

HUMAN COMPUTER INTERACTION

Fitness Watch And It's Interface

INTRODUCTION

Computer based device: A Fitness watch

DESCRIPTION:

A fitness band/watch is a wearable device with sensors embedded in it. A wrist-worn device that help an individual in self-monitoring their activities. It can detect some combination of walking steps, running distance, heart rate, sleep patterns and swimming laps.

It helps in setting fitness goals such as meeting a basic regular exercise activity goal, burning a specific number of calories in the day, and even drinking a set number of glasses of water.

An app is to be installed on the phone to track or log fitness activities. There are a number of options in the app. It is easy to use and very convenient to measure different parameters.

Any typical fitness tracker comes with around 16 sensors inside. Some may be fully loaded with many kinds of sensors, others may have a few basic ones.

A 3-axis accelerometer, a gyroscope, a compass, light sensor and an optical heartbeat sensor are some basic ones.

ACCELEROMETER

To track movement in every direction. An accelerometer sensor takes inertial measurements of velocity and position.

GYROSCOPE

A gyroscope senses rotational motion and any changes in orientation. When a 3-axis gyroscope is used, that means that a fitness tracker can get 6 degrees of motion.

OPTICAL HEART RATE MONITOR

The optical heartbeat sensor is a pulse sensor. This sensor measures your pulse by using light on your skin. The light sensor changes colors as the blood flows through your wrist.

OTHER SENSORS

Other sensors that fitness trackers may have include a temperature sensor, or a bioimpedance sensor, that can collect heart rate data.

SCOPE OF THE PROJECT

To develop a user-friendly and easy to use UI of a fitness watch for people of all ages. The scope of this project is also to gather the user requirements, analyse the requirements and conduct task analysis, usability testing and heuristics evaluation. Implementation of this project is beyond our scope.

PROBLEM STATEMENT

project is also to gather the user requirements, analyse the requirements and conduct task analysis, usability testing

REQUIREMENTS

As a user i need:

- An easy to use interface with minimalist design.
- A direct exit option in mobile app to leave the application if required.
- A compass, light sensor and an optical heartbeat sensor.

Sensors required: The 3-axis accelerometer counts your steps. This sensor allows us to determine the frequency, duration intensity, and patterns of your movement.

A gyroscope senses rotational motion and any changes in orientation.

The optical heartbeat sensor is a pulse sensor.

The light sensor changes colors as the blood flows through your wrist

FEATURES

1. Counting Steps – Pedometer
2. Monitoring heart rate
3. Counting Calories a) Burned calories b) Consumed calories
4. Monitoring other physical activities like swimming, skipping, jogging
5. Determining blood oxygen level.

A good and easy UI to understand

TARGET USER COMMUNITY

The target audience for this is men and women ranging in ages from 25 to 40 who want to be more active on a daily basis. They are fit individuals or individuals with desires to track their exercise.

However over the years people of all ages have started making its purchase. From middle-school kids to 50-60 year old senior citizens, all of them buy it for various reasons.

EXISTING PRODUT'S DESIGN



LIMITATIONS

- Small Screen size:

The watch has a very small display which makes it difficult for users to click or choose what's on screen accurately.

- Not stand-alone devices:

Wearable technology is usually linked to separately standing smart devices due to the small processor size. An app is to be installed to keep track of fitness activities, however the app used for this purpose have user interface problems and it does not really help as expected.

- Battery run-time:

It has complex and inefficient charging system. The battery run-time of fitness trackers can be a critical issue, as most of them do not last long.

- Inaccurate Measurement :

Some devices do not provide results with desired accuracies. For eg. when the user wearing a fitness band shakes arms, often that get counted as a step.

