PERSONAL ASSISTANCE FOR SENIORS WHO ARE SELF-RELIANT

NAALAIYA THIRAN PROJECT BASED LEARNING ON PROFESSIONAL

READINESS FOR INNOVATION, EMPLOYABILITY

AND

ENTREPRENEURSHIP

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report "PERSONAL ASSISTANT FOR SENIORS WHO ARE SELF-RELIANT" is the bonafide work of "JAYARAHUL V (611819104018), KAVIN T S (611819104022), GANGADHARAN M (611819104015) and SRINIVASAN C (611819104047)" who carried out the project work under my supervision.

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INTERNAL EXAMINAR   **EXTERNAL EXAMINAR**

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CHAPTER 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.

- Python , IBM Cloud, Text to Speech, Node-Red ,IBM IoT Platform & the system holds Ram 4GB Are the Required specifications to develop the application.

- This device act as a Personal Assistant, Friend, Nurse, Caretaker who will remind and care for us at all the time, Where time & Item to be reminded is Fixed By us.

1.2 PURPOSE

- Medication reminders serve as a good way to stay on track and uphold an appropriate schedule.

- It is a strategy for engaging with patients and caregivers to create a complete and accurate medication list .

- It is designed to assist the patient who forgets to take medicine,patients will no longer have to worry about daily medication.

- The application will remaind when it's time to take medicine.

- The mobile application is used for keeping the record in medicine details and reminding the schedule of medicine.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEM

- Elderly people let slip the medications at the correct time and the existing solutions for this problem is setting reminders or using pill boxes, calendars, Personal Assistance.

- Though the solutions give reminders, the voice commands or assistance given by this system is more efficient.

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2.3 PROBLEM STATEMENT DEFINITION

- The study proposed, Unobtrusive Biosensors, Intelligent Medical Boxes, and a Cloud Computing Architectural Framework. Amongst other technologies and advancement that would pitch the HealthCare Industry to unparalleled heights in terms of efficiency and Patient Comfort.

- The paper proposes to revolutionize the industry by real time exchange of data to seamlessly and proactively offer prediction, diagnosis and remedies.

- The framework this paper proposes is aptly called the Internet of Medical Things (IoMT) which opens a whole new avenue for the Patient-HealthCare provider Interface (PHI) and Wearable Health Technology (WHT)

- A comprehensive survey of IoT- and IoMT based edge-intelligent smart health care, mainly focusing on journal articles published between 2014 and 2020.The systematic review process PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to identify studies and narrow down results for this review.

- The proposed medicine box helps the patient to take the right medicine at the right time along with an email which will help the patient to take the medicine. Server for storing medication time and other information, mail transferring protocol, temperature sensor for proper monitoring of patient body temperature has been integrated in this project.

- The researchers had developed a complete model of monitoring patients at regular intervals through an interconnected network among the doctors, nurses and patients with a view to minimizing the workload of the doctors and nurses, reducing the chances of medical professionals being infected by COVID-19 type of contagious disease and increasing the overall efficiency of patient monitoring in hospitals.

Advantages:

- Keep track of their medication.
- Consumption patterns, receive reminders to.
- Consume their medications.
- Pill restock alert will alert close contacts

CHAPTER 3

IDEATION AND PROPOSED SOLUTI0N

3.1 EMPATHY MAP CANVAS

- An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

- It is a useful tool to helps teams better understand their users.

- Creating an effective solution requires understanding the true problem and the person who is experiencing it.

- The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.
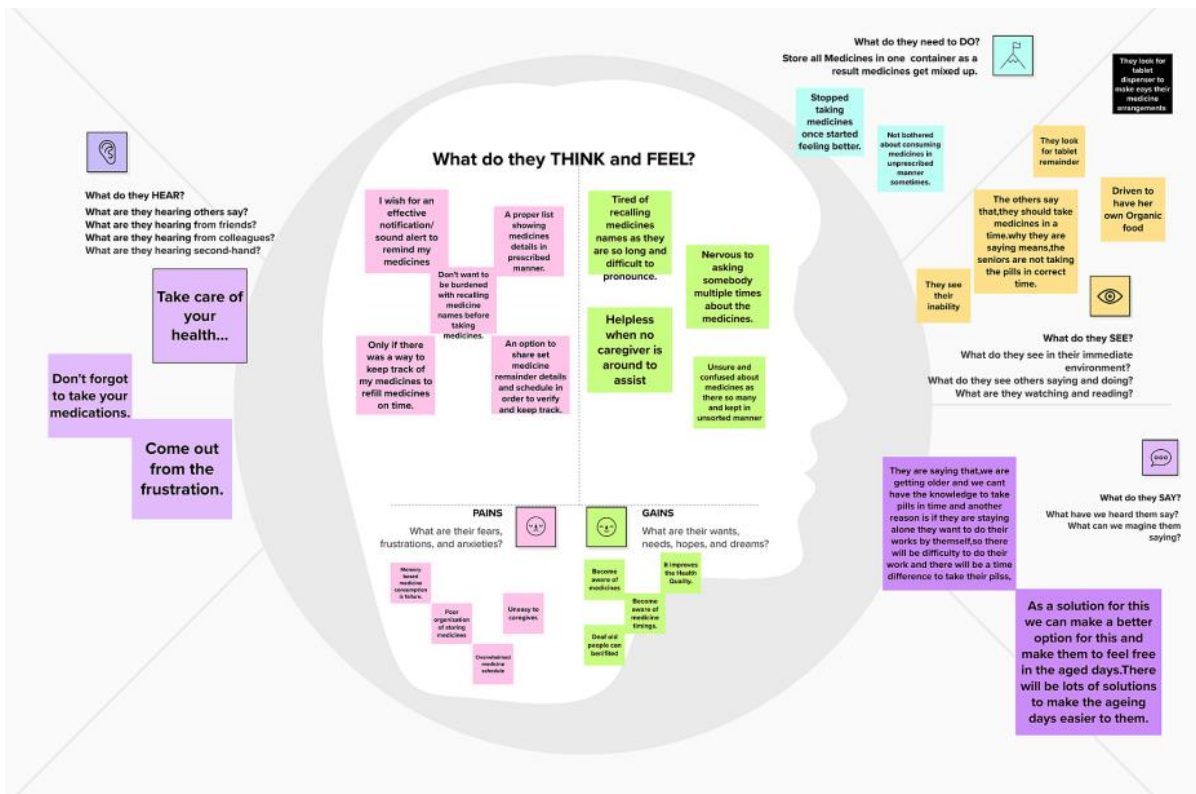
3.2 Ideation & Brainstorming

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

STATEMENT:

1. The study proposed, Unobtrusive Biosensors, Intelligent Medical Boxes, and a Cloud Computing Architectural Framework. Amongst other technologies and advancement that would pitch the HealthCare Industry to unparalleled heights in terms of efficiency and Patient Comfort.

2. The paper proposes to revolutionize the industry by real time exchange of data to seamlessly and proactively offer prediction, diagnosis and remedies.

