MeRing - Medical Evaluation Ring

An IoT Product to save lives.

Introduction

In our modern world, where we have a lot of Medical technologies and a treatment for most of health problems and diseases, we quite forget about people who are old aged.

Old aged people frequently don't have the energy or the patience to seek medical treatments for their own good, and that's where our problem starts.

In today's era we have a lot of old aged population, as for 2019 we had 605 Million people of age of 65 and above and even more for 2020 (727 Million), this population often get sick or need treatment as soon as possible and very often visit Medical Clinics may it be from the most minor reason to a high life threatening reason.

People who live solitary lives, often don't have any family member to take care of them nor call an ambulance if needed, and often refuse to get a treatment may it be from stubbornness or by thinking "it will pass".

Possible Solution

In a modern world, we have so many technologies that could serve those people who live alone and can save lives.

Our Idea of solution for this problem is a “Thing” we call “ME Ring”, which stands for Medical Evaluation Ring, this solution supposed to help those old aged people who live in solitary but not only, it can also be a solution for monitoring the healthiness of you or those that are important to you.

The “ME Ring” is a ring which will Help medical centers to monitor your medical state and send the data to your medical center or even your own Doctor.

The ring will often check the medical indices such as Oxygen Levels, Blood Pressure, Heartbeat, Sugar Levels and such, if the indices will show some Unexpected bumps or we’ll see unstable indices, the Medical Center can appoint a meeting for the Doctor to check on you.

Also there been a lot of cases in which people who live in solitary were sometimes been found lifeless only after a few days or even more, and this ring comes to solve that also when there’s no Heartbeat and it’s not from a malfunction it could automatically contact an Ambulance.

Solution (Continued)

Our idea which belongs to medical healthcare can be quite problematic.

Technology Wise:

we need the required technology to monitor the indices of the patient, for that we will need sensors which will be integrated to the ring, those sensor will be needed to be in the right size to fit the ring so the ring won't too big and comfortable on the finger, almost as you “forget” that it is on your finger.

For all the data we collect and all the patients we have (if we take all the 727 Million people as mentioned), we need quite a big Database to contain all this information, which can be problematic.

Legal Wise:

If we will be collecting data, we need the patient’s acknowledgment and approval to collect it, not all of agree to the idea of “collect data about me”, and for that we need the patient’s consent.

Also we need Medical Center’s agreement to receive the patient’s data, such as illnesses, chronologic illnesses, allergies and such.

Stakeholders

- Elderly - The stakeholders are mainly the elderly, who have no help or relatives to assist them when they need to get to health funds for general examinations or consultation with doctors. Elderly people who do not have assistance even in medical emergencies and have difficulty calling an ambulance or medical staff.

  A large number of cases of cardiac arrest and heart attacks can be counted on condition that detection is done early, such cases have no warning signs and cannot be predicted, immediate action must be taken and a medical team called - a matter of life or death. It follows that there is a need for such a system that will automatically call an ambulance especially for the elderly who have difficulty doing it alone

- The medical staff - will have follow-up for certain patients
- Medical centers that would like to have the new technology that will attract new potential clients.

- Relatives - Relatives who cannot help an elderly person who is their relative. Can buy him the ring and Make sure he is feeling well and if necessary he will be treated and an ambulance will be called.

Challenges

- Incorrect fitting of the ring to the finger can result in loss of the ring or incorrect measurements.
- Delay / failure to send distress call in case of medical emergency.
- Technical challenge - if there is a fault in the system or the system fails or the system shows incorrect metrics
- Finding cheap but good and durable materials that do not rust
- Finding small sensors that will fit the ring
- Database
- Securing each patient's medical data
- Loss of connection between the ring and the moblie device due to reaching out of bluetooth range
- Low battery - the ring will have to be charged from time to time

Possible Solutions (Challenges)

- Each user\patient will have his wanted finger measured (like when buying jewelry ring). Another option is to make a Silicone ring which is flexible and can extend at your desire.
- Incase of a failed distress call the system will retry as much attempts as necessary until the medical center will acknowledge they've received the call. Preventing a delay in a call can be network issue which cannot be fixed on our side and for that we could add an Emergency button for quick dialing to the Medical Center\Ambulance.
- Incorrect Metrics might occur from a faulty sensor or faulty ring, if metrics act weird then the medical center can see the indices and make the relevant decision.
- Database could be problematic since we do not know how many users there will be, the lookup time on the databases more depends on the hardware and the amount of tables we've got. we could use a Cloud service or BigData everything depends on the database's architecture.

Possible Solution (Challenges)

- Securing each patient\user data can be provided with the Cloud’s package, a good cloud service often provides a good security for their service, it might cost much more but for good things we need to pay extra.

Requirements (System)

- **<u>The ring:</u>**
- **SR1. The ring needs a bluetooth device (functional).**
- **SR2. The ring needs a socket for charging (functional).**
- **SR3. The ring needs to have a blood pressure sensor (functional).**
- **SR4. The ring needs to have an oxygen level sensor (functional).**
- **SR5. The ring needs to have a heartbeat sensor (functional).**
- **SR6. The ring needs to have a sugar level sensor (functional).**

Requirements (System)

- **<u>The phone app:</u>**
- **PR1. The phone app needs to be granted permission to access the phonebook, messages, location, etc to contact medical staff (functional).**
- **PR2. The app needs a secure login and account keeping system (non-functional).**
- **PR3. The app needs an emergency button (functional).**
- **PR4. The app needs a ‘contact medical staff’ button (functional).**
- **PR5. The app needs a ‘make a doctor appointment’ menu (functional).**
- **PR6. The app needs a medical measurement display menu(functional).**
- **PR7. The app needs an ‘update emergency contact’ menu (functional).**

Requirements (System)

- **<u>The cloud service:</u>**
- **CR1. The cloud service needs to store account login information (non-functional).**
- **CR2. The cloud service needs to store account medical data (non-functional).**
- **CR4. The cloud service needs a security system to avoid leaks and information theft (non-functional).**

Requirements (User)

- **<u>The ring:</u>**
- **UR1. The ring needs to be simple enough for elders to operate.**
- **UR2. The ring needs to be comfortable to wear.**
- **UR4. The ring needs to be connected to a phone app to operate it.**
- **UR6. The ring needs a size adjustment feature that users can control (functional).**
- **UR8. The ring needs to have water protection (functional).**
- **UR13. The ring needs to send medical information directly to the app (non-functional).**