POSSIBLE SOLUTIONS

- For display problems either the screen size of the screen should be increased or the the icons to be selected should have sufficient space in between so that the user don't find any difficulty in selecting the features.
- The user interface can be improved by improving typography, considering the spatial relation between items on the page.
- Adding a text-to-speech feature will enhance the interaction with the system. User will be able to ask questions and get answer in the form of audio, this feature will also be suitable for visually impaired person.
- As the charging system is very sensitive and even a little disturbance near charging socket causes problems in charging, wireless charging system be taken into consideration.
- Options like putting the device in stand-by mode when not in use should be available to increase the battery life.
- A feature that should be included in all fitness tracker are notifications or reminders for users to move or be active. Additionally, users should be able to control how often these notifications occur.

TASK ANALYSIS

Logging a Task on Device

1. Get the fitness band
2. Wear band on your wrist.
3. Switch the device on.
 - 3.1. Locate the power button.
 - 3.2. Touch the button to wake the screen.
4. Swipe screens to reach workout tab and start.
 - 4.1. Click on 'Workout' menu
 - 4.2. Find the desired exercise icon.
 - 4.3. Touch the icon to start.
5. Pause/resume
 - 5.1. To pause, tap the screen once.
 - 5.2. To resume, tap once again.
6. Log activity
 - 6.1. Touch the power button once to finish and save the data.

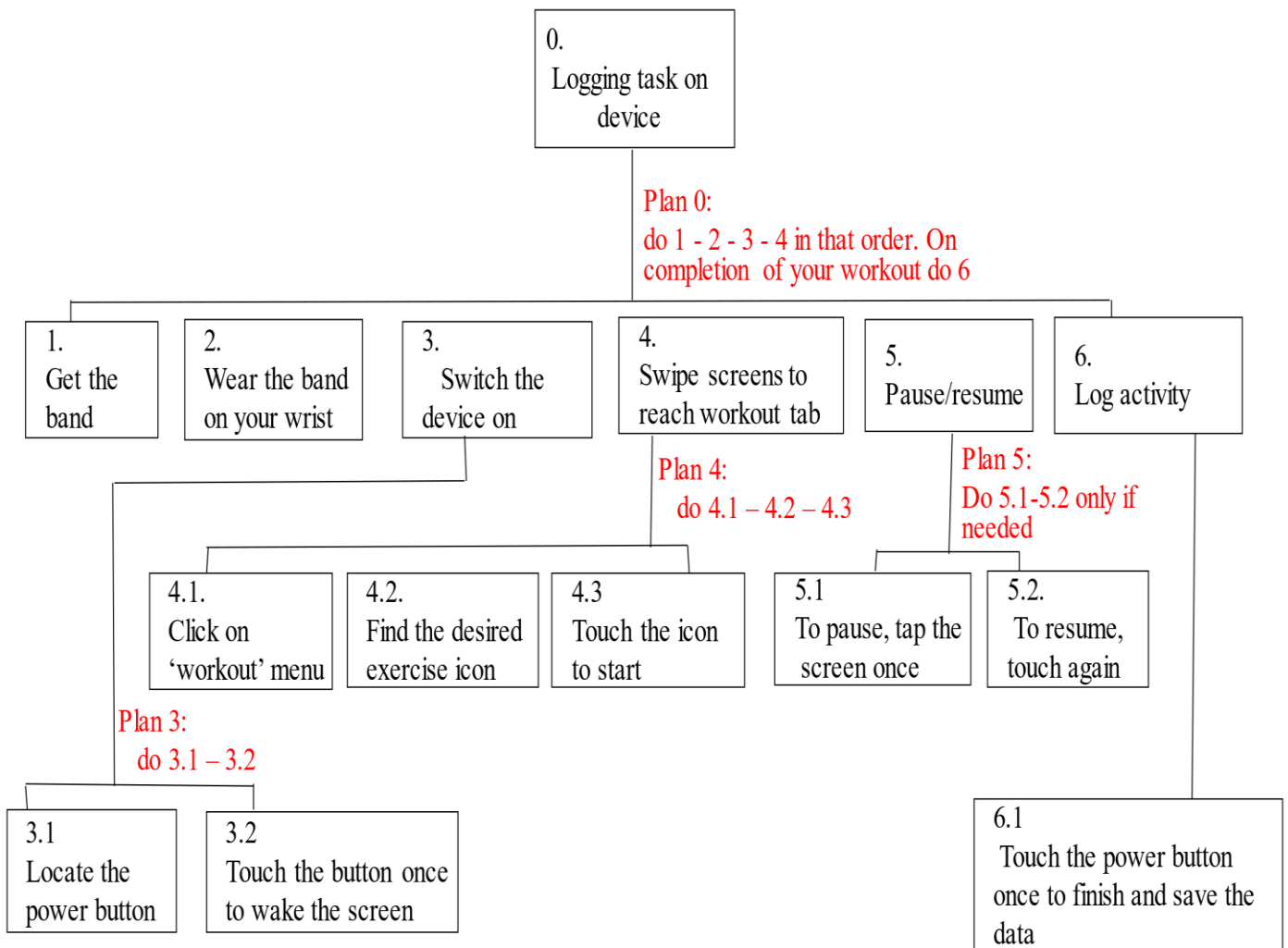
Plans:

Plan 0: Do 1—2—3—4 in that order. On completion of your workout do 6.

Plan 3: Do 3.1—3.2

Plan 4: Do 4.1—4.2—4.3.

Plan 5: Do 5.1—5.2 only if needed.



Check status of your goals.

1. Get your phone.
2. Switch the phone on.
 - 2.1. Locate the power button.
 - 2.2. Press the power button to wake the screen.
 - 2.3. If password protected, enter the password or pattern to unlock.
 - 2.4. If not, simply swipe up.
3. Open the app.
 - 3.1. Locate the app icon.
 - 3.2. Touch the icon.
4. Go to 'My Progress' tab.
 - 4.1. Locate the tab.
 - 4.2. Select the tab.
5. Go to activity you want to check.
 - 5.1. Check your completed task.
 - 5.2. Turn reminders on for yours incomplete task.
6. Close the app.

Plans:

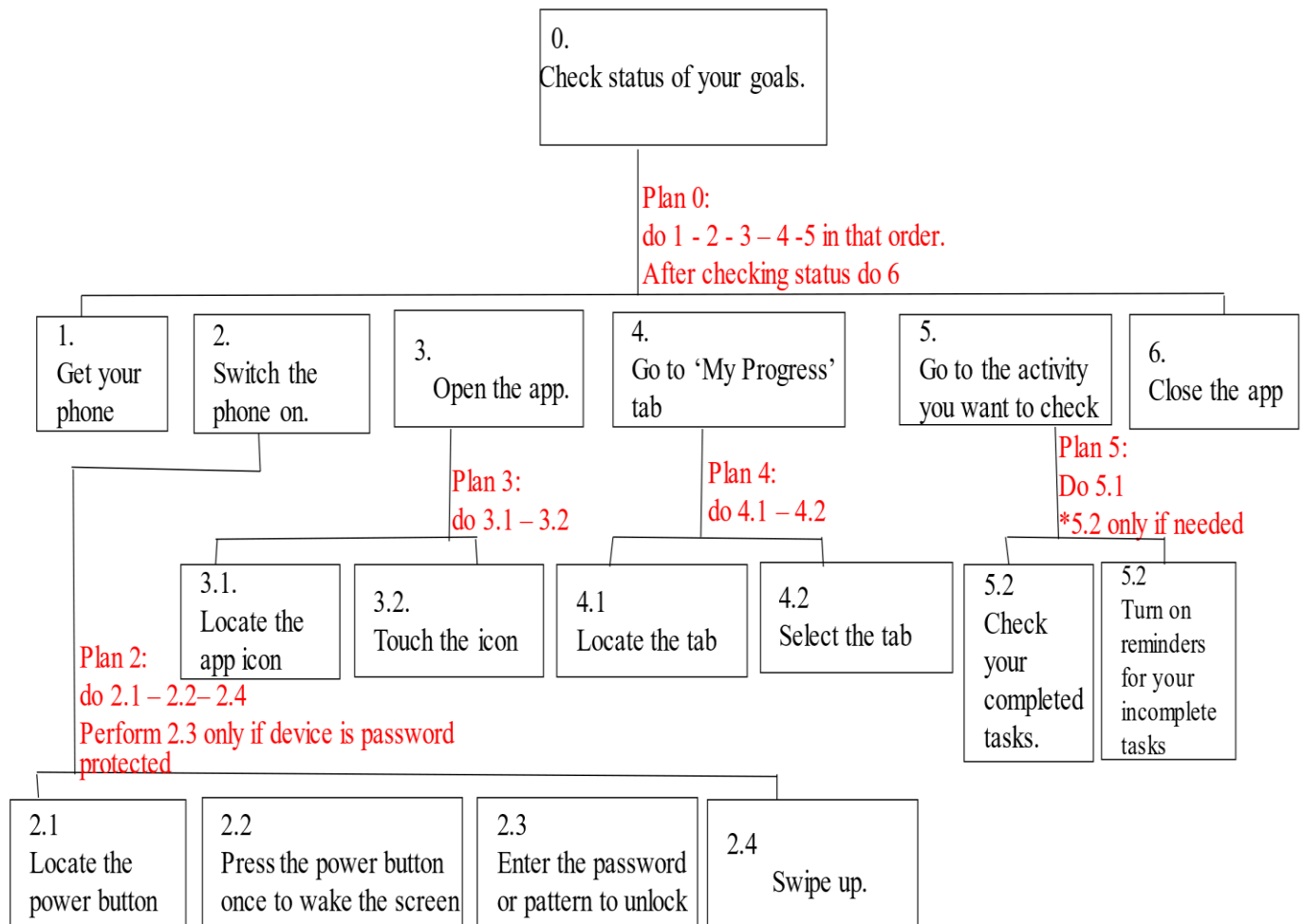
Plan 0: Do 1—2—3—4—5 in same order. After checking status do 6.

Plan2: Do 2.1—2.2—2.4. subtask 2.3 to be done only if device is password protected.

Plan 3: Do 3.1—3.2

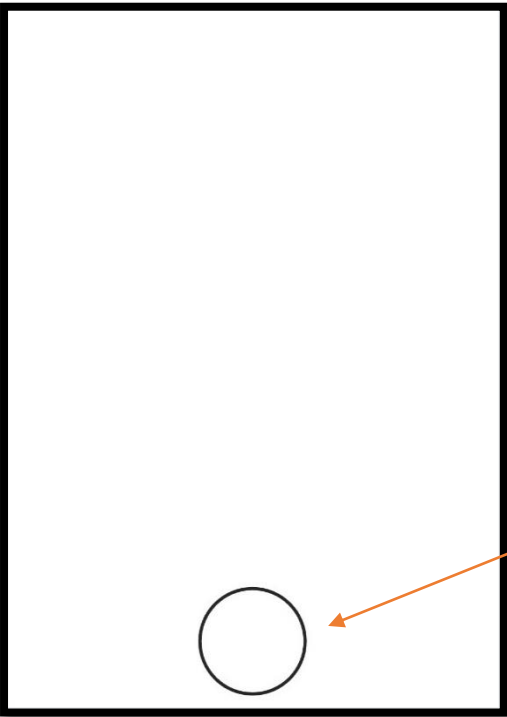
Plan 4: Do 4.1—4.2.

Plan 5: Do 5.1. 5.2 to be done only if needed.



