right time.

3. IDEATION & PROPOSED SOLUTION

3.1. Empathy Map Canvas
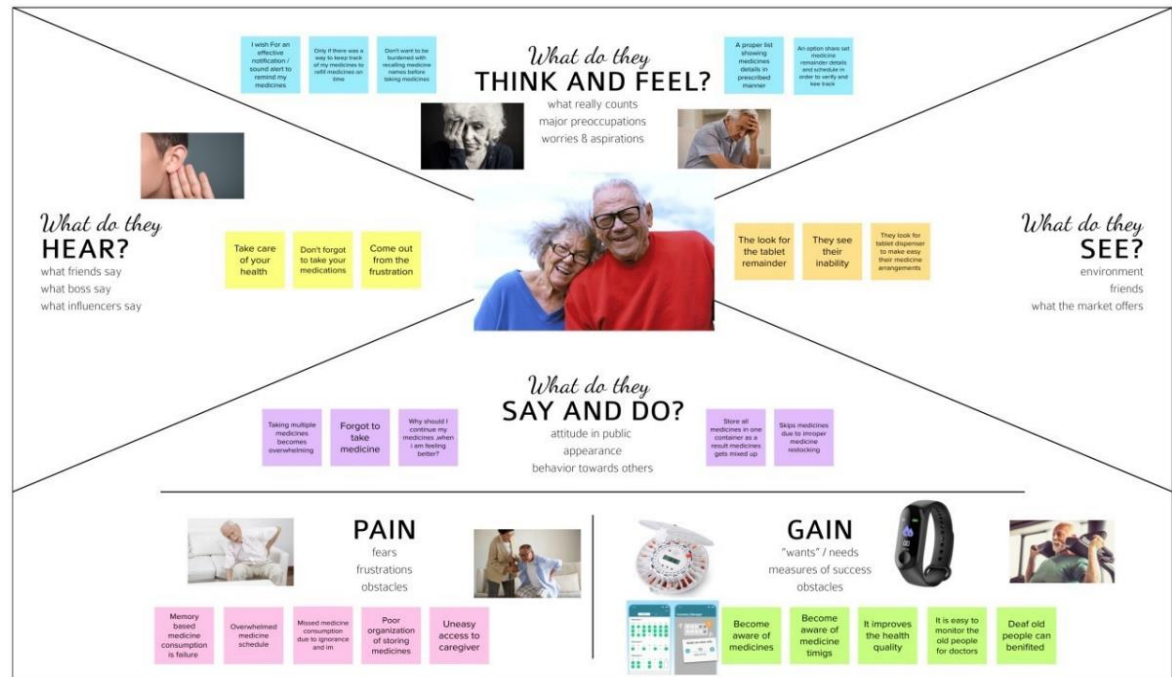
3.2.Ideation & Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Step-2: Brainstorm, Idea Listing and Grouping

Step-3: Idea Prioritization

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⏱ 20 minutes

Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

- Announcement of medication taking on time
- Obtain access to the hospital information system
- Before the medication gets over, text Clinic.
- SMS alerts are sent to the phone numbers of the caregivers.
- in a hazard situation, to notify the patient's nurse or doctor
- obtain the doctor's contact information if it is available
- stock availability alert
- Remainder makes it easier for people to take their medications on time.
- Android-based application
- SMS alerts are sent to the phone numbers of the caregivers.

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3.Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Sometimes the elderly forgets to take their medication at the appropriate time. They also forget which medication He or she should take at that time. It is also difficult for doctors and caregivers to monitor patients around the clock. This medicine reminder system was created to address this issue. A user (caretaker) app is created that allows him to set the desired time and medicine.
2.	Idea / Solution description	We present a smart Internet of Things-based medication reminder system. The suggested plan was specifically designed for the Android operating system. We use a reminder system for our system, which sounds an alarm when it's time to take your medication. Additionally, the user can set their medication time using an android application. There will be some features in the application that allow the user to learn more specifics about their medication. It keeps track of the medications, allowing the user to adjust how much medication to take within the application.
3.	Novelty / Uniqueness	It is an easy-to-use app that reminds users to take their medications and get them refilled, warns about drug interactions, and assists caregivers in managing prescriptions for loved ones.
4.	Social Impact / Customer Satisfaction	I constructed these proto-personas, or names, based on the research findings from the user interview. They would be crucial to the rest of the design process. All design decisions may be assessed and re-evaluated using these personas, keeping the user and their perspective in mind.
5.	Business Model (Revenue Model)	There is no one-size-fits-all answer when it comes to business. The model you select will depend on your target market, business objectives, and the resources you already have available.
6.	Scalability of the Solution	where the user can set the time for their medication. There will be some features in the application that allow the user to learn more specifics about their medication. It keeps track of the medications, allowing the user to adjust how much medication to take within the application.

