Project Report

Date	17 November, 2022
Team ID	PNT2022TMID21355
Project Name	Project - Personal Assistance For Seniors Who Are Self Reliant

Personal Assistance For Seniors Who Are Self Reliant

1. INTRODUCTION :

1.1 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.

1.2 PURPOSE :

The purpose of this IOT-based application is reminding the elders about their medication. Elders need not remember their medicine dosage timings as they can set a reminder on their dosage timings. The reminder can be set for multiple medicines and timings including date, time and medicine description. A notification will be sent to them through message or speech inside the system preferably chosen by the elders. The system focuses on easy navigation and good user interface.

2. LITERATURE SURVEY :

2.1 EXISTING SOLUTION :

ELA REMIND: A Medicine Box Reminder System for Elderly Living Alone (ELA) implementing the infrared Sensor, Internet of Things and Mobile Application [1] developing this ELA Remind which is a medicine box reminder system for Elderly Living Alone (ELA) by implementing the Infrared Sensor, Internet of Things and Mobile Application. By having this system, elderly will always be reminded on time to take their medicine every day without fail. In fact, it helps to check on their medication intake history to ensure that the elderly was taking the medicine as per schedule. At the same time, it helps reduce the wastage of medication as well.

Unobtrusive monitoring of computer interactions to detect cognitive status in elders [2] Researchers have demonstrated the importance of the early detection of cognitive decline. Users over the age of 75 are at risk for medically related cognitive problems and confusion, and early detection allows for more effective clinical intervention. In this paper, we present algorithms for inferring a user's cognitive performance using monitoring data from computer games and psychomotor measurements associated with keyboard entry and mouse movement.

2.2 REFERENCES :

[1] N. S. A. Zulkifli, L. Y. Hong, N. S. N. Ismail, M. Z. B. Osman and A. F. M. Raffei, "ELA REMIND: A Medicine Box Reminder System for Elderly Living Alone (ELA) implementing the infrared Sensor, Internet of Things and Mobile Application," *2022 4th International Conference on Smart Sensors and Application (ICSSA)*, 2022, pp. 144-149, doi: 10.1109/ICSSA54161.2022.9870941.

[2] H. Jimison, M. Pavel, J. McKanna and J. Pavel, "Unobtrusive monitoring of computer interactions to detect cognitive status in elders," in *IEEE Transactions on Information Technology in Biomedicine*, vol. 8, no. 3, pp. 248-252, Sept. 2004, doi: 10.1109/TITB.2004.835539.

2.3 PROBLEM STATEMENT DEFINITION :

Elders may often fail to comply with their medication whether it was from forgetting to take the medicine, from taking medicine at the wrong time or even from taking too much medicine. Therefore, there are many systems such as reminder, alarm, and so on to remind elders. We have focused on those patients who having difficulty to take medication on time, we tried to design and to aid elders with managing their medical prescriptions, through a reminder app they will use to look at and manage their medications. The medicine reminder system will facilitate users to require the right medication on time. This system provides a speech notification regarding the medicine to be taken at the right time.

3. IDEATION & PROPOSED SOLUTION :

3.1 EMPATHY MAP :

THINK AND FEEL	HEAR	SEE
❑ Forgetting things easily and its annoying at time. ❑ Loneliness ❑ Wish to get effective notification or sound alert to remind my medicines.	❑ Friends recommend them to hire a caregiver ❑ Would like to hear from doctor regarding my health condition to be good	❑ More new technology on market but don't know how to use them. ❑ Would like to see their house filled with their children's but we are alone seeing Loneliness.
		
SAY AND DO	PAIN	GAIN
❑ Dislike Products with new tech and claim that they are old fashioned ❑ Hardworking ❑ Forget to take medicine	❑ Health is not as good as before ❑ Worry about accidents ❑ Memory Loss	❑ Live independently and happy ❑ Easy tracking system to know medicine consumption details and restoring ❑ Remember tasks in daily life

3.2 IDEATION AND BRAINSTORMING :

Following ideas were discussed in brainstorming session

1. Fall detector and prevention
2. Personal Assistant like tablet reminder for Older Adults
3. Patient tracking
4. Smart home devices like automatic door
5. Smart lighting
6. Health monitor
7. Customized watch like band for old aged persons
8. Communication tools to prevent social isolation
9. Smart Pill Box
10. Smart Missing Thing's Tracker
11. Smart Stove
12. IOT Based Automatic Restock of Provision
13 .Customized Mobile App for services
14. Diet Planner
15. Smart Flooring to prevent sliping
16. Smart Schedule Television

3.3 PROPOSED SOLUTION :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Patients may often fail to comply with their medication whether it was from forgetting to take the medicine, from taking medicine at the wrong time. Maintaining daily medication become very difficult for old people.But it is not always possible for us to remind them of their medicine's dosages every time. For this purpose, there needs to be some facility for us which monitoring patient and take care
2.	Idea / Solution description	We introduce a smart medicine reminder system based on IoT. For our system, we implement a reminder system which provides notification regarding which medicine to be taken with voice commands when it is time for taking medicine.
3.	Novelty / Uniqueness	An app is built for the user which enables them to set the desired time and medicine . If the medicine time arrives the user will get notified by the app through iot device with voice commands
4.	Social Impact / Customer Satisfaction	Nowadays we are all used to living technology-based life. We can use this technology in a way that will be beneficial for us. So this web application will be user friendly and will have voice commands which will remind the user about the medicine to be taken hence the user can intake their medicines on time without forgetting it.
5.	Business Model (Revenue Model)	Reminding System app will be of low cost and best method for patients and old aged people to take their tablets correctly .Therefore, this system will gain great reaches in market business.
6.	Scalability of the Solution	The application is easily accessible and helps us to measure how well a patient can take their daily medication in real-time. This helps the