3. The framework this paper proposes is aptly called the Internet of Medical Things (IoMT) which opens a whole new avenue for the Patient-HealthCare provider Interface (PHI) and Wearable Health Technology (WHT)

4. A comprehensive survey of IoT- and IoMT based edge-intelligent smart health care, mainly focusing on journal articles published between 2014 and 2020.The systematic review process PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to identify studies and narrow down results for this review.

Step-2: Brainstorm, Idea Listing and Grouping:

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

🕐 **10 minutes**

Kavin.T S

Smart Wrist Watch	Mobile application for alarm	Tablet Dispenser
Smart Assistance	Web Application with smart Assistance	Neckwear remainder

Jayarahul.V

Health monitoring	Meditation Assistance	Voice Assistant to remaind the tablet
Blood presure monitor	spo2 monitor	

Gangadharn.M

Vibration band for deaf and old	Speech monitor	video monitoring
Gps tracker for amnesia suffered old people		

Srinivasan.c

Pulse Checker	Temperature Checker	Color difference in tablet dispenser
Smart medicine bag for blind people		
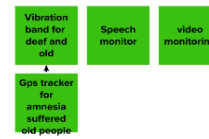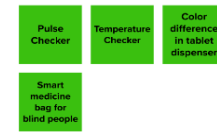
3

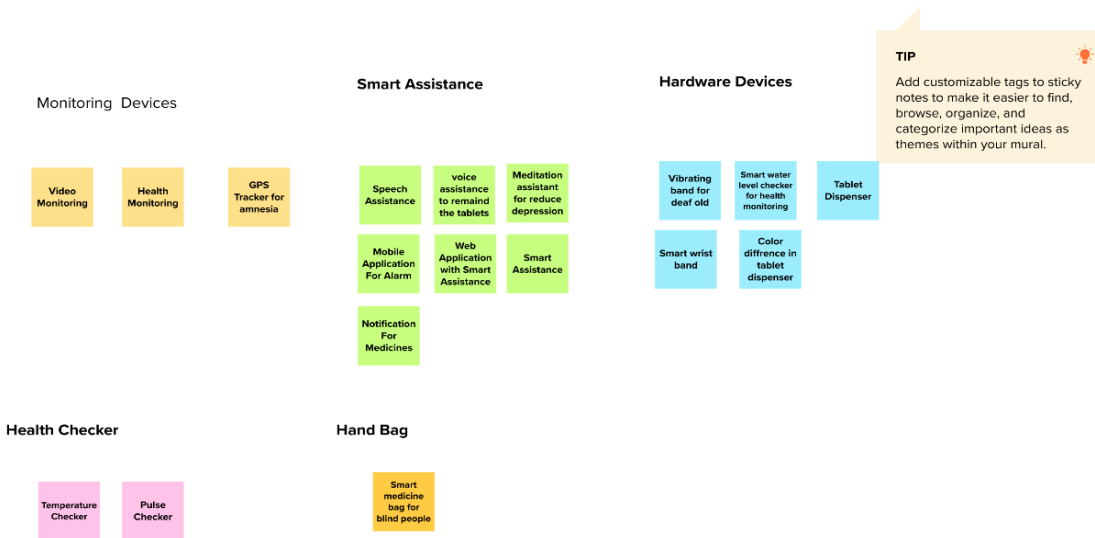## Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.
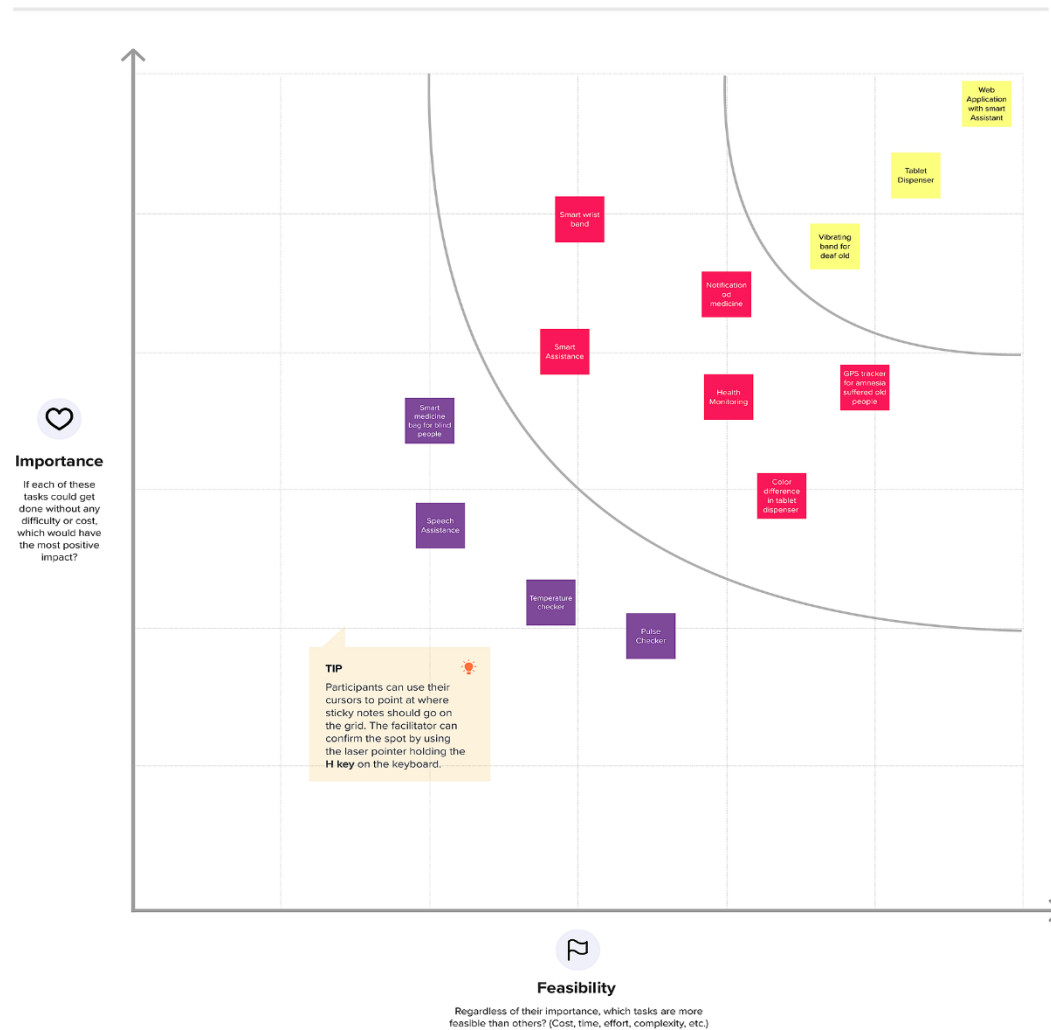
🕐 **20 minutes**

Monitoring Devices

Smart Assistance

Hardware Devices

Video Monitoring	Health Monitoring	GPS Tracker for amnesia

Speech Assistance	voice assistance to remaind the tablets	Meditation assistant for reduce depression
Mobile Application For Alarm	Web Application with Smart Assistance	Smart Assistance
Notification For Medicines		

Vibrating band for deaf old	Smart water level checker for health monitoring	Tablet Dispenser
Smart wrist band	Color diffrence in tablet dispenser	

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Health Checker

Hand Bag

Temperature Checker	Pulse Checker

Smart medicine bag for blind people

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?