3.4.Problem Solution fit

CS

1. **CUSTOMER SEGMENT(S)**

   ➢ Caretakers
   ➢ Persons, who need to help their closed one

CC

6. **CUSTOMER CONSTRAINTS**

   ➢ Low power
   ➢ Budget Friendly
   ➢ No cash

AS

5. **AVAILABLE SOLUTIONS**

   ➢ Pill Reminder and Med Tracker App
   ➢ e-pill TimeCap & Bottle Last Opened Time Stamp with Reminder

J&P

2. JOBS-TO-BE-DONE / PROBLEMS

   ➢ Forget to give medication on time.
   ➢ Can't keep remember the amount of medicine remains.

RC

9. PROBLEM ROOT CAUSE

   ➢ If there is no internet connection, there would be no sharing of data between Cloud and device.
   ➢ So, we need proper net connection.

BE

7. BEHAVIOUR

What does your customer do to address the problem and get the job done?

   ➢ The Customer first update the system with medicine name, Time to take and amount of medicine in pack into the device.
   ➢ The Device will take care of the remaining things like remainder and notify when the medicine get over.

TR

3. TRIGGERS

   ➢ Unable to give or take medicine on time and can't remember the amount of medicine remains triggers the customer to act like this

EM

4. EMOTIONS: BEFORE

   ➢ Caretakers feels guilty

SL

10. YOUR SOLUTION

   ➢ We introduce a smart medicine reminder system based on IOT. The proposed scheme was particularly created for the Android platform. For our system.
   ➢ We implement Medicine amount tacker to be notified by the caretakers when the medicine get over.

CH

8. CHANNELS of BEHAVIOUR

8.1 ONLINE

   If it is in online mode, the patients can make a report in the help section present in the setting option.

8.2 OFFLINE

   If it is in offline mode, the patients can directly send a feed a mail or message to the receiver.
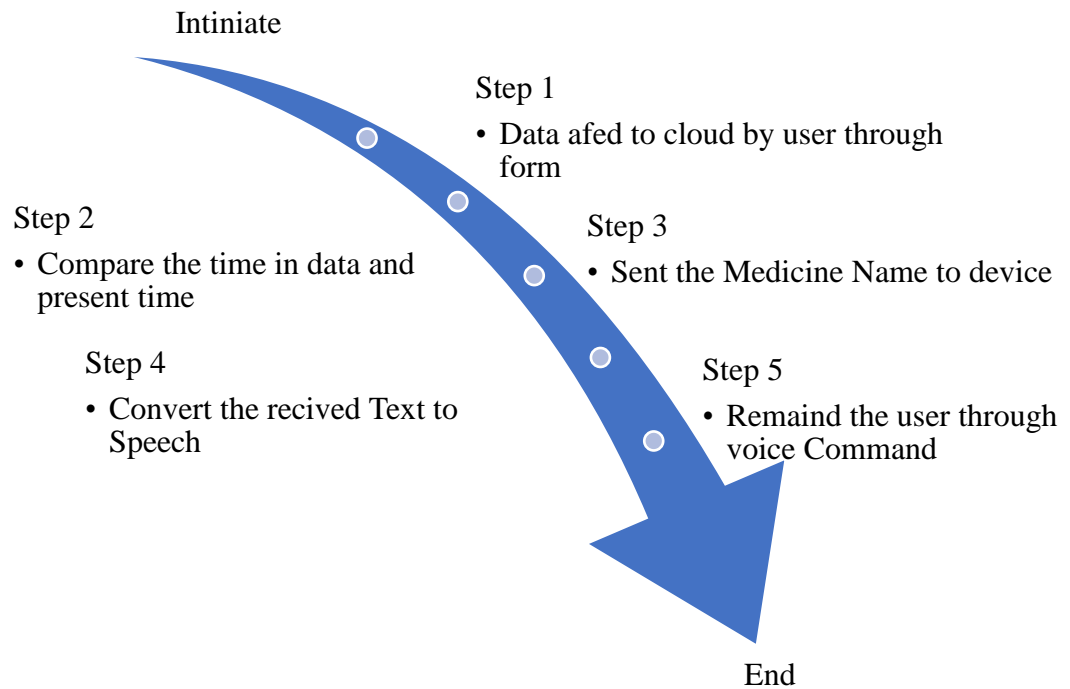
4. REQUIREMENT ANALYSIS