3.4 PROBLEM SOLUTION FIT

1. CUSTOMER SEGMENT(S) Who is your customer? Senior Citizens with age 60+	**6. CUSTOMER CONSTRAINTS** network connection, available devices.	**5. AVAILABLE SOLUTIONS** There are many medicine reminder apps already available like Medication reminder, My therapy
2. JOBS-TO-BE-DONE / PROBLEMS medicine reminder system which sends notification to the user at the time when they should take the medicine with the medicine name.	**9. PROBLEM ROOT CAUSE** Senior or old age people tend to forget to take their medicines on time and also they tend to forget the medicine names so this reminder system would be of great use to them.	**7. BEHAVIOUR** The users just have to install the reminder system app and set the time and medicine name to get their reminders.
3. TRIGGERS Using reminder systems helps the user to be in free state of mind because they need not keep thinking about it and at the same time the users can take their tablets correctly thereby not affecting their health. Relatives using this app or adds about this product can trigger the users.	**10. YOUR SOLUTION** We are going to develop a medicine reminder system to remind at the respective time the respective pill name.	**8. CHANNELS of BEHAVIOUR** Online: Sending the notification as e-mails or sms or as speech. Offline: Complaint letters or any hardware IOT Component issue
4. EMOTIONS: BEFORE / AFTER **How do customers feel when they face a problem or a job and afterwards?** BEFORE: Insecure, Worried, Tensed. AFTER: Confident, Relaxed , No tension , Improved Heath State		

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 through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	login through User Id and Password.
FR-4	IBM Cloudant DB	User details are stored in this
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 REQUIREMENT :

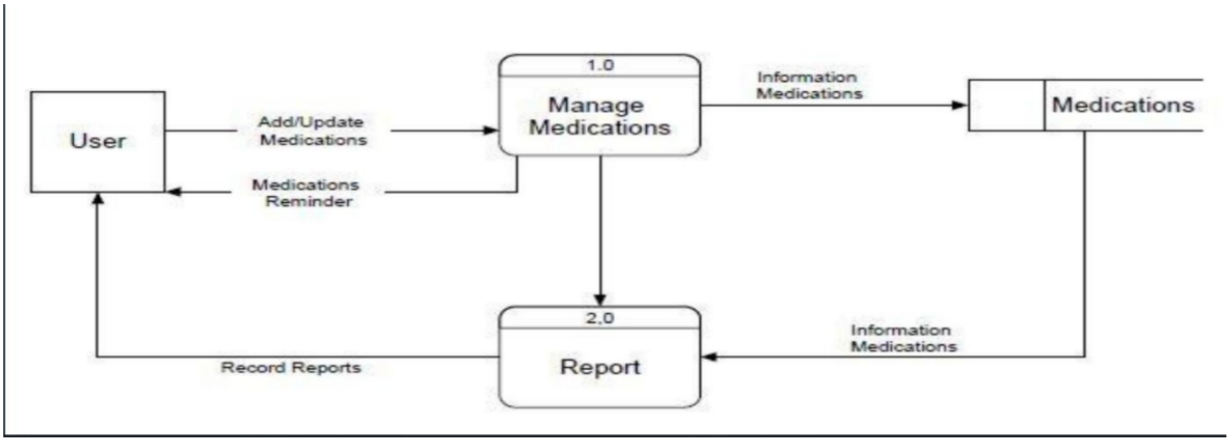
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It can track and monitor the medications. Reminds to take medicine ontime.
NFR-2	Security	The cloudant database is highly secured and it prevents data from hacking.
NFR-3	Reliability	The medication routine is properly assigned and will work without any failure .
NFR-4	Performance	This app sends a daily text message reminder to take the right medication at the right time. Works in real time if the person miss a medication immediately they will be notified thus makes it a useful app for senior citizens.
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 DATAFLOW DIAGRAMS :

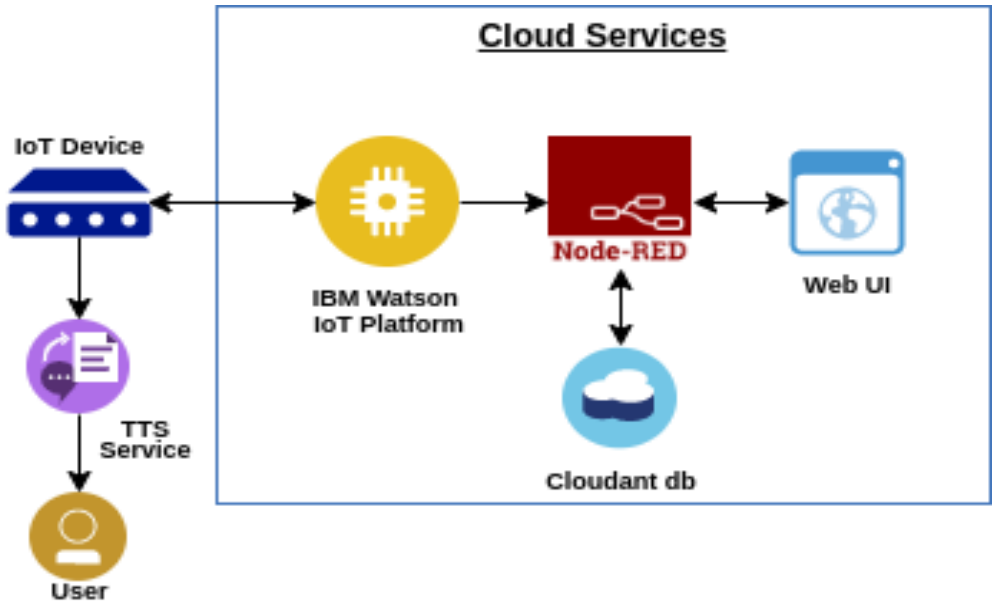
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFDcan depict therightamount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and wheredataisstored.