Requirements (User)

- **<u>The phone app:</u>**
- **UP1. The app needs to give detailed information about it’s functions (non-functional).**
- **UP2. The app needs to give detailed information about the rings**
- **Functions (non-functional).**
- **UP4. The phone app needs to be accessibility friendly.**
- **UP6. The phone app needs a direct communication line with medical staff (non-functional).**
- **UP7. The phone app needs an emergency button to alert medical staff in emergencies (functional).**
- **UP8. The phone app needs a function to manually measure blood pressure,oxygen level,heartbeat,sugar level on users' demand (functional).**

Requirements (User)

- **UP14. The phone app needs to alert the user of measurements that are bad but not critical and tell him to contact medical staff for checkup (non-functional).**
- **UP15. The phone app needs to alert the user and the medical staff directly via the emergency function when measurements are critical (non-functional).**
- **UP16. The phone app needs an option to enter a family member's phone number as an emergency contact (for extra, medical staff will still be alerted) (functional).**
- **UP17. Users will have accounts they will need to log into (functional).**
- **UP18. Doctors will have their own accounts and they would be able to update and change user info (setting parameters for measurements, etc) (functional).**

Requirements (Businesses)

- **<u>The ring:</u>**
- **BR1. The ring price needs to be at a reasonable price for customers to buy it.**
- **BR2. The ring materials need to be cheap to achieve a reasonable price.**
- **BR3. The ring materials need to be approved for safety regulations.**
- **BR5. The ring development cost should not exceed the budget.**
- **BR7. The ring advertising should appeal to the family of people with medical problems.**

Requirements (Businesses)

- **<u>The phone app:</u>**
- **BP1. The app needs to be free of charge for the users**
- **BP2. The phone app advertising should appeal to people with medical problems.**
- **BP3. The phone app advertising should appeal to the family of people with medical problems.**
- **BP5. The phone app development needs to come under budget.**

Test case ID:001
Test priority (Low/Medium/High):High
Module Name:The ring needs a bluetooth device.
Test Title:Bluetooth Connectivity.
Description:
The ring has a bluetooth device which allows a mobile app to connect to it in order to allow users to monitor their own indices.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Have mobile app ready, and ring ready.
Dependencies: Ring charged and ready, mobile app ready.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Click on “Connect My Ring”	Message appear “Searching for device”	Searching for device..	Pass	
2	App finds device and connects	message appear “Connected successfully”	App and ring are connected	Pass	
3	“Confirm” button	Clicking on confirm, allows usage of the app	transfers to main screen where user can see his vitals.	Pass	

Post Conditions: The ring is connected and app is ready to use.

Test case ID:001.1
Test priority (Low/Medium/High):High
Module Name:The ring needs a bluetooth device.
Test Title:Bluetooth Connectivity.
Description:
The ring has a bluetooth device which allows a mobile app to connect to it in order to allow users to monitor their own indices.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Have mobile app ready, and ring ready.
Dependencies: Ring charged and ready, mobile app ready.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Click on “Connect My Ring”	Message appear “Searching for device”	Searching for device..	Pass	
2	App finds device and connects	message appear “Connected successfully”	App and ring are connected	Fail	App stuck on “Searching for device” forever.

Post Conditions: The ring cannot be connected to app.

Test case ID:001.2
Test priority (Low/Medium/High):High
Module Name:The ring needs a bluetooth device.
Test Title:Bluetooth Connectivity.
Description:
The ring has a bluetooth device which allows a mobile app to connect to it in order to allow users to monitor their own indices.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Have mobile app ready, and ring ready.
Dependencies: Ring charged and ready, mobile app ready.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Click on “Connect My Ring”	Message appear “Searching for device”	Searching for device..	Pass	
2	App finds device and connects	message appear “Connected successfully”	App and ring are connected	Pass	
3	“Confirm” button	Clicking on confirm, allows usage of the app	Not Responding, makes user stuck on the same screen.	Fail	“Confirm” button is no responding therefore user stuck.

Post Conditions: User cannot exit from the “Confirm” screen.

Test case ID:002
Test priority (Low/Medium/High):High
Module Name:The Rings needs to have a charging socket.
Test Title:Charging socket.
Description:
The ring has a charging socket in order to charge the ring when battery is low.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Have a ring at low battery after usage.
Dependencies: The user has a ring, and a mobile app ready.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Plug a charger into the ring.	Ring is charging.	Ring is in charging state.	Pass	

Post Conditions: Ring is in charging state.

Test case ID:003
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Blood pressure sensor.
Test Title:Blood pressure sensor.
Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21
Description:
The ring has a blood pressure sensor which monitors user's blood pressure at given intervals.
The monitoring is not constant but updates\checks every few seconds.

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows Blood pressure.	Accurate blood pressure is shown.	shows blood pressure	Pass	

Post Conditions: Blood pressure is accurate and update at given intervals.

Test case ID:003.1
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Blood pressure sensor.
Test Title:Blood pressure sensor.
Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21
Description:
The ring has a blood pressure sensor which monitors user's blood pressure at given intervals.
The monitoring is not constant but updates\checks every few seconds.

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows Blood pressure.	Accurate blood pressure is shown.	Sensor cannot measure the blood pressure	Fail	Faulty Sensor, or cannot sense the blood pressure.

Post Conditions: Blood pressure does not shown, instead shows "--".

Test case ID:004
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Oxygen level sensor.
Test Title:Oxygen level sensor.
Description:
The ring has a Oxygen level sensor which monitors user's Oxygen at given intervals.
The monitoring is not constant but updates\checks every few seconds.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows Oxygen level.	Accurate Oxygen level is shown.	shows oxygen level	Pass	

Post Conditions: Oxygen levels are accurate and update at given intervals.

Test case ID:004.1
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Oxygen level sensor.
Test Title:Oxygen level sensor.
Description:
The ring has a Oxygen level sensor which monitors user's Oxygen at given intervals.
The monitoring is not constant but updates\checks every few seconds.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows Oxygen level.	Accurate Oxygen level is shown.	cannot measure oxygen levels	Fail	Faulty Sensor maybe.

Post Conditions: Oxygen levels does not show up instead shows "--".