4.1.Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	login through User Id and Password.
FR-4	Network Connectivity	via wifi /mobile data.
FR-5	IBM IoT Platform	Access cloud storage via internet and it gives medication information.
FR-6	Node-RED	Uses to transfer the data from IOT platform to UI platform and helps in storing the data.

4.2.Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	It can easily track and monitor the medication time of users and share the information to the caregivers.
NFR-2	**Security**	The cloudant database is highly secured and it prevents data from hacking.
NFR-3	**Reliability**	The prescription of medication for users is assured all the time.
NFR-4	**Performance**	It reminds users to take their medications and getthem refilled, warns about drug interactions, and assists caregivers in managing prescriptions.
NFR-5	**Availability**	To keep track the medication of users.
NFR-6	**Scalability**	The users can set the time for their medication and also can adjust how much medication to take within the application.

5. PROJECT DESIGN

5.1. Data Flow Diagrams

Intiniate

Step 1
- Data afed to cloud by user through form

Step 2
- Compare the time in data and present time

Step 3
- Sent the Medicine Name to device

Step 4
- Convert the recived Text to Speech

Step 5
- Remaind the user through voice Command

End

5.2. Solution & Technical Architecture
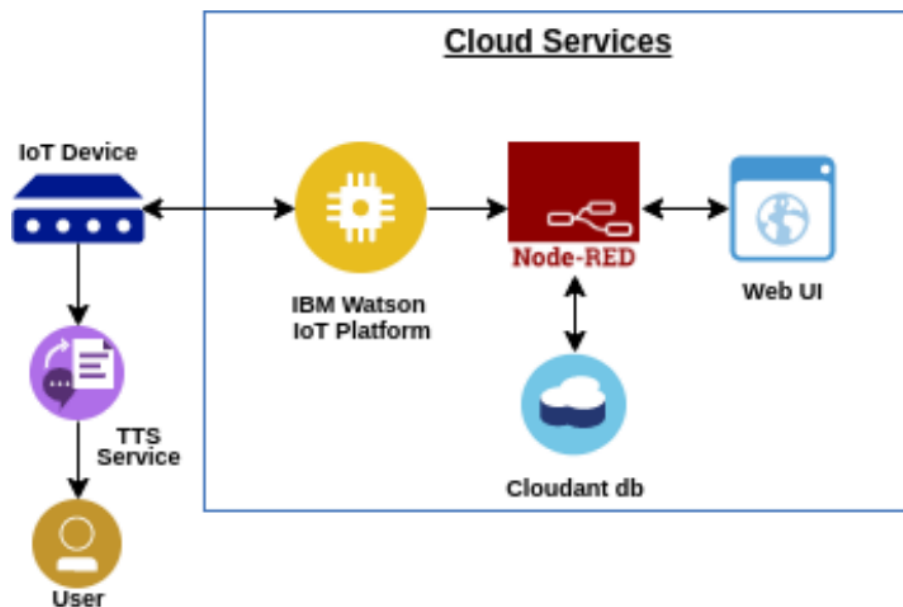
Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	Node-RED	Node-RED Dashboard
2.	Application Logic-1	Gathering medicine details andcheck the timings	Python
3.	Application Logic-2	alarms	IBM Watson
4.	Cloud Database	Database Service on Cloud	IBM Cloudant DB

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	programming the IoT device, text to speech service, storing details in cloud	IBM Watson, nodered, IBM cloud
2.	Security Implementations	Implementing encryption for security purpose	SHA-256.
3.	Scalable Architecture	Application is able to load as many members as logged in	IBM Watson
4.	Availability	Application is available 24/7	IBM Watson, node red, IBM cloud
5.	Performance	Reminder with correct timing	IBM Watson, IBM IoT Platform