5.2 SOLUTION AND TECHNICAL ARCHITECTURE :

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.



5.3 USER STORIES :

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	IBM Watson IOT platform	USN-1	Creating devices and board and generating data	I can generate the data.	Medium	Sprint-1
	Storing data using Node - red	USN-2	Storing the data in IBM Cloudant DB through node-red functions	I am able to store the data in the IBM cloudant	High	Sprint-2
	Frontend in app	USN-3	Creating the frontend for users to use the medicine reminder app in MIT App inventor	I can use the MIT app inventor to create the front end	High	Sprint-3
	Backend in app	USN-4	Designing the block of backend for the app in MIT App inventor	I can use the MIT app inventor to develop the back end	Low	Sprint-3
	User Login	USN-5	As a user I can register for the application through Gmail and login to the app	I can receive mails and can login the app	Medium	Sprint-4
	Reminder(TTS)	USN-5	Getting the speech reminder to users to take their tablets.	I can hear the reminders at the right time.	High	Sprint-4

6. PROJECT PLANNING AND SCHEDULING :

6.1 SPRINT PLANNING AND ESTIMATION :

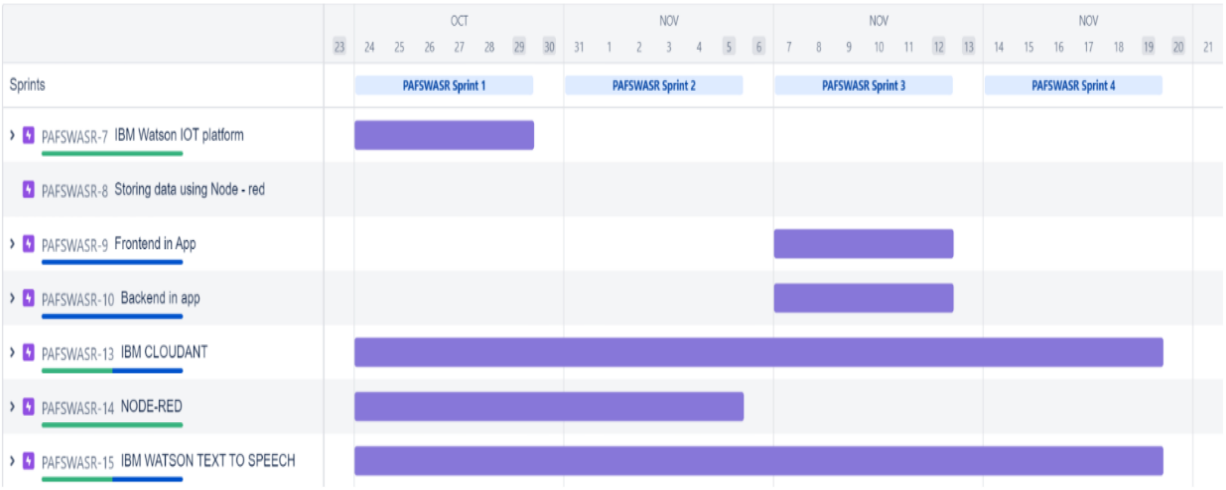
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	IBM Watson IOT platform	USN-1	Creating devices and board and generating data	7	medium	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi
Sprint-1	Storing Data using node-red	USN-2	Storing the data in IBM Cloudant DB through node-red functions	13	High	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi
Sprint-3	Frontend in App	USN-3	Creating the frontend for users to use the medicine reminder app in MIT App inventor	8	High	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi
Sprint-3	Backend in App	USN-4	Designing the block of backend for the app in MIT App inventor	12	High	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi
Sprint-4	User login	USN-5	As a user, I can register for the application through Gmail and login in to the app	10	Medium	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi
Sprint-2	Node red	USN-1	Creating node red web service	20	medium	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi
Sprint-4	Reminder(TTS)	USN-5	Getting the speech reminder to users to take their tablet	10	High	Divya Meena AL Pradeepa H Srividhyalakshmi R Uma Sharaswathi