Test case ID:005
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Heartbeat sensor.
Test Title:Heartbeat sensor.
Description:
The ring has a Heartbeat sensor which monitors user's heartbeat at given intervals.
The monitoring is not constant but updates\checks every few seconds.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows heartbeats.	Accurate heartbeats are shown.	shows heartbeats as bpm.	Pass	

Post Conditions: heartbeat shows accurate and updated indices at given intervals.

Test case ID:005.1
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Heartbeat sensor.
Test Title:Heartbeat sensor.
Description:
The ring has a Heartbeat sensor which monitors user's heartbeat at given intervals.
The monitoring is not constant but updates\checks every few seconds.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows heartbeats.	Accurate heartbeats are shown.	cannot measure heartbeats	Fail	Faulty sensor maybe?

Post Conditions: heartbeat does not show indices instead shows "--".

Test case ID:006
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Sugar level sensor.
Test Title:Sugar level sensor.
Description:
The ring has a Sugar level sensor which monitors user's Sugar in blood at given intervals.
The monitoring is not constant but updates\checks every given time.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows Sugar level.	Accurate Sugar Level is shown.	shows Sugar level.	Pass	

Post Conditions: Sugar level shows an accurate and updated indices at given intervals.

Test case ID:006.1
Test priority (Low/Medium/High):High
Module Name:The ring needs to have Sugar level sensor.
Test Title:Sugar level sensor.
Description:
The ring has a Sugar level sensor which monitors user's Sugar in blood at given intervals.
The monitoring is not constant but updates\checks every given time.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: Ring is connected to app.
Dependencies: Ring connected, app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Main screen shows Sugar level.	Accurate Sugar Level is shown.	Does not show anything	Fail	Faulty mechanism or faulty sensor maybe?

Post Conditions: Sugar level does not show indices instead shows "--".

Test case ID:007 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):High | **Test Designed date: 20.12.21**

Module Name:The phone app needs to be granted permission to access. | **Test Executed by: Vlad Propisnov**

Test Title:Permission confirm. | **Test Execution date: 20.12.21**

Description:

The Mobile app will ask the user's permission to access his\hers Phonebook,Location and such in order to check the phone's location, and allow the medical staff to monitor it.

Pre-conditions: App is installed on user's mobile.

Dependencies: app is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	Download the app.	app is ready to use on phone.	app is ready to use	Pass	
2	User opens the app	user needs to input his\hers ID and phone number	window shows up in order to "Log in"	Pass	
3	app asks for user's permission to access his info.	User allows the access and the user is allowed to use the app.	transfers to main screen after user's agreement.	Pass	

Post Conditions: After the users agreement, he\she is allowed to use the app freely, the app will have Terms of use and such which explains that the access is only for monitoring his\hers location in order to know to which address\location to send the medical staff.

Test case ID:008
Test priority (Low/Medium/High):High
Module Name:The app needs to have a secure login system.
Test Title:Logging in to app. .
Description:
The mobile on first use will prompt a login screen in which the user will have to fill the form.
The login form will contain 2 fillable panels, ID and phone number.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: App is installed on user's mobile.
Dependencies: App is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User opens the app	user needs to input his\hers ID and phone number	window shows up in order to "Log in"	Pass	
2	User inputs his ID	Checks that the ID box is numerical and does not contain any chars.	"V" mark will appear near the box if ID is integer only.	Pass	
3	User inputs his Phone number.	Checks that the Phone Number box is numerical and does not contain any chars.	"V" mark will appear near the box if Phone Number is integer only.	Pass	

Post Conditions: User will be allowed to try and connect.

Test case ID:008.1
Test priority (Low/Medium/High):High
Module Name:The app needs to have a secure login system.
Test Title:Logging in to app. .
Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21
Description:
The mobile on first use will prompt a login screen in which the user will have to fill the form.
The login form will contain 2 fillable panels, ID and phone number.

Pre-conditions: App is installed on user's mobile.
Dependencies: App is in working state.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User opens the app	user needs to input his\hers ID and phone number	window shows up in order to "Log in"	Pass	
2	User inputs his ID	Checks that the ID box is numerical and does not contain any chars.	accepts characters input	Fail	
3	User inputs his Phone number.	Checks that the Phone Number box is numerical and does not contain any chars.	accepts characters input.	Fail	

Post Conditions: User will be allowed to try and connect.

Test case ID:009
Test priority (Low/Medium/High):Medium
Module Name:The app needs to have a emergency button.
Test Title:Emergency button.
Description:
The mobile app will have an emergency button which will allow the user to click on it and it will instantly dial up to the medical service.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: App is installed on user's mobile and user is logged in.
Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User presses "Emergency" button.	The app will call to the medical service.	phone will call the appropriate medical service.	Pass	

Post Conditions: App will immediately call a medical service .

Test case ID:009.1
Test priority (Low/Medium/High):Medium
Module Name:The app needs to have a emergency button.
Test Title:Emergency button.
Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21
Description:
The mobile app will have an emergency button which will allow the user to click on it and it will instantly dial up to the medical service.

Pre-conditions: App is installed on user's mobile and user is logged in.
Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User presses "Emergency" button.	The app will call to the medical service.	Button is not responding.	Fail	Error in accessing dial up?

Post Conditions: App will not do anything .

Test case ID:010 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Contact Medical Staff' button. | **Test Executed by: Vlad Propisnov**

Test Title:Contact medical staff button. | **Test Execution date: 20.12.21**

Description:

The mobile app will have an emergency button which will allow the user to click on it and it will instantly dial up to the medical service.

Pre-conditions: App is installed on user's mobile and user is logged in.

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User presses "Contact Medical Staff" button.	The app will prompt a menu in which the user will be allowed to choose his\hers reason of contact.	Menu shows up in which the user will be able to choose his\hers service.	Pass	
2	User presses "Send" button.	The information will be sent to the appropriate staff, and the staff will choose the next step for the user.	Message is sent to the medical staff.	Pass	

Post Conditions: After clicking send, "Message sent and the Medical Center will contact you" window will be prompted.

Test case ID:010.1 **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Contact Medical Staff' button. **Test Executed by: Vlad Propisnov**

Test Title:Contact medical staff button. **Test Execution date: 20.12.21**

Description:

The mobile app will have an emergency button which will allow the user to click on it and it will instantly dial up to the medical service.

Pre-conditions: App is installed on user's mobile and user is logged in.