5.3.User Store

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (citizen)	Registration	USN-1	As a user, I can register for the application by confirming OTP and access manually	I can access my account.	High	Sprint-1
Customer (Doctor)	User Requirements	USN-2	As a user, I want to monitor patients heartbeat24/7.	I can receive confirmation email &click confirm.	High	Sprint-1
Customer (Care takers)	Confirmations	USN-3	As a user, I can register and confirm through-mail OTP.	I can register & access the dashboard	Low	Sprint-2
Customer (Elderly people)	Payment options	USN-4	As a user, I can pay through Cash on Delivery or else with Credit/Debit card.	I can register or pay through login Dashboard.	Medium	Sprint-1
administratorr	Dashboard	USN-5	As a user, I can log into the application by entering mail and password.	I want to access customer Health and save the Data 24/7.	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

6.1. Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	IBM Watson IOT platform	USN-1	Creating devices and board and generatingdata	1	medium	Nishok Rajan P Karthikeyan B Saravanaprakash S Viswa Bharathi K
Sprint-2	Storing Data using node-red	USN-2	Storing the data in IBM Cloudant DB throughnode-red functions	2	High	Nishok Rajan P Karthikeyan B Saravanaprakash S Viswa Bharathi K
Sprint-3	IoT device / Micro controller Board	USN-4	The board connect with the cloud and retrievethe information and remain the peoples	2	Low	Nishok Rajan P Karthikeyan B Saravanaprakash S Viswa Bharathi K
Sprint-4	Reminder (TTS)	USN-5	Getting the speech reminder to users to taketheirtablet	1	High	Nishok Rajan P Karthikeyan B Saravanaprakash S Viswa Bharathi K

6.2. Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	31 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	07 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	14 Nov 2022

7. CODING & SOLUTIONING

7.1. Feature 1

- IoT Device
- IBM Watson platform
- Node - Red
- Cloudant DB
- Web UI
- Python Code

7.2. Feature 2

- Login
- Python IDLE

8. TESTING

8.1. Test Case

Section	Total Case	Not Tested	Failed	Pass
WEB UI	5	0	0	5
Text To Speech	10	0	0	10
Data from Node-RED to Device	10	0	0	10
Cloud Data Loading	10	0	0	10
Cloud Data Retrieval	10	0	0	10
Time Compare	10	0	0	10

8.2. Use Acceptance Test Case

a. Connect with the device.