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

6.3 REPORTS FROM JIRA :

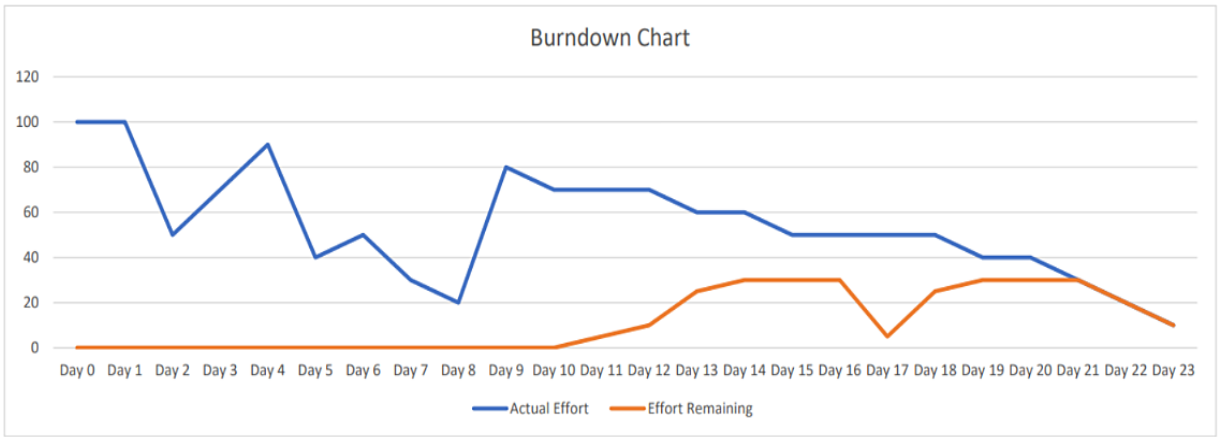
ROADMAP



BURNDOWN CHART

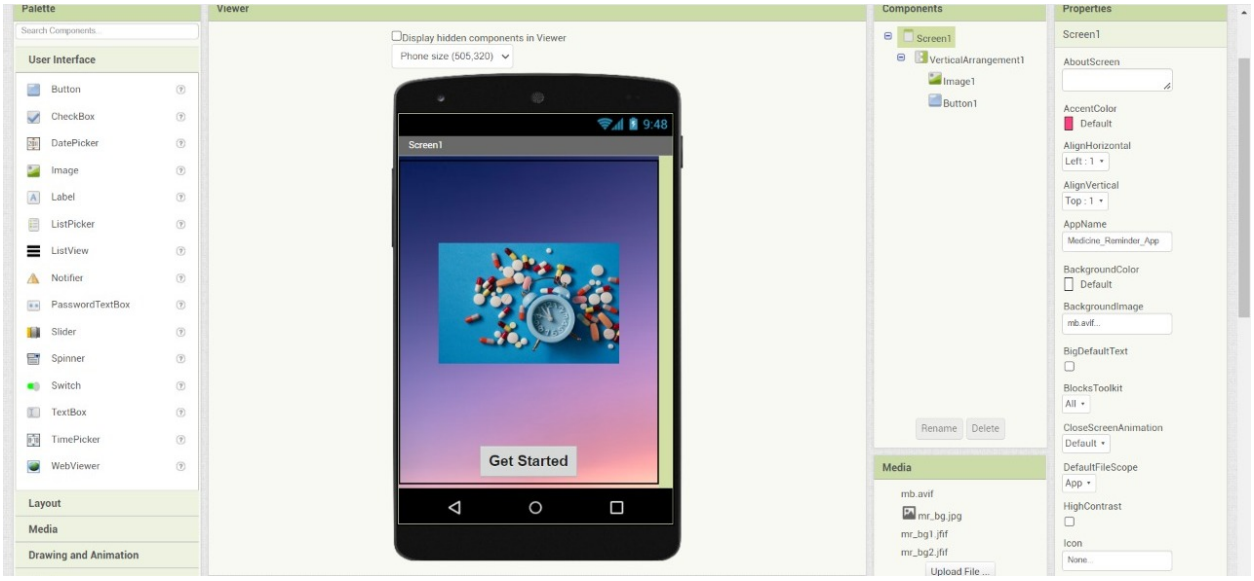
Work left to do versus time

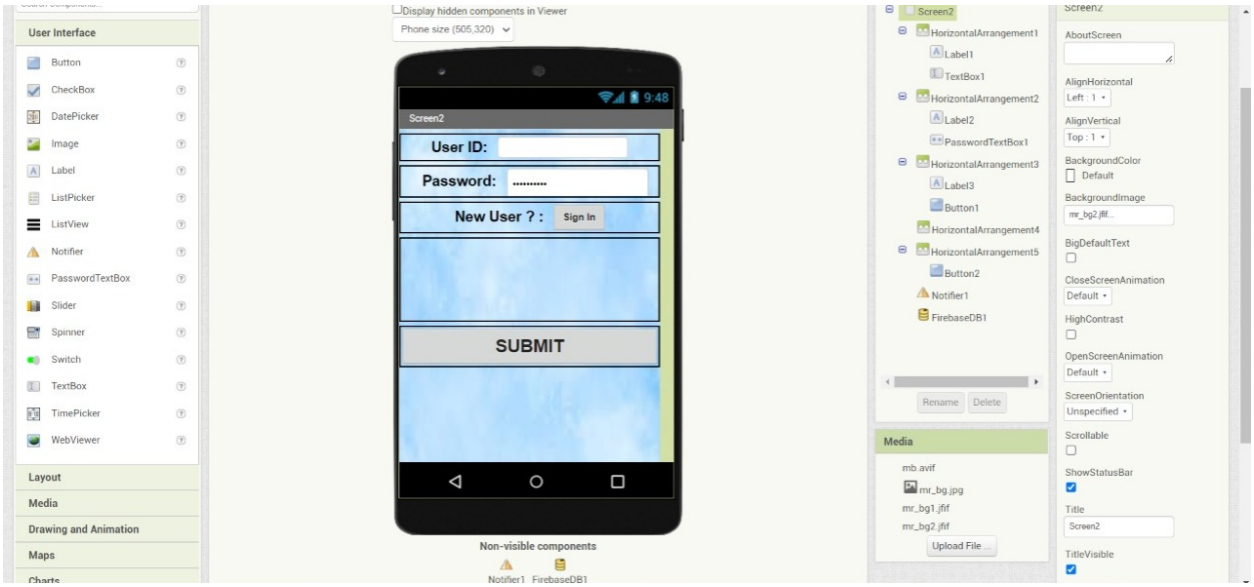
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Actual Effort	100	100	50	70	90	40	50	30	20	80	70	70	70	60	60	50	50	50	50	40	40	30	20	10
Effort Remaining	0	0	0	0	0	0	0	0	0	0	0	5	10	25	30	30	30	5	25	30	30	30	20	10