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User presses "Contact Medical Staff" button.	The app will prompt a menu in which the user will be allowed to choose his\hers reason of contact.	Button is not responding.	Fail	

Post Conditions: User stuck in the main screen, button is not responding to any action.

Test case ID:010.2 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Contact Medical Staff' button. | **Test Executed by: Vlad Propisnov**

Test Title:Contact medical staff button. | **Test Execution date: 20.12.21**

Description:

The mobile app will have an emergency button which will allow the user to click on it and it will instantly dial up to the medical service.

Pre-conditions: App is installed on user's mobile and user is logged in.

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User presses "Contact Medical Staff" button.	The app will prompt a menu in which the user will be allowed to choose his\hers reason of contact.	Menu shows up in which the user will be able to choose his\hers service.	Pass	
2	User presses "Send" button.	The information will be sent to the appropriate staff, and the staff will choose the next step for the user.	"Send" Button is not responding.	Fail	

Post Conditions: After clicking send nothing happens, user stuck in the same window.

Test case ID:011 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Doctor Appointment' button. | **Test Executed by: Vlad Propisnov**

Test Title:Doctor Appointment button. | **Test Execution date: 20.12.21**

Description:

When clicking on "Contact Medical Staff" the user will have a varied menu in which he\she will be able to choose his desired service.

Pre-conditions: App is installed on user's mobile and user is logged in, "Contact Medical Staff" button is pressed..

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User chooses "Doctor Appointment" from the menu of "Contact Medical Staff"	Window with available appointments will pop up.	Available appointments shown to the user.	Pass	
2	User chooses one of the available appointments.	confirm window will pop up, showing the info about the selected appointment.	window with appointment info pops up.	Pass	
3	user click "Confirm"	closes the popped up window.	Message is sent to the medical service.	Pass	

Post Conditions: After clicking Confirm, "Message sent to the Medical Center." message will be shown.

Test case ID:011.1 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Doctor Appointment' button. | **Test Executed by: Vlad Propisnov**

Test Title:Doctor Appointment button. | **Test Execution date: 20.12.21**

Description:

When clicking on "Contact Medical Staff" the user will have a varied menu in which he\she will be able to choose his desired service.

Pre-conditions: App is installed on user's mobile and user is logged in, "Contact Medical Staff" button is pressed..

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User chooses "Doctor Appointment" from the menu of "Contact Medical Staff"	Window with available appointments will pop up.	None appointment show up.	Fail	

Post Conditions: User cannot select any appointment.

Test case ID:011.2 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Doctor Appointment' button. | **Test Executed by: Vlad Propisnov**

Test Title:Doctor Appointment button. | **Test Execution date: 20.12.21**

Description:

When clicking on "Contact Medical Staff" the user will have a varied menu in which he\she will be able to choose his desired service.

Pre-conditions: App is installed on user's mobile and user is logged in, "Contact Medical Staff" button is pressed..

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User chooses "Doctor Appointment" from the menu of "Contact Medical Staff"	Window with available appointments will pop up.	"Doctor Appointment" is not responding to action.	Fail	

Post Conditions: User cannot proceed to selecting appointments.

Test case ID:011.3 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Doctor Appointment' button. | **Test Executed by: Vlad Propisnov**

Test Title:Doctor Appointment button. | **Test Execution date: 20.12.21**

Description:

When clicking on "Contact Medical Staff" the user will have a varied menu in which he\she will be able to choose his desired service.

Pre-conditions: App is installed on user's mobile and user is logged in, "Contact Medical Staff" button is pressed..

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User chooses "Doctor Appointment" from the menu of "Contact Medical Staff"	Window with available appointments will pop up.	Available appointments shown to the user.	Pass	
2	User chooses one of the available appointments.	confirm window will pop up, showing the info about the selected appointment.	Nothing happens after choosing appointment	Fail	

Post Conditions: User cannot confirm chosen appointment therefore cannot complete the process.

Test case ID:011.4 | **Test Designed by: Vlad Propisnov**

Test priority (Low/Medium/High):Medium | **Test Designed date: 20.12.21**

Module Name:The app needs to have a 'Doctor Appointment' button. | **Test Executed by: Vlad Propisnov**

Test Title:Doctor Appointment button. | **Test Execution date: 20.12.21**

Description:

When clicking on "Contact Medical Staff" the user will have a varied menu in which he\she will be able to choose his desired service.

Pre-conditions: App is installed on user's mobile and user is logged in, "Contact Medical Staff" button is pressed..

Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User chooses "Doctor Appointment" from the menu of "Contact Medical Staff"	Window with available appointments will pop up.	Available appointments shown to the user.	Pass	
2	User chooses one of the available appointments.	confirm window will pop up, showing the info about the selected appointment.	window with appointment info pops up.	Pass	
3	user click "Confirm"	closes the popped up window.	"Confirm" button not responding.	Fail	

Post Conditions: user cannot confirm the process therefore stuck in the confirmation window.

Test case ID:012
Test priority (Low/Medium/High):Medium
Module Name:The app needs to have a 'Update Emergency Contact' button.
Test Title:Update Emergency Contact.
Description:
The user will be able to update his emergency contact info, in case of moving to other address.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: App is installed on user's mobile and user is logged in.
Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User click on "Personal Information" button.	the user will go to his personal profile screen	Personal info screen shows up.	Pass	
2	User allowed to change his\hers contact info.	user will be allowed to edit his\hers personal information.	user allowed to change personal information.	Pass	
3	user click "Update"	"Information Updated" message appears.	Personal Information is updated.	Pass	

Post Conditions: User's personal information is updated.

Test case ID:012.1
Test priority (Low/Medium/High):Medium
Module Name:The app needs to have a 'Update Emergency Contact' button.
Test Title:Update Emergency Contact.
Description:
The user will be able to update his emergency contact info, in case of moving to other address.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: App is installed on user's mobile and user is logged in.
Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User click on "Personal Information" button.	the user will go to his personal profile screen	Button is not responding to action	Fail	

Post Conditions: User cannot access his own profile.

Test case ID:012.2
Test priority (Low/Medium/High):Medium
Module Name:The app needs to have a 'Update Emergency Contact' button.
Test Title:Update Emergency Contact.
Description:
The user will be able to update his emergency contact info, in case of moving to other address.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: App is installed on user's mobile and user is logged in.
Dependencies: App is in working state and user logged in.

Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User click on "Personal Information" button.	the user will go to his personal profile screen	Personal info screen shows up.	Pass	
2	User allowed to change his\hers contact info.	user will be allowed to edit his\hers personal information.	User cannot edit personal info, info is no editable.	Fail	

Post Conditions: User cannot edit personal info.

Test case ID:012.3
Test priority (Low/Medium/High):Medium
Module Name:The app needs to have a 'Update Emergency Contact' button.
Test Title:Update Emergency Contact.
Description:
The user will be able to update his emergency contact info, in case of moving to other address.

Test Designed by: Vlad Propisnov
Test Designed date: 20.12.21
Test Executed by: Vlad Propisnov
Test Execution date: 20.12.21

Pre-conditions: App is installed on user's mobile and user is logged in.
Dependencies: App is in working state and user logged in.

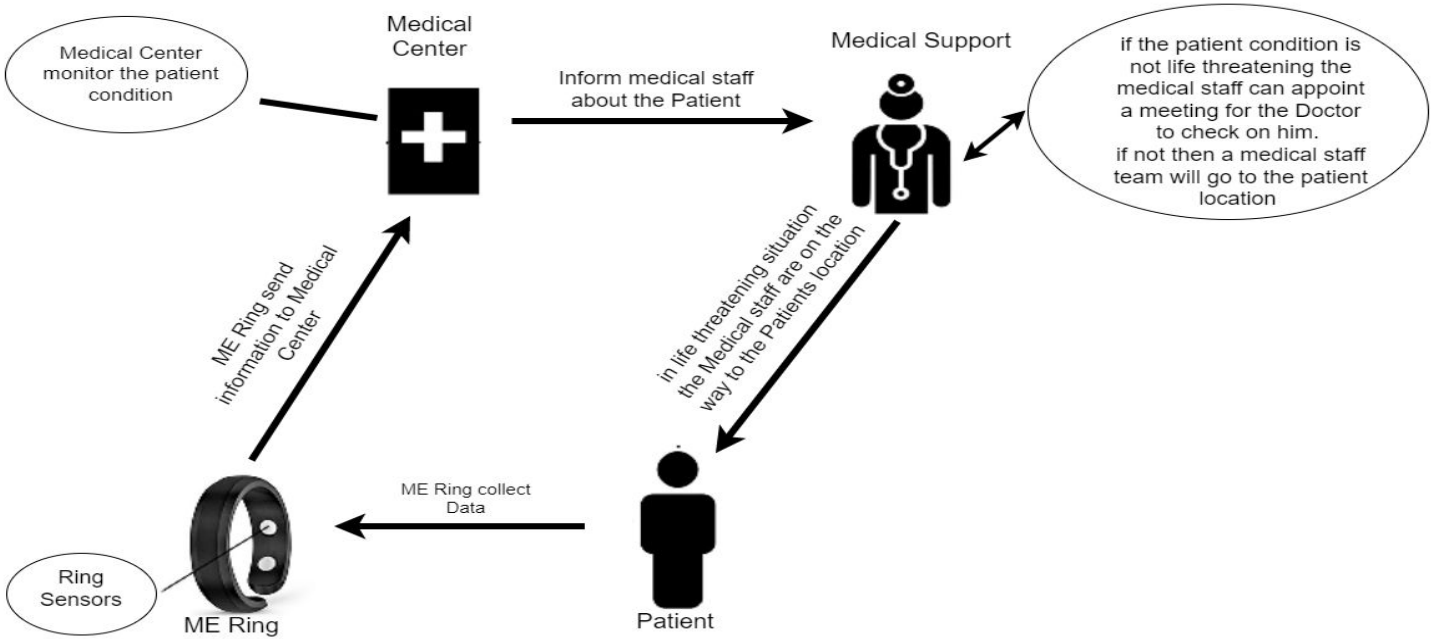
Step	Test steps	Expected Result	Actual Result	Status(Pass\Fail)	Notes
1	User click on "Personal Information" button.	the user will go to his personal profile screen	Personal info screen shows up.	Pass	
2	User allowed to change his\hers contact info.	user will be allowed to edit his\hers personal information.	user allowed to change personal information.	Pass	
3	user click "Update"	"Information Updated" message appears.	Button not responding	Fail	

Post Conditions: User cannot update his\hers personal info after editing since the button is not responding.

Architecture

Our product will be using small sensors that are attached to the Ring and collect information about the patient's condition at any given time. This information can be monitored by the medical center the patients are working with and if at any time the patient condition getting worse or has a life threatening condition the medical center will be able to send help to the patient’s location or if it's a small change in the patient's condition they can book a doctor appointment for the patient for a check up.

Architecture



Materials/Sensors

The production of the ME Ring we will need special sensors that can collect the patient's medical condition in any given time.

- Blood Pressure Sensor - This sensor will be responsible for measuring the Blood Pressure, an air pump to inflate a cuff surrounding the finger with sufficient pressure to prevent blood flow, Most of the Finger Sensors and inaccurate but with the proper algorithm it can be more accurate.
- Oxygen Level Sensor - The pulse oximeter shines 2 lights through your fingertip, one red light and one infrared light. Blood containing lots of oxygen absorbs more infrared light and lets more red light pass through it. Blood without enough oxygen absorbs more red light and lets more infrared light pass through it.
- Heartbeat Sensor - Heart beat sensors are designed to give digital output heart beat when a finger is placed on it. When the heart beat detector starts working, the light emitting detector (LED) blinks simultaneously for every heartbeat.

Materials\Sensors

Sugar Level Sensor - **Our body creates blood sugar by digesting some food into a sugar that circulates in your bloodstream, a tiny needle inside the ring will often pinch the finger and will check the sugar level in the blood, the needle will be changed often, one solution can be a synthesizer inside the ring but at a cost of bigger ring.**

Also we will need a high quality materials for the Ring endurance and the user’s comfort.

Cloud

- All the patients information will also will be saved in a Cloud storage for backup.
- Data synching will occur often as possible to prevent data loss.
- Security must be good to prevent data leakage, theft and deletion.
- Cloud service must provide a good Firewall protection,Penetration Testing and avoiding public internet connections.
- A lot of users means bigger cloud storage, which might be overwhelming and will cost a lot to maintain and secure it.