b. Load Tablet name and time in User UI
We load Two tablet Paracitamol and Dolo 650 set remainder and time 9.31 Am
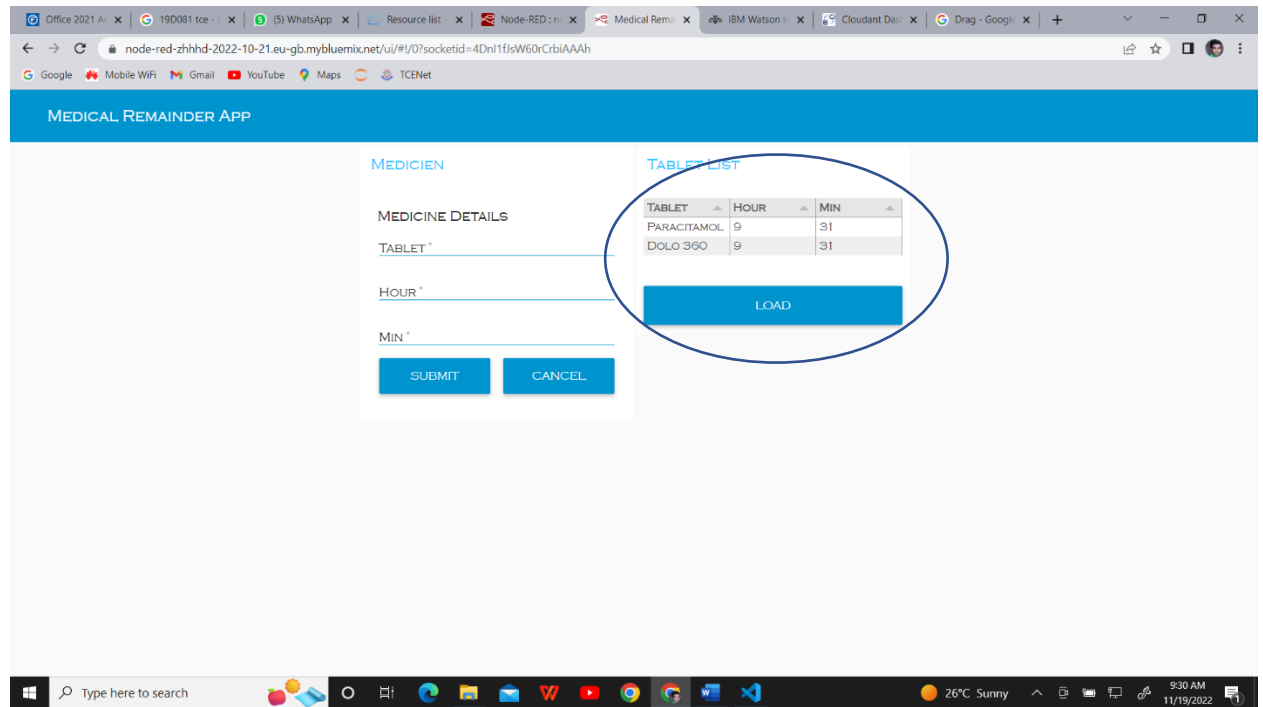
C. At 9.31 Am data saved in the DB is received and the audio file for instructions is generated and voice command was given to the user.
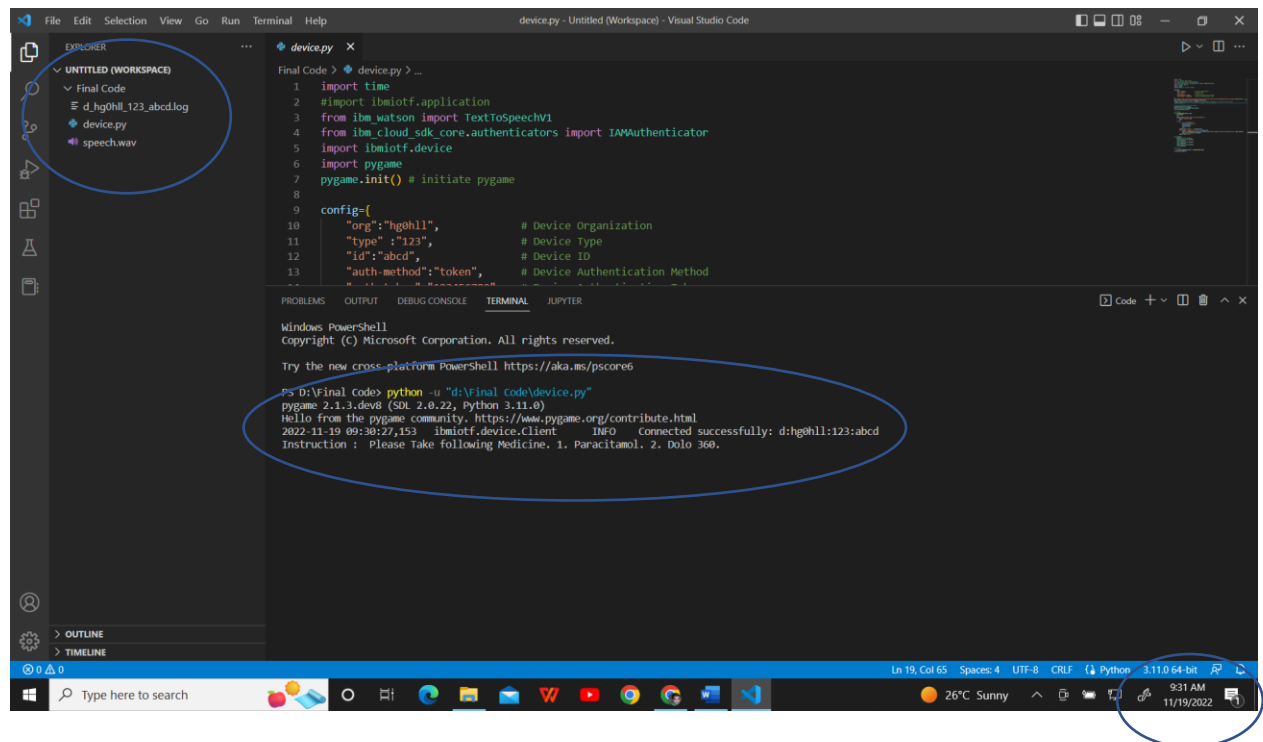
9. RESULT

9.1.Performance Matrix

An experiment is conducted on an elderly person who is in need of Personal Assistant Device and the following results are obtained, it shows the medicine reminder that gives the information regarding the intake of medicine by the person using the personal Assistant Device. The stored data in cloudant database on specified time alerts user with a voice message.