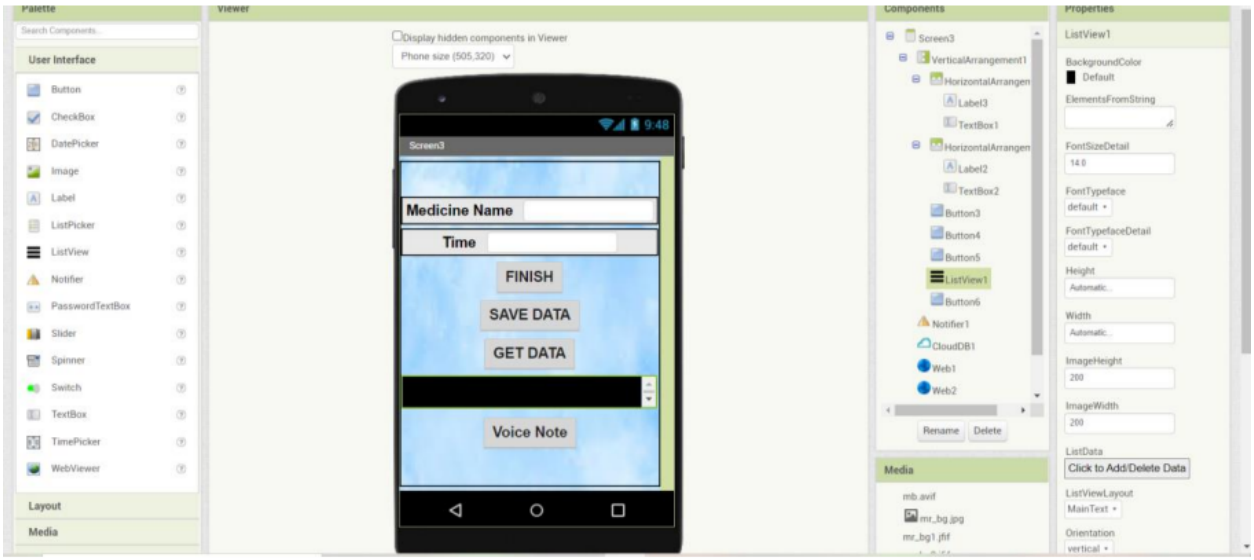


7. CODING & SOLUTIONING :

7.1 Feature 1 - USER INTERFACE (FRONT END) :






Palette
Viewer
Components
Properties
User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
TextBox
TimePicker
WebViewer
Layout
Media
Display hidden components in Viewer
Phone size (505,320)
9:48
Screen3
Medicine Name
Time
FINISH
SAVE DATA
GET DATA
Voice Note
Screen3
VerticalArrangement1
HorizontalArrangen
Label3
TextBox1
HorizontalArrangen
Label2
TextBox2
Button3
Button4
Button5
ListView1
Button6
Notifier1
CloudDB1
Web1