Mobile application

The patients will also be provided with an application that will let them see all the information the ME Ring collects on them this will give them some general understandings about their health condition and allow them to monitor their own health and indices.

Each user will be granted his own credentials to log in to his own medical profile, there he could also see medical suggestions which will be suggested by the medical center or even by his doctor himself.

Possible thing we could add to the mobile application is the option to create an appointment with a specific doctor.

Mock Up - Main requirements

- **Login System:**

  008 - he app needs to have a secure login system
  030 - Users will have accounts they will need to log into

- **Sensors:**

  023 - The ring needs to be able to measure blood pressure automatically at times set by the doctor
  024 - The ring needs to be able to measure oxygen level automatically at times set by the doctor
  025 - The ring needs to be able to measure heartbeat automatically at times set by the doctor
  026 - The ring needs to be able to measure sugar level automatically at times set by the doctor
  016 - The app needs a medical measurement display menu

- **Emergency Button:**

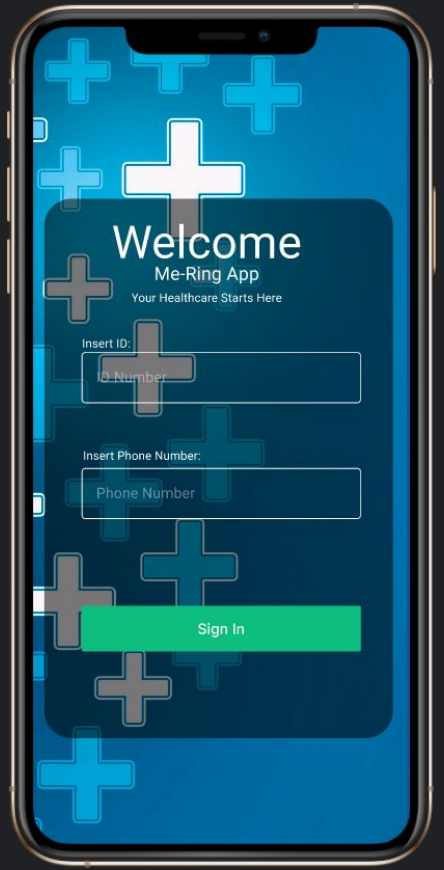
  009 - The app needs to have a emergency button

- **Doctor Appointment**

  011 - The app needs to have a ‘Doctor Appointment’ button

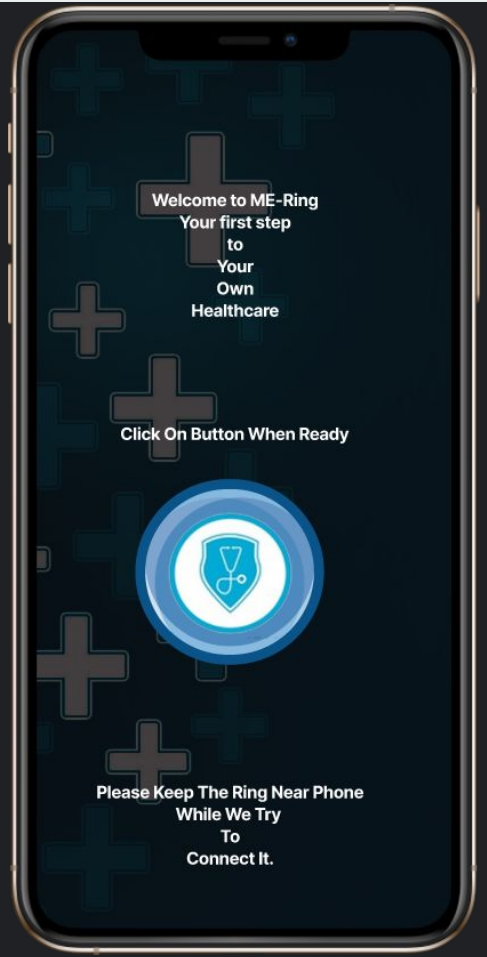
Mock Up

- On Boot, Login screen is prompted.
- Each patient that has a ring is registered automatically in the Database.
- Patients login using their ID and Phone Number.



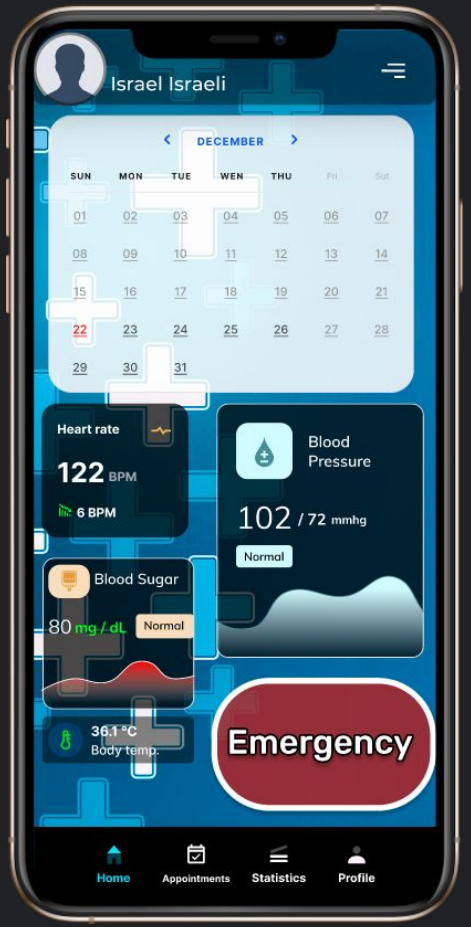
Mock Up

- After the user is logged in successfully.
- The patient need to connect his ring to the app.
- By clicking on the button, the user will be conncted to the up and will be able to use the app freely.