Ideas placed on grid:
- Web Application with smart Assistant
- Tablet Dispenser
- Smart wrist band
- Vibrating band for deaf old
- Notification od medicine
- Smart Assistance
- Health Monitoring
- GPS tracker for amnesia suffered old people
- Smart medicine bag for blind people
- Color difference in tablet dispenser
- Speech Assistance
- Temperature checker
- Pulse Checker

TIP 💡

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

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)	Old people who are need pill remainder and self-assistance because they don't want to skip their medicines
2.	Idea / Solution description	Create a basic, easy-to-use app so that users don't forget their medicine schedules, can easily discover pharmacies and clinics near them, and can be directed through the app by their loved One's if necessary.
3.	Novelty / Uniqueness	Deaf people can easily remind the tablet time with the vibration in the smart watch
4.	Social Impact / Customer Satisfaction	I constructed these proto-personas, or names, based on the research findings from the user interview. All design decisions may be Assessed and re-evaluated using these personas, keeping the user and their perspective in mind. Customers are satisfied when they intake their medications on time and they feel healthy
5.	Business Model (Revenue Model)	Through our web application the revenue can be made in the form of pop-up advertisements, overlay ads from third party services.
6.	Scalability of the Solution	As the model is integrated with cloud software, we can update the user experience without reinstalling a model and the persona can keep a Reminder up to year.

3.4 Problem Solution fit

Project Title: Personal Assistance for seniors who are self-Reliant　　　**Project Design Phase-I - Solution Fit**　　　**Team ID: PNT2022TMID40888**

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS Who is your customer? i.e. working parents of 0-5 y.o. kids Customer is a Old man or women who is suffering from helath issues who doesn't have a personal care taker to give prescribed medicine on time.	6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. The customer is unaware of the prescription due to lack of knowledge to read a particular prescription.He/She is forgetting to take medicine on time before and after food because no care taker to remind.	5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking If the medicine time arrives the web application will send the name to the IoT device. The device will receive the medicine name and notify the voice commands.	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC	2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. Forgot to take medicine.The person will be notified to take medicine in a right time using alert messages.It helps the user to do their daily routoine without seeking from other people.	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. The seniors don't have care taker to guide them to take medicine according to the prescription because care taker lead their own life with their busy shedules so there is need of additional source.	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace) The seniors directly seek for help to allot a person or any other devices which is based on reminding the seniors about the medicines which should be taken and monitor around the clock.	Focus on J&P, tap into BE, understand RC
Identify strong TR & EM	3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. People simply forget,skip or stop taking their medicines, which leads to non adherence.Trigger helps people to integrate healthy behavior using technology in a simple way in a simple way. 4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design. Despite effective treatments, depression may often unrecognize and untreated.Feeling taking correct medicinesat correct times.After the usage of app they feel healthy.	10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. An app is build for the user which enables him/her to set the desired time and medicine name to the IoT device.The device will receive the medicine name and notify the user with voice commands.	8.CHANNELS of BEHAVIOUR CH **8.1 ONLINE** What kind of actions do customers take online? Extract online channels from #7 **8.2 OFFLINE** What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. Upload details about medicine and get alert messages oncorrect time. Setting alarm at the correct time.	Identify strong TR & EM

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR No:	Functional Requirement(Epic):	Sub Requirement (Story / Sub-Task):
FR-1	User Registration	Registration has been done through the form in ourApplication.
FR-2	User Confirmation	Confirmation has been done within our Application.
FR-3	Data Management	All the data's are stored in the cloud and retrievedwhen it is needed.
FR-4	Internet Connectivity	Users should have a stable internet connection toaccess the Application.
FR-5	User Input Management	All the user's data are gotten with the help of a textfield in the dashboard in the app.
FR-6	Acknowledgement	All the data are stored in the cloud via the app andacknowledgment will be given to the user.

4.2 Non-Functional Requirements:

Following are the non-functional requirements of the proposed solution.

NFR NO:	Non-Functional Requirements	Description
NFR-1	Usability	Smart medicine box usability is the characteristics of the user that facilitate.Use, to make it easier for the user to perceive the information presented by the user interface, to understand and decide based on that information
NFR-2	Security	Smart medicine box, like other computer systems, can be vulnerable tosecurity breaches, potentially, impacting the safety and effectiveness of the device.
NFR-3	Reliability	The probability of medicine box will perform a required function without failure under stated conditions for a specific period.
NFR-4	Performance	Medical device testing is the process ofdemonstrating that the device will reliably and safely perform in use.
NFR-5	Availability	Medicine box is availability over all the conditions of weather and atmospherepressure and be carried out with us.
NFR-6	Scalability	In feature we can upgrade the smart medicine box to the health care assistant to monitor our health care and book appointments to doctors.