Web2
Rename
Delete
Media
mb.avif
mr_bg.jpg
mr_bg1.jfif
ListView1
BackgroundColor
Default
ElementsFromString
FontSizeDetail
14.0
FontTypeface
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FontTypefaceDetail
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Click to Add/Delete Data
ListViewLayout
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Orientation
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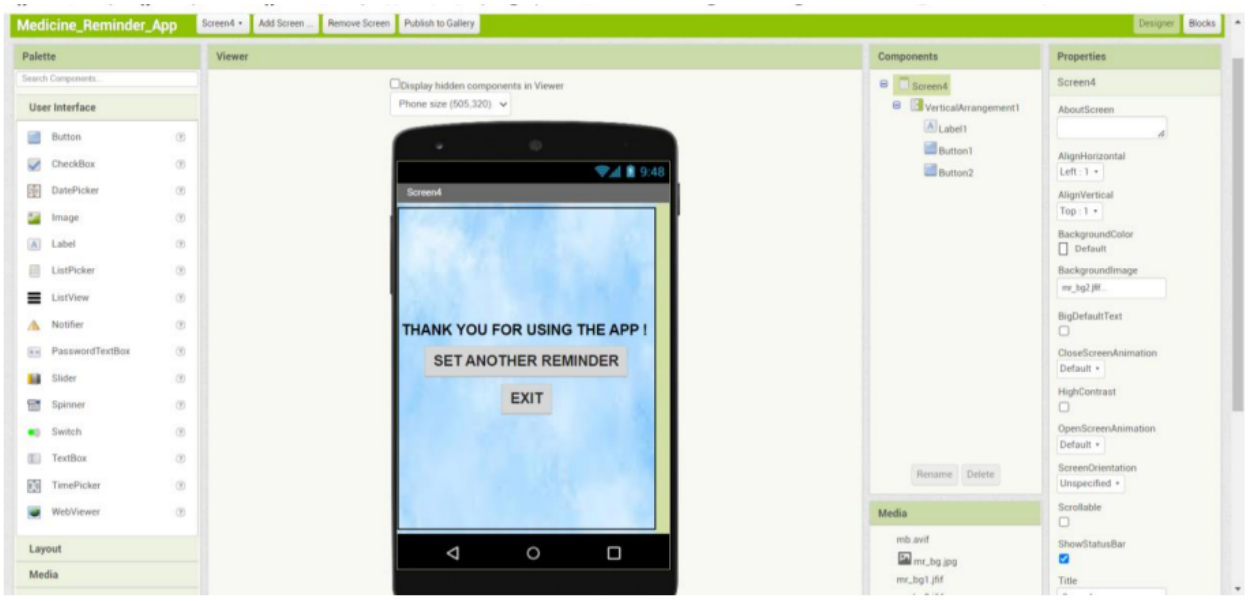
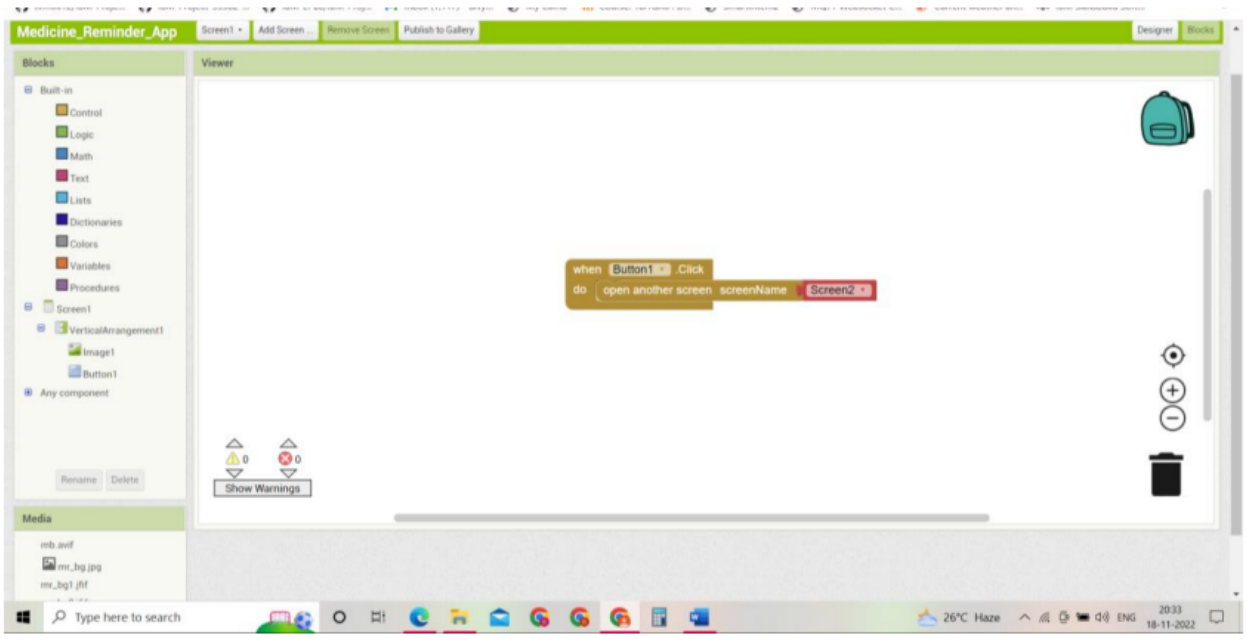
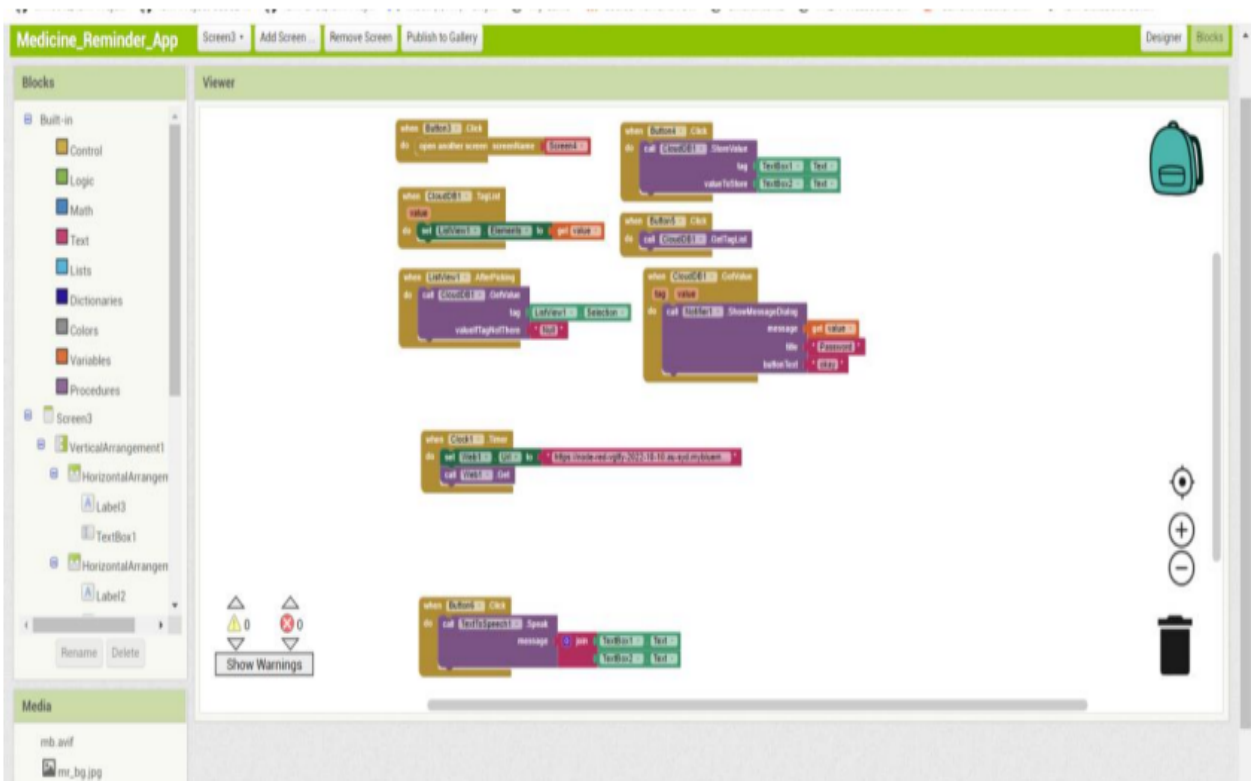