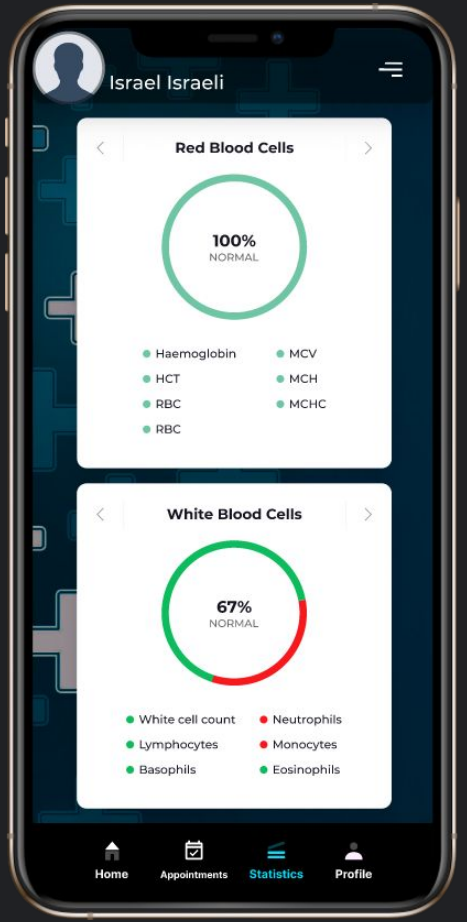
Mock Up

- Application’s main screen.
- On main screen patient can see his own measurements.
- Emergency button, which on click calls Ambulance if needed.
- Calendar which shows Appointments(if there is).
- Navbar at the bottom.
- Rest of the menu is on the 4 line at the top near profile picture.



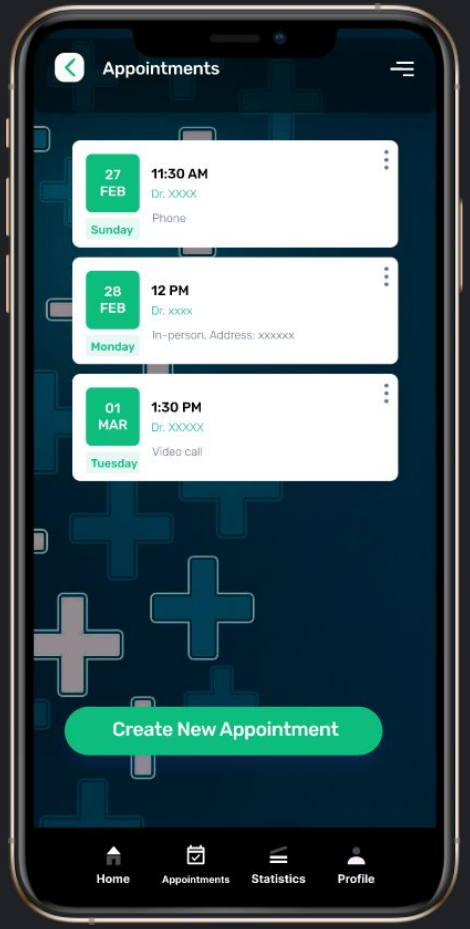
Mock Up

- Pressing on Statistics on the navbar transfers to the statistics screen.
- At this screen patient can have a more detailed information about himself.
- Swiping left or right changes the category.



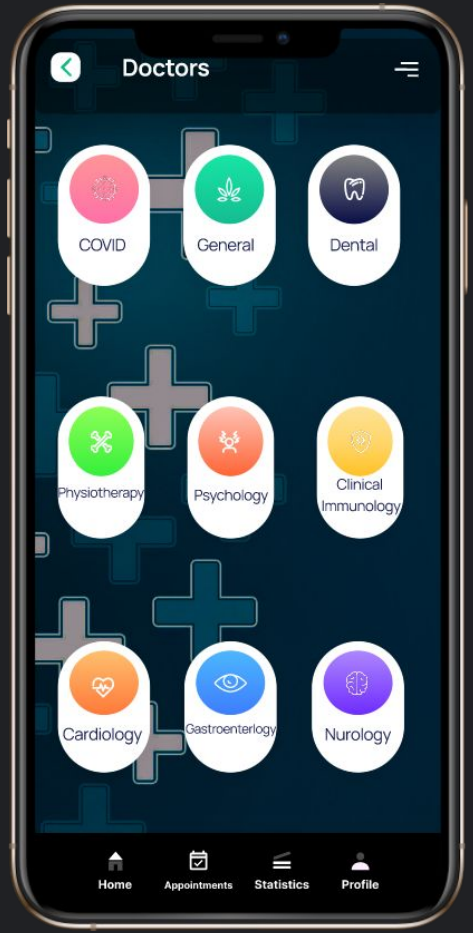
Mock Up

- Clicking on the Appointments, shows if there is currently any appointments.
- Patient can create a new appointment if needed.
- Clicking on the 3 dots on the appointment, allows patient to cancel the appointment.



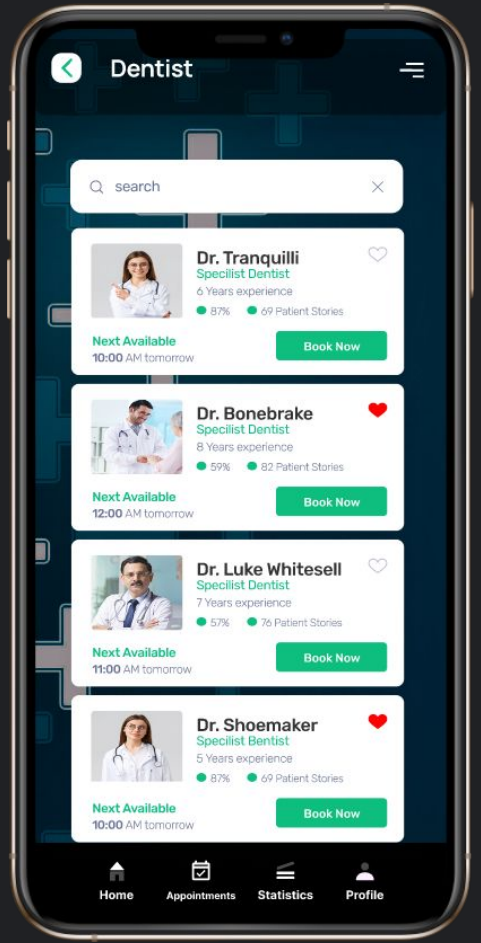
Mock Up

- Upon creating a new appointment, there's a variety of categories to choose from.
- Each Category shows it's own doctors.