10. ADVANTAGES & DISADVANTAGES
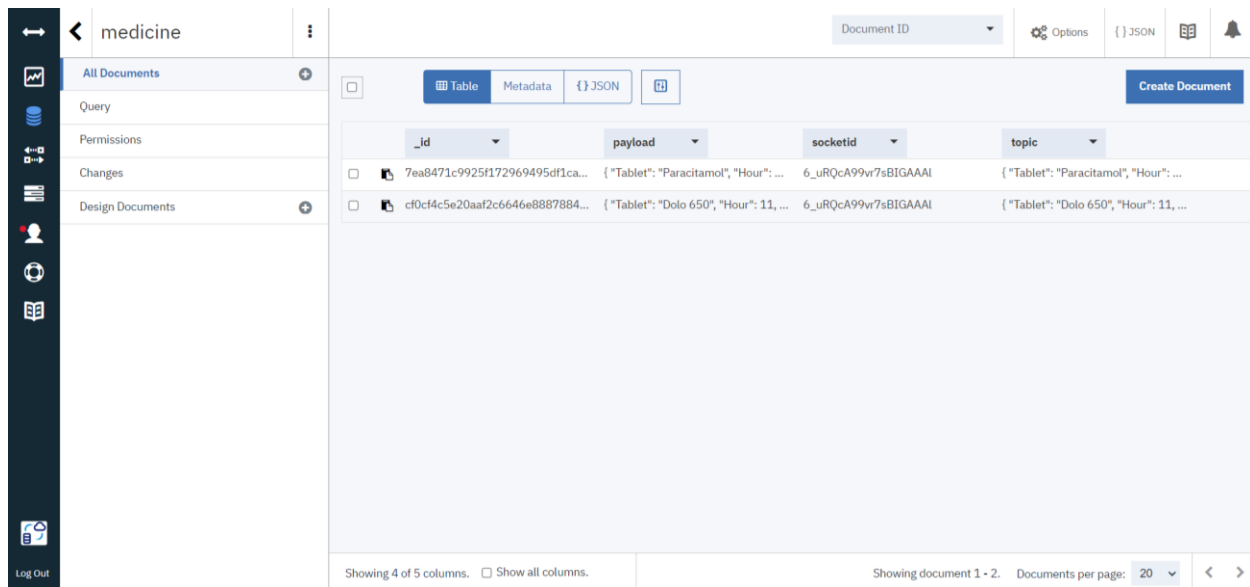
ADVANTAGES

- Availability One of the primary preferences of possessing a PDA is the capacity to stay in contact with individuals through email, text informing and telephone. Since PDAs are so convenient and networks so broad, clients can take them anyplace.
- Association Another advantage of possessing a PDA is expanded association. Schedule and rundown applications make it simple to monitor arrangements, make notes in a hurry and document past discussions or other information.
- Status For some PDA clients, the gadget has the additional advantage of meaning a specific status. Organization gave PDAs might be held for more significant level representatives and can come to connote a place of power or significance. For individual clients, having the most recent PDA might be an indication of riches or innovative information.
- Broad Internet Connectivity For occupied people, the primary preferred position of getting a PDA is being able to remain associated through email, calls, text informing and different courier applications. These are worked with broad organization network so clients can get to the Internet anyplace they are.