Medicine_Reminder_App
Screen4
Add Screen
Remove Screen
Publish to Gallery
Designer
Blocks
Palette
Viewer
Components
Properties
User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
TextBox
TimePicker
WebViewer
Layout
Media
Display hidden components in Viewer
Phone size (505,320)
9:48
Screen4
THANK YOU FOR USING THE APP !
SET ANOTHER REMINDER
EXIT
Screen4
VerticalArrangement1
Label1
Button1
Button2
Rename
Delete
Media
mb.avif
mr_bg.jpg
mr_bg1.jfif
Screen4
AboutScreen
AlignHorizontal
Left : 1
AlignVertical
Top : 1
BackgroundColor
Default
BackgroundImage
mr_bg2.jfif
BigDefaultText
CloseScreenAnimation
Default
HighContrast
OpenScreenAnimation
Default
ScreenOrientation
Unspecified
Scrollable
ShowStatusBar
Title

7.2 Feature 2 - USER INTERFACE (BACK END) :




Medicine_Reminder_App
Screen3
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Remove Screen
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Variables
Procedures
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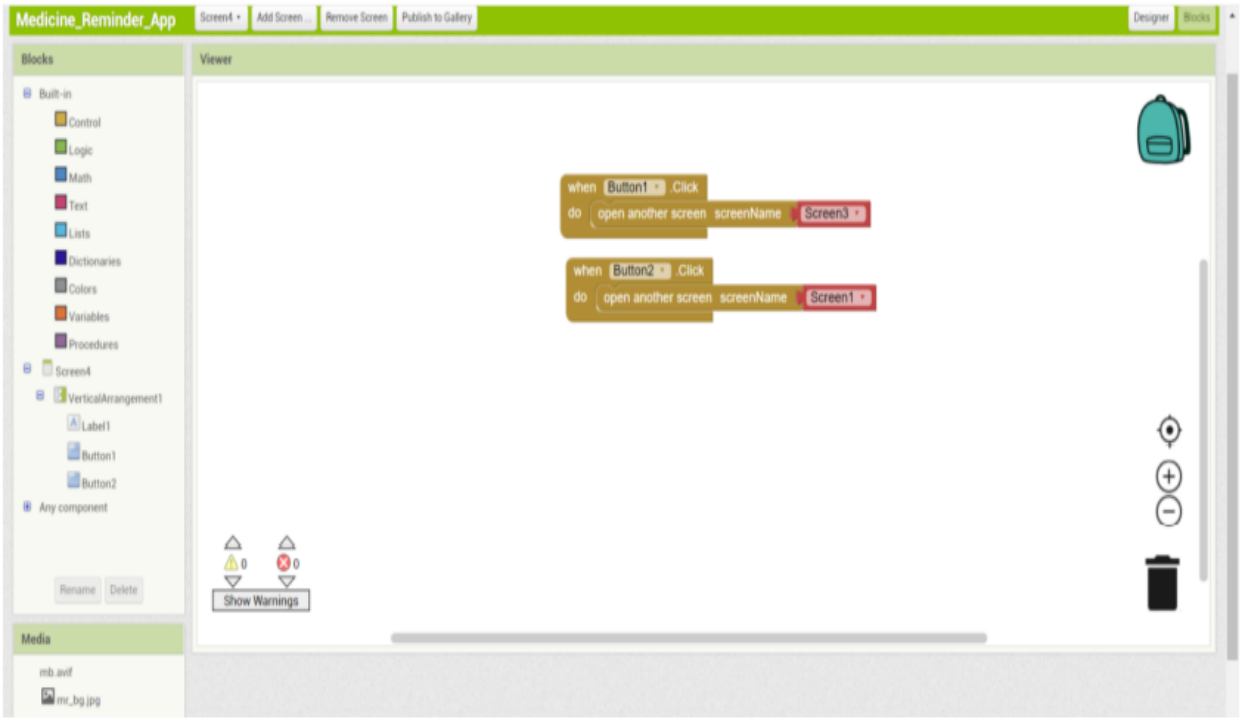
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Viewer
Built-in
Control
Logic
Math
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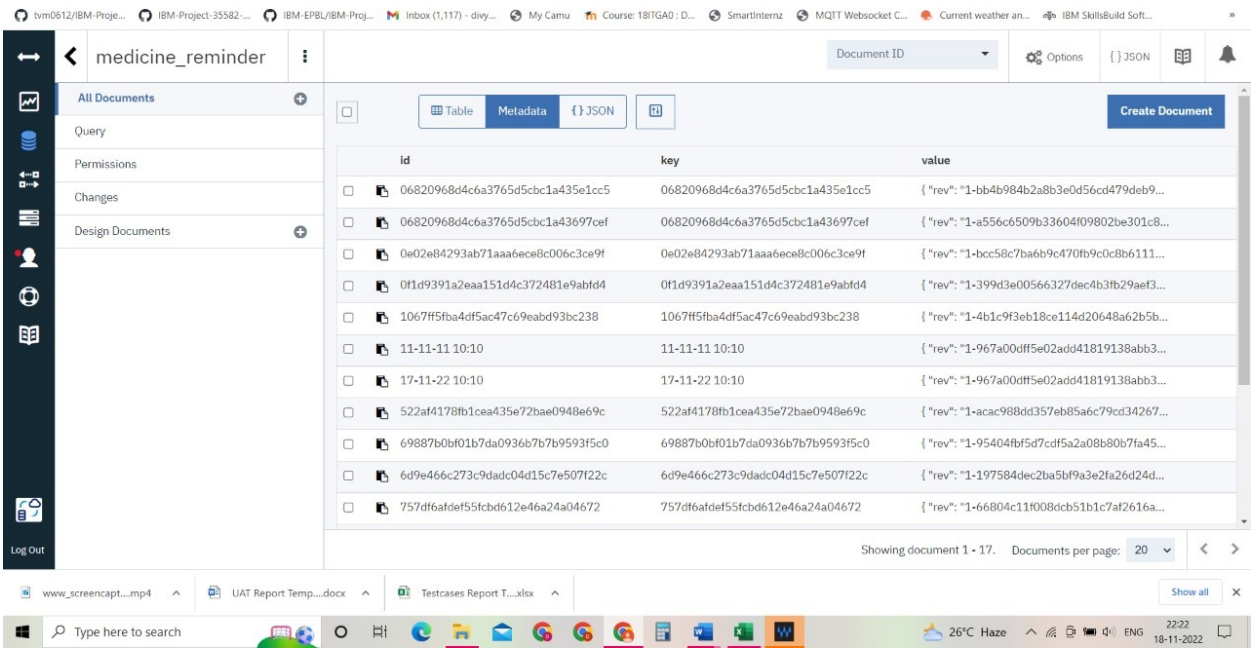
Dictionaries
Colors
Variables
Procedures
Screen4
VerticalArrangement1
Label1
Button1
Button2
Any component
Rename
Delete
when Button1 .Click
do open another screen screenName Screen3
when Button2 .Click
do open another screen screenName Screen1
Show Warnings
Media
mb.avif
mr_bg.jpg

7.3 Database Schema :



8. TESTING :

8.1 Test Cases :

Test case 1: Stores the data of medicine and the time it has to be taken

Test case 2: Retrive the name of medicine and the time

Test case 3: Can view the reminder database

Test case 4: Gives voice message of the reminder