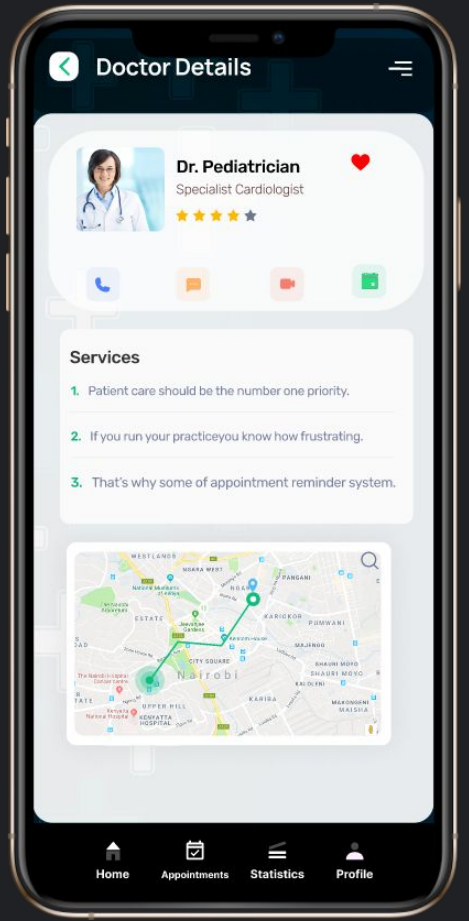
Mock Up

- After Choosing category, the patient can choose which doctor he wants.
- Each doctor tab shows closest appointment.
- Each doctor has a rating by other patients as well the doctor’s experience.



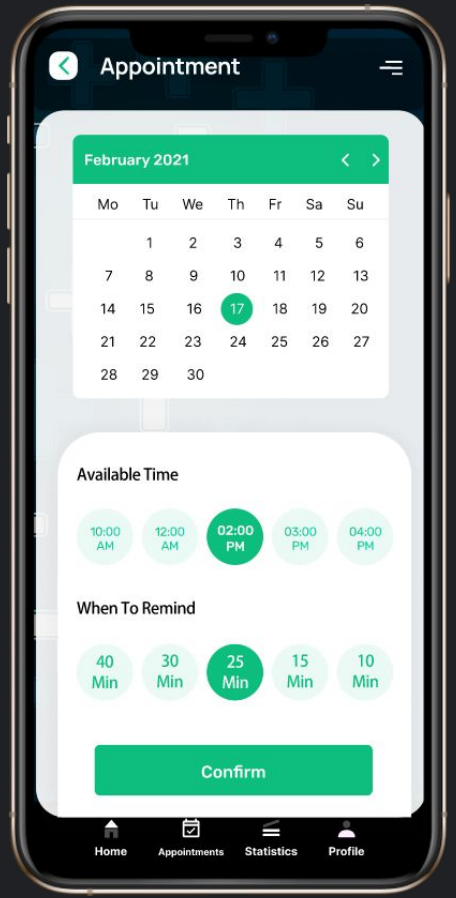
Mock Up

- Before choosing a doctor, patient can see details about each doctor such as location, services,rating and contact info.



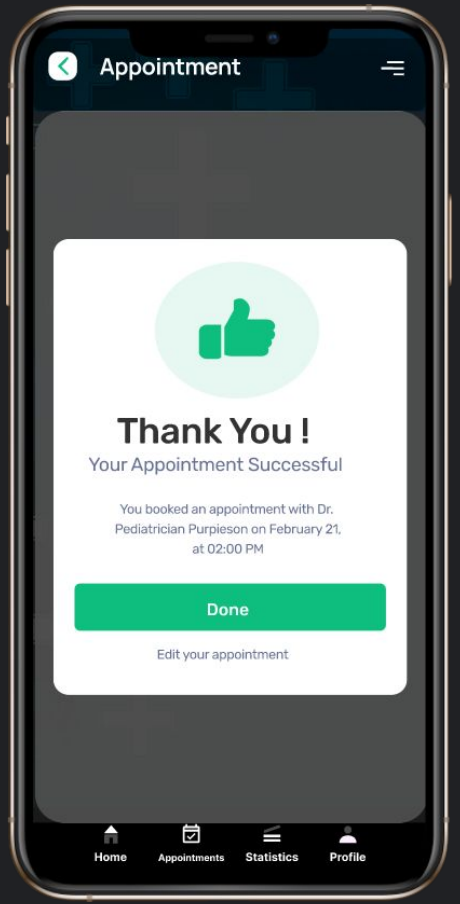
Mock Up

- Clicking on “Book Now” transfer to make appointment window.
- Here patient can choose which Date\Time as well as when to remind him as he wants.
- If specific date does not have any appointments, nothing will show up at the “Available Time”.



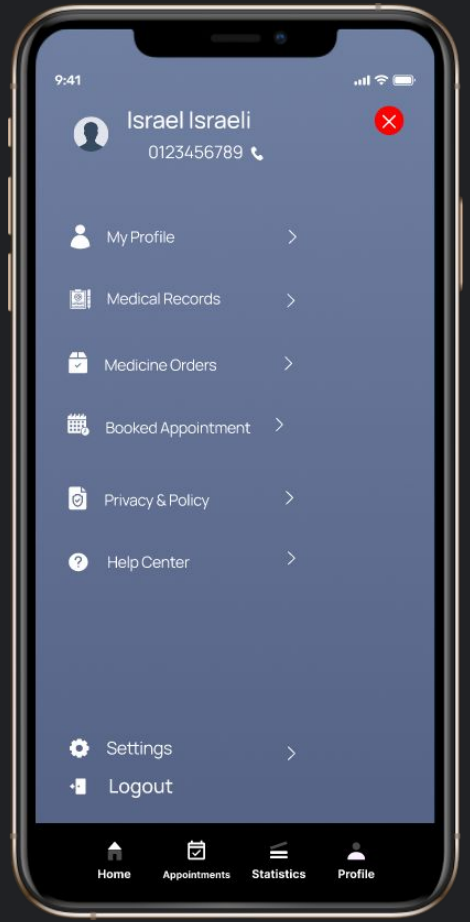
Mock Up

- After making a successful appointment, a window will prompt to “Confirm” or Edit.
- When appointment is done it will show up on the “Appointments” screen.



Mock Up

- Clicking on the 4 line near profile will open a menu.(this one).
- User can jump from page to page through this menu also.
- My profile is the option to edit Patient Information such as address, Phone number, Contacts and such.
- Medical record is for patient's history such as previous appointments.
- Booked Appointments same as Appointments at the bottom.



Mock Up

- Patient’s Profile.
- Only Phone Number/Address/Location and Secondary Contact are editable.