CHAPTER 5

PROJECT DESIGN

5.1 Data Flow Diagrams
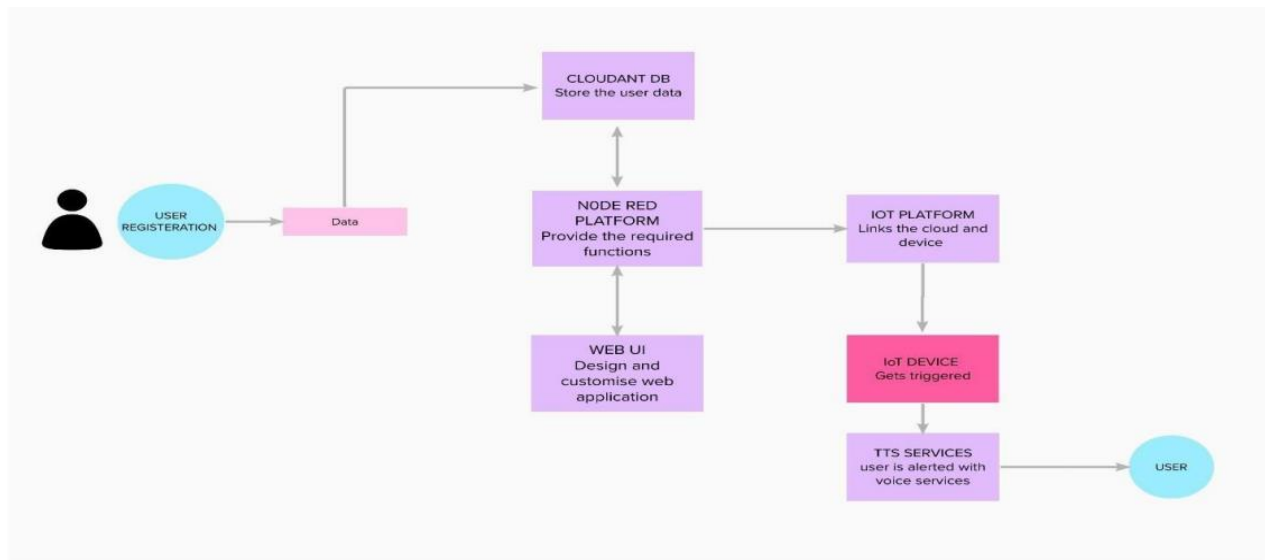
5.2 Solution & Technical Architecture

HARDWARE

Medicine Box

Bluetooth

Push Button

Driver Circuit

Arduino

LCD Display

BUZZER

LED

Sensor

Every 5 minutes, action will be taken on the medicinal box though sensors. Bluetooth module of medicine box connected to mobile phone and recorded input will be sent to the controller
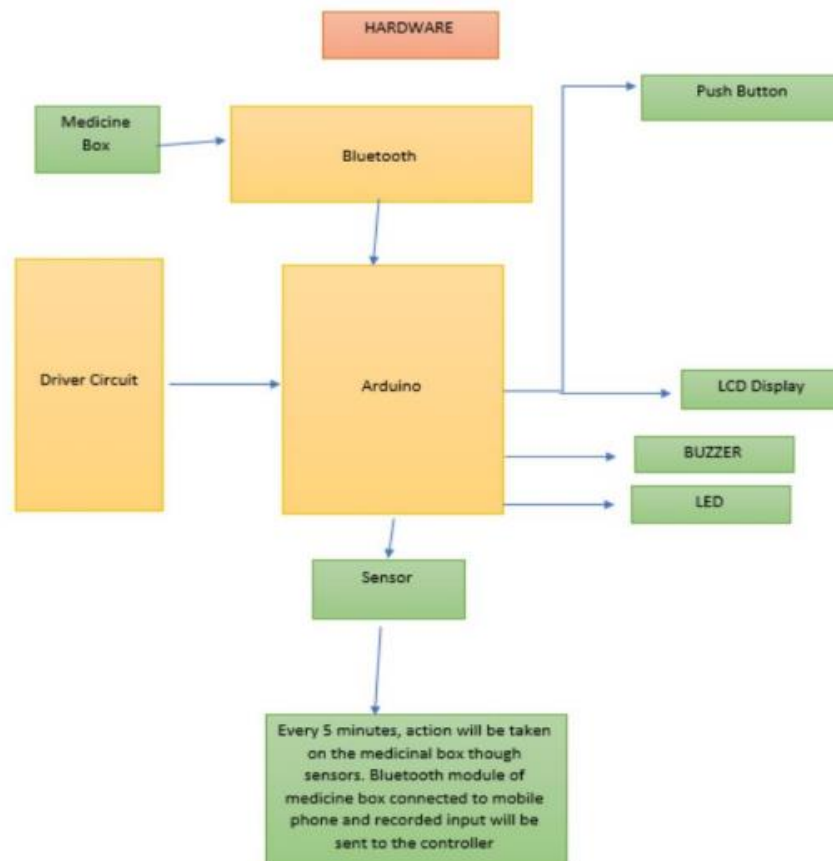
5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
Customer (Senior user)	Caretaker	USN-1	As a user, I want to take Medicines on time and monitormy health.	I want to take medicines on time	High	Sprint-1
Customer (Diabetes Patient)	Smart medicine box	USN-2	As a user, I want to take my tablets on time by voice command.	I want to take my tablets on time by voice command	High	Sprint-1
Customer (Thyroid Patient)	Smart medicine box	USN-3	As a user, my patient needs to take medicines on time and monitoring the activity.	My patient needs to take medicines on time	Medium	Sprint-2
Customer (Coma Patient)	Caretaker	USN-4	As a user, my patient needs medication time and prescription should load in database for upcoming week.	My patient medication time and prescription should be in database list	low	Sprint-4
Customer (Disabled People's)	Smart medicine box	USN-5	As a user, I need to take my medicine in nearby places with light notification.	I need to take my medicine in nearby places with light notification	Medium	Sprint-3

CHAPTER 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	Buzzer(Set Alarm)	USN-1	As a user, I can set an alarm to alerting a medicine through medicine remainder system.	10	High	Srinivasan.C
Sprint-1	Form	USN-2	As a user, I can Activate and Deactivate the Alarm	10	High	Srinivasan.C
Sprint-2	Cloudant	USN-3	As a user once I can the set the alarm then I gets the notification.	1	Low	Kavin.T.S Jayarahul.V Gangadharan.M
Sprint-2	Task	USN-4	Create All the Required Specifications(Node Red,IoT Device, Cloud,etc,.)	19	High	Kavin.T.S Jayarahul.V Gangadharan.M
Sprint-3	Task	USN-5	Connecting the Node red, cloud,IoT Device,Web UI, IoT Watson,TTS Service.	18	High	Kavin.T.S Jayarahul.V Gangadharan.M
Sprint-3	Cloud	USN-6	As a user, I can store the name of the medicine with its description.	2	Medium	Kavin.T.S Jayarahul.V Gangadharan.M
Sprint-4	Device	USN-7	As a user, they can also help large hospitals and clinics manage their inventory more Effectively.	10	Low	Kavin.T.S Jayarahul.V Gangadharan.M

Sprint-4	Device,Cloud	USN-8	As a user ,they used for keeping the record in medicine details the reminding the schedule of medicine. We have used the IoT enabled Arduino device for monitoring the System.	10	High	Kavin.T.S Jayarahul.V Gangadharan.M

6.2 Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned EndDate)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	3 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	6 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	13 Oct 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	20 oct 2022

6.3 Reports from JIRA

CHAPTER 7

CODING & SOLUTIONING

7.1 Feature 1

Node-Red

It is built on Node. js, which is a none-blocking, lightweight I/O model, making it lightweight and efficient. Flows created in Node-RED are stored using JSON, and can imported and exported and shared with ease

Json code:

[{"id":"25e80d5f7eabd726","type":"tab","label":"Flow 6","disabled":false,"info":"","env":[]},{"id":"5f4d0ada73cc55c1","type":"inject","z":"25e80d5f7eabd726","name":" "," props":[{"p":"payload._id","v":"","vt":"date"},{"p":"topic","vt":"str"}],"repeat":"1","crontab" :"","once":false,"on ceDelay":0.1,"topic":"","x":110,"y":60,"wires":[["9c8adefc6d1779c4"]]},{"id":"9c8adefc6d177 9c4","type":"functio n","z":"25e80d5f7eabd726","name":"","func":"var d= new Date();\nvar utc=d.getTime() + (d.getTimezoneOffset() * 60000);\nvar offset=5.5;\nnewDate = new Date(utc + (3600000*offset));\nvar n=newDate.toISOString()\nvar date = n.slice(0,10)\nvar time = n.slice(11,16)\nglobal.set('time',time)\nmsg.payload=date+\" \"+time\nreturn msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":180,"y":200,"wires":[["8f7d 76639d5f94dd"]]},{ "id":"8f7d76639d5f94dd","type":"cloudant in","z":"25e80d5f7eabd726","name":"","cloudant":"f42e6b50.00d088","database":"medicinedat a","service":"nodered-fysyl-2022--cloudant-1667109493143- 42012","search":"_id_","design":"","index":"","x":330,"y":60,"wires":[["2fb55de161698808"]]} ,{"id":"2fb55de161 698808","type":"switch","z":"25e80d5f7eabd726","name":"","property":"payload","propertyTy pe":"msg","rules":[{ "t":"null"},{"t":"else"}],"checkall":"true","repair":false,"outputs":2,"x":410,"y":180,"wires":[["f 95865b1d9e1b711"] ,["551edaf7fb9ec70d"]]},{"id":"551edaf7fb9ec70d","type":"function","z":"25e80d5f7eabd726", "name":"","func":" msg.payload={\"medicine\":msg.payload.medicine}\nglobal.set(\"medicine\",msg.payload.medi cine);\nreturn msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":620,"y":180,"wires":[["1e02 d85ab74e642c","10 2f967d15928f52"]]},{"id":"1e02d85ab74e642c","type":"debug","z":"25e80d5f7eabd726","nam e":"","active":true,"t

osidebar":true,"console":false,"tostatus":false,"complete":"payload","targetType":"msg","status Val":"","statusType":
"auto","x":930,"y":160,"wires":[]},{"id":"102f967d15928f52","type":"ibmiot out","z":"25e80d5f7eabd726","authentication":"apiKey","apiKey":"25ef956a02333189","output Type":"cmd","devic eId":"b11m3edeviceid","deviceType":"b11m3edevicetype","eventCommandType":"command", "format":"String","d ata":"medicinedata","qos":0,"name":"IBM IoT","service":"registered","x":940,"y":220,"wires":[]},{"id":"6da02a687e43c04b","type":"func tion","z":"25e80d5f 7eabd726","name":"Funtion to store the data in Cloudant","func":"var d=msg.payload.date\nvar t=msg.payload.time\nmsg.payload={\n \"medicine\": msg.payload.medicine,\n \"_id\":\"d+\" \"+t\n}\nreturn msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":250,"y":340,"wires":[["7b0e 41295a320ce5","d7 1162549c2fa8a3","75bc24f14acaa667"]]},{"id":"7b0e41295a320ce5","type":"cloudant out","z":"25e80d5f7eabd726","name":"","cloudant":"f42e6b50.00d088","database":"medicineda ta","service":"nodered-fysyl-2022--cloudant-1667109493143- 42012","payonly":true,"operation":"insert","x":550,"y":280,"wires":[]},{"id":"d71162549c2fa8a 3","type":"function" ,"z":"25e80d5f7eabd726","name":"Function to clear the data","func":"msg.payload={\n \"date\":\"\",\n \"medicine\":\"\",\n \"time\":\"\"\n}\nreturn msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":690,"y":340,"wires":[["a7ad ca4476f505c9"]]},{ "id":"a7adca4476f505c9","type":"delay","z":"25e80d5f7eabd726","name":"","pauseType":"dela y","timeout":"14","t imeoutUnits":"seconds","rate":"1","nbRateUnits":"1","rateUnits":"second","randomFirst":"1","r andomLast":"5","ra ndomUnits":"seconds","drop":false,"allowrate":false,"outputs":1,"x":180,"y":460,"wires":[["66b 58e943da6e910"]]} ,{"id":"75bc24f14acaa667","type":"debug","z":"25e80d5f7eabd726","name":"","active":true,"to sidebar":true,"conso le":false,"tostatus":false,"complete":"payload","targetType":"msg","statusVal":"","statusType":" auto","x":690,"y":42 0,"wires":[]},{"id":"66b58e943da6e910","type":"ui_form","z":"25e80d5f7eabd726","name":""," label":"","group":"b 82da486.9fc8d8","order":0,"width":0,"height":0,"options":[{"label":"Medicine","value":"medici ne","type":"text","r equired":true,"rows":null},{"label":"Date","value":"date","type":"date","required":true,"rows":n ull},{"label":"Time" ,"value":"time","type":"time","required":true,"rows":null}],"formValue":{"medicine":"","date": "","time":""},"paylo ad":"","submit":"submit","cancel":"cancel","topic":"topic","topicType":"msg","splitLayout":"","" className":"","x": 430,"y":460,"wires":[["75bc24f14acaa667","6da02a687e43c04b"]]},{"id":"fdad2ad33b84f566", "type":"http

in","z":"25e80d5f7eabd726","name":"","url":"/medicineData","method":"get","upload":false,"swaggerDoc":"","x":1

50,"y":580,"wires":[["ae52acd6228730ed"]]},{"id":"2a94d9f317579855","type":"http
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acd6228730ed","type":"function","z":"25e80d5f7eabd726","name":"","func":"msg.payload={\"medicine\":global.ge t(\"medicine\")}\nreturn

msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":420,"y":560,"wires":[["2a94 d9f317579855"]]},{ "id":"767bf6397ee88881","type":"http

in","z":"25e80d5f7eabd726","name":"Store Medicine

Datas","url":"/storeMedicine","method":"get","upload":true,"swaggerDoc":"","x":140,"y":640,"wires":[["cff980ca5

7cbe343"]]},{"id":"cff980ca57cbe343","type":"function","z":"25e80d5f7eabd726","name":"","func":"var d=msg.payload.date\nvar t=msg.payload.time\n\nmsg.payload={\n \"medicine\": msg.payload.medicine,\n \"_id\":\"d+\" \"+t\n}\nreturn

msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":360,"y":640,"wires":[["c34f 9152122dc6a2","74

4d1a5ddabcfb2e","8de2752e48b09bfb"]]},{"id":"c34f9152122dc6a2","type":"http
response","z":"25e80d5f7eabd726","name":"","statusCode":"","headers":{},"x":710,"y":640,"wires":[]},{"id":"744d 1a5ddabcfb2e","type":"cloudant

out","z":"25e80d5f7eabd726","name":"","cloudant":"f42e6b50.00d088","database":"medicineda ta","service":"nodered-fysyl-2022--cloudant-1667109493143-

42012","payonly":true,"operation":"insert","x":630,"y":720,"wires":[]},{"id":"8de2752e48b09bf b","type":"debug","

z":"25e80d5f7eabd726","name":"","active":true,"tosidebar":true,"console":false,"tostatus":false, "complete":"false","

statusVal":"","statusType":"auto","x":550,"y":820,"wires":[]},{"id":"f95865b1d9e1b711","type" :"function","z":"25e

80d5f7eabd726","name":"","func":"msg.payload={}\nglobal.set(\"medicine\",msg.payload);\nre turn

msg;","outputs":1,"noerr":0,"initialize":"","finalize":"","libs":[],"x":620,"y":80,"wires":[[]]},{"i d":"f42e6b50.00d08 8","type":"cloudant","host":"e9dbfd87-aa0d-4b2f-86ac-d38f62c6ee14-
bluemix.cloudantnosqldb.appdomain.cloud","name":"My Cloudant

account"},{"id":"25ef956a02333189","type":"ibmiot","name":"api","keepalive":"60","serverNa me":"64yf7x.messag

ing.internetofthings.ibmcloud.com","cleansession":true,"appId":"","shared":false},{"id":"b82da 486.9fc8d8","type":"

ui_group","name":"Form","tab":"d439f3bef0e4b698","order":1,"disp":true,"width":"6","collaps e":false,"className"

":""},{"id":"d439f3bef0e4b698","type":"ui_tab","name":"Main","icon":"dashboard","disabled":f alse,"hidden":false}]

7.2 Feature 2

MIT App inventor:

MIT App Inventor is an online platform designed to teach computational thinking concepts through development of mobile applications. Students create applications by dragging and dropping components into a design view and using a visual blocks language to program application behavior.