8.2 User Acceptance Testing :

1. Is the model tested in node red web service ? YES

2. Deployment testing phase : DONE

3. How the user can use the medicine reminder system? Can use through mobile application . The medicine and the time it has to be taken will be shown as text message and also as a voice note for the user to remind them to take their medicine on time.

9. RESULTS :

9.1 Performance Metrics :

10. ADVANTAGES & DISADVANTAGES :

ADVANTAGES :

- Medication tracking history
- Flexible scheduling
- Compliance reminders and alerts
- Time zone support
- Right way to monitor the health of elders
- Avoiding the absence mind of elders

DISADVANTAGES :

- Some elders reported that they never received a SMS reminder.
- It is possible that mobile phone numbers were entered incorrectly or that those elders changed their phone numbers .
- Elders may not receive the SMS reminders due to incorrect data entry.
- Elders were considerably less likely to own a mobile phone, making them harder to access using reminder technology.

11. CONCLUSION :

Hence, this medicine reminder system for elders who are self reliant is very useful for the aged-people and they are able to take their medication at the right time. This system avoids elders forgetting their medicines and skipping it. When they hear the speech alert they will take the medicine at the right time. They can be fit and healthy with the help of this app.

12. FUTURE SCOPE :

In this medicine reminder system we can store medicine name and time, we can retrive and view the reminder data and this sytem also gives a voice note. This system can be modified using the upcoming technologies for the betterment usage.

13. APPENDIX :

github link:

https://github.com/IBM-EPBL/IBM-Project-27834-1660067668