DISADVANTAGES

- Cost One of the greatest hindrances of a PDA is the expense. Other than paying for the gadget itself, most PDAs require the purchaser to buy in to a utilization contract. This includes a month-to-month bill and the chance of overage charges if the client outperforms his designated free telephone minutes or information limits.
- Interruption PDAs may likewise turn into an interruption when they're not satisfying an authentic need. The capacity to be constantly associated can prompt sat around riding the Web, settling on telephone decisions or messing around. Some business clients whine of being "available to come in to work" when their colleagues and bosses can reach them whenever.
- Restricted in Scope PDAs are restricted in degree. They are neither PC substitutions nor would they be able to be successfully used to supplant mobile phones. PDAs are not furnished to manage miniature preparing capacities.
- Time constraint PDAs are not generally the best response to business arrangements. Paper-based coordinators are a more reasonable choice since PDAs are hard to utilize, information passage is abnormal, they are moderate and beginner clients discover them superfluously unpredictable.

11. CONCLUSION

With the continuously increasing utilization of internet in this point in time, this assignment paintings have been engaged to execute a framework depending on web innovation which could discuss through internet for health checking of patients and for giving assist to vintage people. It utilized to apprehend the development of patient which sends these statistics to everything communicate producer to reveal the readings. During the crisis situations, a caution might be raised over the internet level telling the expert/overseer by way of the patient simply by squeezing a seize in the helpful machine. This offers a trustworthy framework which can screen the well-being reputation continuously of a patient or a vintage individual.

12. FUTURE SCOPE

Whether or not the role of IoT as the best solution to provide help for the weak elderly citizens is accepted, yet these people are certainly in need of care. There are some strong and determined persons who manage to preserve their mind and body active until an old age. Still there are many who are in need of aid in their routine life as well as those people who totally depend on others. It provides an effective homecare monitoring and care support for elderly people by communication and coordination with professional helpers and thereby improving the quality for independent life of old aged. Future elder care IoT projects will also more than likely have the ability to take on medical diagnostics, as well as use facial recognition algorithms to determine how someone is feeling. But despite all of this future capability, there still exists a dichotomy of things that IoT can do way better than humans and things they simply cannot do at all. For instance, an elder care IoT based projects in the future may easily be able to find and retrieve a pill box from another room, however, without an excellent mobility system, it will be stopped dead in its tracks should it get caught on something along the way. Collaboration and integration between researchers, private industry, investors, and the government will be key in the years to come.

13. APPENDIX

13.1.   Source Code

```
import time
from ibm_watson import TextToSpeechV1
from ibm_cloud_sdk_core.authenticators import IAMAuthenticator
import ibmiotf.device
import pygame
pygame.init() # initiate pygame

config={
    "org":"hg0hll",          # Device Organization
    "type" :"123",           # Device Type
    "id":"abcd",             # Device ID
    "auth-method":"token",   # Device Authentication Method
    "auth-token":"123456789"   # Device Authentication Token
}
url="https://api.eu-gb.text-to-speech.watson.cloud.ibm.com/instances/8e5bc662-02f5-
4cc3-b2a3-27086673e789"  # TextToSpeech URL Link
api="QGXbVq1lTgSFNn8_7wpT1kGVYIKCHG8NLfHnC1BBXNwj"
# TextToSpeech API Key
client= ibmiotf.device.Client (config) # Config in a Varible called client
client.connect()                 # Connect with the device
```

```python
# Load TextToSpeech API Key and URL
auth=IAMAuthenticator(api)
tts=TextToSpeechV1(authenticator=auth)
tts.set_service_url(url)

# callback
def myCommandCallback (cmd):
    a=cmd.data
    c=1
    instruction="Please Take following Medicine. "
    if len(a["command"])==0:
        pass
    else:
        for i in a["command"]:
            instruction+=str(c)+". "
            instruction+=i
            instruction+=". "
            c+=1
        print("Instruction : ",instruction)
        with open("./speech.wav","wb") as audio_file:
            res=tts.synthesize(instruction,accept="audio/mp3",voice='en-
US_AllisonExpressive').get_result()
            audio_file.write(res.content)
        play("speech.wav")

def play(a):
    p=pygame.mixer.Sound(a)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
    pygame.mixer.Sound.play(p)
    time.sleep(20)
    pygame.mixer.Sound.play(p)
    time.sleep(20)

while True:
    client.commandCallback = myCommandCallback
client.disconnect()
```

13.2. GitHub Link & demo Link

Git Hub: https://github.com/IBM-EPBL/IBM-Project-17183-1659630098
Demo Link: https://drive.google.com/file/d/1a27ixFapTklgvbLxf-ivnIPfo3hBbry8/view?usp=sharing