7.3 Database Schema

CHAPTER 8

TESTING

8.1 Test cases

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status
SplashScreen_TC_OO1	Functional	Home Page	Verify the splash screen is working good	Online Simulator	1.Enter URL and click go 2.The splash screen will open 3.click the image in splash screen	Splash Screen should function.	Splash screen should display	Working as expected	Pass
HomePage_TC_OO2	UI	Home Page	Verify the UI elements in Home screen	UI	1.Enter URL and click go 2.Enter the medicine details to store data: a.Enter the medicine name b.Enter the Date c.Enter the Time 3. click next button to move to the next page	Web UI elements are functioning	Application should show below UI elements: a.Name of Medicine text box b.Date text box c.Time text box d.Next button	Working as expected	pass
RemainderPage_TC_OO3	Functional	Home page	Verify user is able to get the remainder alarm with medicine name displayed	Node-red	1.Enter URL and click go 2. automatically diplay the medicine data in the text box 3.The alarm should ring at the user entered time	It' Time to Take Medicine Glipizide	Get the remainder alarm	Working as expected	pass

RemainderPage_TC_OO4	Functional	Login page	verify user is able the get the alarm at the correct time	Node-red	1.Enter URL and click go 2.Alarm remainder should display	It' Time to Take Medicine	Application should Remaind at correct time	Working as expected	pass
DB_TC_OO4	Functional	Login page	verify the data is stored in cloudant DB	Cloud	1.Enter URL and click go 2.go to cloudant DB 3.Verify the data	{ "id": 2022-11-18 21:23, "medicine": Paracetamol}	The Medicine data should stored in the DB	Working as expected	pass
Simulation_TC_OO5	Functional	Login page	Verify the simulation is Working Good	Node-red,MIT App Inventor, Cloud, Watson IoT.	1.Enter URL and click go 2.Run the simulation 3.The LED should Blink 4.The Alarm should ring	Take Medicine Paracetamol	The Alarm should come through buzzer and the LED also Blink then the Medicine name should display in the LED	Working as expected	pass

8.2 User Acceptance Testing

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the project-personal assistance for seniors who are self reliant at the time of the release to User Acceptance Testing(UAT).

2. Defect Analysis

This reportshows the numberof resolved or closed bugs at each severitylevel,and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37

3.Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	2	0	0	2
Client Application	2	0	0	2
Security	1	0	0	1

Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

CHAPTER 9

Results

Performance Metrics

	NFT - Risk Assessment							
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score	Justification
1	Personal Assistance	New	Low	Moderate	Moderate	Low	>10 to 30%	GREEN	As we had made this project in
	for Seniors Who Are								MERN stack With industry Mentor Aproval
	Self-Reliant								

NFT - Detailed Test Plan				
S.No	Project Overview	NFT Test approach	Assumptions/Dependencies/Risks	Approvals/SignOff
1	Medicine Reminder Web -UI	Stress	App Crash/ Developer team/ Site Down	Approved
2	Medicine Reminder Web -UI	Load	Server Crash/ Developer team/ Server Down	Approved

End Of Test Report							
S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
1	Medicine Reminder Web -UI	Stress	Performance	CPU -01	GO	High Performance Netlify Cloud server	Closed	Approved
2	Medicine Reminder Web -UI	Load	Scalability	DB Storage - 01	NO-GO	One MongoDB Instance for free	Closed	Approved

CHAPTER 10

ADVANTAGES & DISADVANTAGES

Advantages

Remote monitoring: Real-time remote monitoring via connected IoT devices and smart alerts can diagnose illnesses, treat diseases and save livesin case of a medical emergency.

Prevention: Smart sensors analyze health conditions, lifestyle choices andthe environment and recommend preventative measures, which will reducethe occurrence of diseases and acute states.

Reduction of healthcare costs: IoT reduces costly visits to doctors andhospital admissions and makes testing more affordable.

Medical data accessibility: Accessibility of electronic medical records allow patients to receive quality care and help healthcare providers make theright medical decisions and prevent complications.

Improved treatment management: IoT devices help track the administration of drugs and the response to the treatment and reduce medicalerror.

Improved healthcare management: Using IoT devices, healthcareauthorities can get valuable information about equipment and staff

Disadvantages:
Security and privacy: Security and privacy remain a major concern deterring users from using IoT technology for medical purposes, as health monitoring solution have the potential to be breached or hacked. The leak ofsensitive information about the patient's health and location and meddling with sensor data can have grave consequences, which would counter the benefits of IoT.

Risk of failure: Failure or bugs in the hardware or even power failure canimpact the performance of sensors and connected equipment placing healthcare operations at risk. In addition, skipping a scheduled software update may be even more hazardous than skipping a doctor checkup.

Integration: There's no consensus regarding IoT protocols and standards, sodevices produced by different manufacturers may not work well together. The lack of uniformity prevents full-scale integration of IoT, therefore limiting its potential effectiveness.

Cost: While IoT promises to reduce the cost of healthcare in the long-term,the cost of its implementation in hospitals and staff training is quite high.

CHAPTER 11

Conclusion

It is an advanced digital era, we can also opt for expert agencies without thinking much about the distance. For example, suppose we stay in the European region. Inthat case, we can look for a healthcare app development company in the USA or ahealthcare mobile app development firm in other states.

IoT is already practicing most of these technologies to assist healthcare in developing, and this development will proceed. Promptly than later, healthcare andthe Internet of Things will become intertwined, ultimately modifying how we approach our healthcare.

CHAPTER 12

Future scope

IoT has a lot of potentials and it's not only in healthcare. In future challenges of IoT in healthcare, many companies are working on new ways to solve the challenges with the help of this technology to help our medical world.

It can reach every patient from all over the world and connect doctors with patients. There is no denying that IoT has already made a huge impact and is onlyset to grow further.

It is a matter of time before the future use of IoT in healthcare medical industry will be run mostly by IoT technology and will be treating patients in less time andlow cost of treatment.

CHAPTER 13

Appendix

Source Code :

```c
#include <LiquidCrystal.h>
#include <stdio.h>
#define mSTATE_1 1
#define mSTATE_2 2
#define mSTATE_3 3
#define mSTATE_4 4
#define mSTATE_5 5
#define mSTATE_6 6
#define mSTATE_7 7
#define mSTATE_8 8
#define mSTATE_9 9
#define ALARM_SWITCH_PIN 2
#define BUZZER_PIN A3
typedef struct
{
bool ALARM_SWITCH;
bool RTC_ALARM;
unsigned long RTC_TIME;
unsigned long RTC_DATE;
char RTC_TIME_C[20];
char RTC_DATE_C[20];
}STATE_VAR;
typedef struct
{
bool alarm_enable;
bool alarm_flag;
int alarm_min;
int alarm_hour;
int tick;
int mls;
int sec;
int min;
int hour;
int month;
int day;
int year;
}RTC_DATA;
void get_input();
void fsm1(STATE_VAR *FSM_VAR);
```

```
void printLCDMesgFromStart(LiquidCrystal *lcd, const char* Message, unsigned int row, bool
lcdclear);
void Buzzer(bool ON, int Buzzer_PIN);
float readTemperature(int TempSensor_PIN);
void RTC(RTC_DATA* rtc);
void RTC_Init(RTC_DATA* rtc, int tick);
void RTC_SetTime(RTC_DATA* rtc, int hour, int min, int sec);
void RTC_SetDate(RTC_DATA* rtc, int year, int month, int day);
void RTC_SetAlarm(RTC_DATA* rtc, int hour, int min);
void RTC_EnableAlarm(RTC_DATA* rtc);
void RTC_DisableAlarm(RTC_DATA* rtc);
bool RTC_GetAlarmStatus(RTC_DATA* rtc);
long RTC_GetTimeHHMMSS(RTC_DATA* rtc);
long RTC_GetDateYYYYMMDD(RTC_DATA* rtc);
long RTC_GetDateMMDD(RTC_DATA* rtc);
STATE_VAR FSM1_VAR;
RTC_DATA rtc;
LiquidCrystal lcd(A4, A5, 13, 12, 11, 10);
void setup()
{
Serial.begin(9600);
pinMode(ALARM_SWITCH_PIN, INPUT);
lcd.begin(16, 2);
lcd.setCursor(0, 0);
RTC_Init(&rtc, 100);
RTC_SetTime(&rtc, 11, 00, 0);
RTC_SetDate(&rtc, 2020, 7, 7);
RTC_SetAlarm(&rtc, 11, 36);
RTC_EnableAlarm(&rtc);
}
void get_input()
{
String Date;
String Time;
FSM1_VAR.ALARM_SWITCH = digitalRead(ALARM_SWITCH_PIN);
FSM1_VAR.RTC_ALARM = RTC_GetAlarmStatus(&rtc);
FSM1_VAR.RTC_TIME = RTC_GetTimeHHMMSS(&rtc);
FSM1_VAR.RTC_DATE = RTC_GetDateYYYYMMDD(&rtc);
if(FSM1_VAR.ALARM_SWITCH == 0)
FSM1_VAR.ALARM_SWITCH = true;
else
FSM1_VAR.ALARM_SWITCH = false;
if(rtc.min < 10 && rtc.sec < 10)
Time = String(rtc.hour) + ':' + '0' + String(rtc.min) + ':' + '0' + String(rtc.sec);
else if (rtc.min >= 10 && rtc.sec < 10)
Time = String(rtc.hour) + ':' + String(rtc.min) + ':' + '0' + String(rtc.sec);
```

```
else if(rtc.min < 10 && rtc.sec >= 10)
Time = String(rtc.hour) + ':' + '0' + String(rtc.min) + ':' + String(rtc.sec);
else
Time = String(rtc.hour) + ':' + String(rtc.min) + ':' + String(rtc.sec);
Date = String(rtc.day) + '/' + String(rtc.month) + '/' + String(rtc.year);
strcpy(FSM1_VAR.RTC_TIME_C, Time.c_str());
strcpy(FSM1_VAR.RTC_DATE_C, Date.c_str());
}
void loop()
{
RTC(&rtc);
get_input();
fsm1(&FSM1_VAR);
delay(100);
}
void fsm1(STATE_VAR *FSM_VAR)
{
static int MACHINE_STATE;
static bool BUZZER;
bool ALARM_SWITCH = FSM_VAR->ALARM_SWITCH;
bool RTC_ALARM = FSM_VAR->RTC_ALARM;
long RTC_TIME = (FSM_VAR->RTC_TIME / 100);
long RTC_DATE = FSM_VAR->RTC_DATE;
Serial.print("DATE (YYYYMMDD): ");
Serial.print(RTC_DATE);
Serial.print(" TIME (HHMM): ");
Serial.println(RTC_TIME);
switch(MACHINE_STATE)
{
case mSTATE_1:
Serial.println("mSTATE_1");
if(!RTC_ALARM){
printLCDMesgFromStart(&lcd, FSM_VAR->RTC_DATE_C, 1, false);
printLCDMesgFromStart(&lcd, FSM_VAR->RTC_TIME_C, 2, false);
MACHINE_STATE = mSTATE_1 ;
}
else if(RTC_ALARM){
printLCDMesgFromStart(&lcd, "WARNING", 1, true);
printLCDMesgFromStart(&lcd, "ALARM!!", 2, false); BUZZER = true; MACHINE_STATE =
mSTATE_2;
}
else
{}
break;
case mSTATE_2:
Serial. println("mSTATE_2");
```

```
if(!ALARM_SWITCH){
MACHINE_STATE = mSTATE_2;
}
else if(ALARM_SWITCH){
RTC_DisableAlarm(&rtc); BUZZER = false; printLCDMesgFromStart(&lcd, FSM_VAR-
>RTC_DATE_C, 1, true);
printLCDMesgFromStart(&lcd, FSM_VAR->RTC_TIME_C, 2, false); MACHINE_STATE =
mSTATE_1;
}
else
{}
break;
default:
BUZZER = false;
MACHINE_STATE = mSTATE_1;
}
Buzzer(BUZZER, BUZZER_PIN);
}
void printLCDMesgFromStart(LiquidCrystal *lcd, const char* Message, unsigned int row, bool
lcdclear)
{
if(lcdclear)
{
lcd->clear();
}
switch(row)
{
case 1:
lcd->setCursor(0, 0);
break;
case 2:
lcd->setCursor(0, 1);
break;
default:
lcd->setCursor(0, 0);
}
if(Message != NULL)
{
lcd->print(Message);
}
}
void Buzzer(bool ON, int Buzzer_PIN)
{
static bool ON_STATE;
if (ON_STATE == false && ON == true)
{
```

```
ON_STATE = true;
tone(Buzzer_PIN, 2000);
}
else if (ON == false)
{
ON_STATE = false;
noTone(Buzzer_PIN);
}
else
{}
}
float readTemperature(int TempSensor_PIN)
{
float Temperature;
Temperature = (float) analogRead(TempSensor_PIN);
Temperature = (Temperature * 5.0) / 1024.0;
Temperature = Temperature - 0.5;
Temperature = Temperature * 100;
return Temperature;
}
void RTC(RTC_DATA* rtc)
{
static bool ALARM;
rtc->mls = rtc->mls + rtc->tick;
if(rtc->mls == 1000)
{
rtc->mls = 0;
rtc->sec++;
}
if(rtc->sec >= 60)
{
rtc->sec = 0;
rtc->min++;
}
if(rtc->min >= 60)
{
rtc->sec = 0;
rtc->min = 0;
rtc->hour++;
}
if(rtc->min < 0)
{
rtc->sec = 0;
rtc->min = 59;
rtc->hour--;
}
```

```
if(rtc->hour >= 24)
{
rtc->sec = 0;
rtc->min = 0;
rtc->hour = 0;
rtc->day++;
}
if(rtc->month != 2 && (rtc->month % 2) == 1)
{
if(rtc->day == 32)
{
rtc->day = 1;
rtc->month++;
}
if(rtc->day < 1)
{
rtc->day = 30;
rtc->month--;
}
}
if(rtc->month != 2 && (rtc->month % 2) == 0)
{
if(rtc->day == 31)
{rtc->day = 1;
rtc->month++;
}
if(rtc->day < 1)
{
rtc->day = 31;
rtc->month--;
}
}
if(rtc->month == 2)
{
if(rtc->day == 29)
{
rtc->day = 1;
rtc->month++;
}
}
if(rtc->month == 3)
{
if(rtc->day < 1)
{
rtc->day = 28;
rtc->month--;
```

```c
}
}
if(rtc->hour < 0)
{
rtc->hour = 23;
}
if(rtc->month > 12)
{
rtc->month = 1;
rtc->day = 1;
rtc->year++;
}
if(rtc->alarm_enable == 1 && rtc->alarm_flag == 0)
{
if(rtc->min == rtc->alarm_min && rtc->hour == rtc->alarm_hour)
{
rtc->alarm_flag = 1;
}
}
}
void RTC_Init(RTC_DATA* rtc, int tick)
{
rtc->tick = tick;
rtc->alarm_flag = 0;
rtc->alarm_enable = 0;
}
void RTC_SetTime(RTC_DATA* rtc, int hour, int min, int sec)
{
rtc->sec = sec;
rtc->min = min;
rtc->hour = hour;
}
void RTC_SetDate(RTC_DATA* rtc, int year, int month, int day)
{
rtc->day = day;
rtc->month = month;
rtc->year = year;
}
void RTC_SetAlarm(RTC_DATA* rtc, int hour, int min)
{
rtc->alarm_min = min;
rtc->alarm_hour = hour;
}
void RTC_EnableAlarm(RTC_DATA* rtc)
{
rtc->alarm_enable = 1;
```

```
rtc->alarm_flag = 0;
}
void RTC_DisableAlarm(RTC_DATA* rtc)
{
rtc->alarm_enable = 0;
rtc->alarm_flag = 0;
}
long RTC_GetTimeHHMMSS(RTC_DATA* rtc)
{
long time;
time = ((long)(rtc->hour) * 10000) + ((long)(rtc->min) * 100) + (long)(rtc->sec);
return time;
}
bool RTC_GetAlarmStatus(RTC_DATA* rtc)
{
return rtc->alarm_flag;
}
long RTC_GetDateYYYYMMDD(RTC_DATA* rtc)
{
long date;
date = ((long)(rtc->year) * 10000) + ((long)(rtc->month) * 100) + (long)(rtc->day);
return date;
}
long RTC_GetDateMMDD(RTC_DATA* rtc)
{
long date;
date = ((long)(rtc->month) * 100) + (long)(rtc->day);
return date;
}
```

Using wokwi

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library
for MQtt#include
<LiquidCrystal_I2C.h>
#include "DHT.h"// Library for dht11
#define DHTPIN 15        // what pin we're
connected to #define DHTTYPE DHT11      //
define type of sensor DHT 11#define LED 2
DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and
typr ofdht connected
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
```

```
//-------credentials of IBM Accounts------

#define ORG "64yf7x"//IBM ORGANITION ID
#define DEVICE_TYPE "b11m3edevicetype"//Device type mentioned in
ibmwatson IOT Platform
#define DEVICE_ID "b11m3edeviceid"//Device ID mentioned in ibm
watson IOTPlatform
#define TOKEN "-&EMtr7l-v-
Gz2G))e"                                        //TokenString data3="";
int buzz= 13;

//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of
eventperform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd
REPRESENTcommand type AND COMMAND IS TEST OF FORMAT
STRING
char authMethod[] = "use-token-auth";// authentication
methodchar token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id
LiquidCrystal_I2C lcd(0x27,32,2);

//_____
WiFiClient wifiClient; // creating the instance for wifiClient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the
predefinedclient id by passing parameter like server id,portand
wificredential

void setup()// configureing the ESP32
{

  Serial.begin(115200); dht.begin(); pinMode(buzz, OUTPUT);pinMode(LED,OUTPUT);
  delay(10);
```

```
/*..................................retrieving to Cloud ...........................................*/

void PublishData(float temp, float humid) {
 mqttconnect();//function call for connecting to
 ibm

}
void mqttconnect() {
 if (!client.connected()) {
   Serial.print("Reconnecting client to
   ");Serial.println(server);
   while (!!!client.connect(clientId,
     authMethod, token)) {Serial.print(".");
     delay(500);
   }


   initMana
   gedDevi
   ce();
   Serial.pr
   intln();
 }
}
void wificonnect() //function defination for wificonnect
{
 Serial.println();
 Serial.print("Conn
 ecting to ");

 WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to
establish theconnection
 while (WiFi.status() != WL_CONNECTED) {
   delay(50
   0);
   Serial.pri
   nt(".");
 }
```

/*..............................retrieving to Cloud ....*/

```
  Serial.println("");
  Serial.println("Wi
  Fi connected");
  Serial.println("IP
  address: ");
  Serial.println(WiF
  i.localIP());
}


void initManagedDevice() {
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd
    OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}


void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{

  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);
  for (int i = 13; i < payloadLength-2; i++) {
    //Serial.print((ch
    ar)payload[i]);
    data3 +=
    (char)payload[i];
  }

  Serial.println("Medicine Name: "+
  data3);if(data3 != "")
  {
    lcd.init()
  }
```

```
  else
  {
digitalWrite(LED,LOW);

  }
data3="";
}
```

GitHub & Project Demo Link :

GitHub Link:
https://github.com/IBM-EPBL/IBM-Project-44087-1660721931

Project Demo Link :

https://drive.google.com/file/d/1Z0zAMFgCh1FJ3U_6Yd5qqMdSgf-HTv9N/view?usp=share_link

https://drive.google.com/file/d/1PqjCGqwmrj5t69rcEZJtX9d8nsc4u3Lc/view?usp=drivesdk