STORY BOARDING

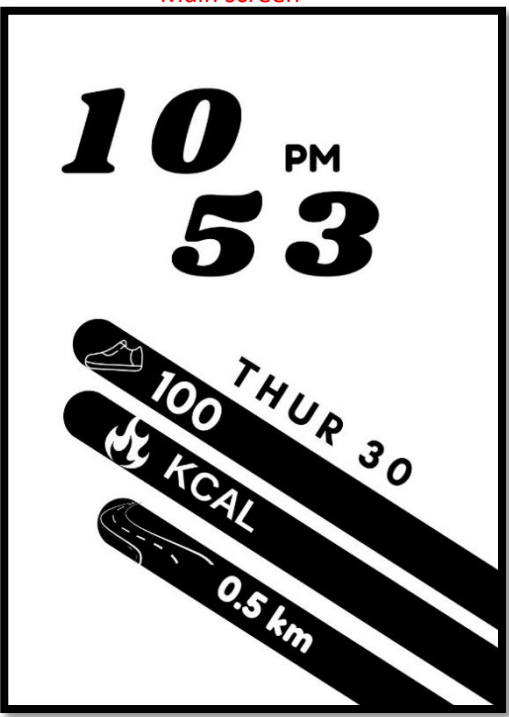
1. MONITORING EXERCISE LIKE SWIMMING ON DEVICE



Touch the power button
to wake the screen

As user touches the
power button the
screen gets activated

Power touch
button



User swipes to see various options



PEDOMETER

User swipes up to see
more options



SLEEP MONITOR



User swipes to
see more options



CHECK BLOOD OXYGEN LEVEL OF OUR BODY

One can choose this option to start the
monitoring their exercise



Start

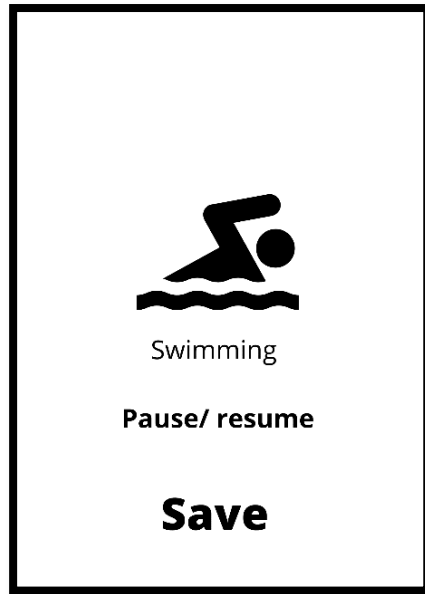
User now swipes to choose
desired exercise among all
the options present

Swipes more to
select desired
workout



Start

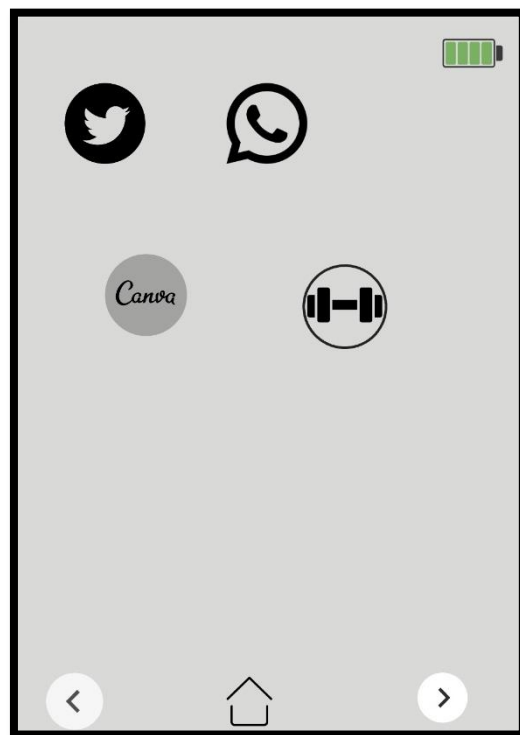
Once user finds his/her desired
exercise he/she may click the start
button



Options are available to pause, resume and save data

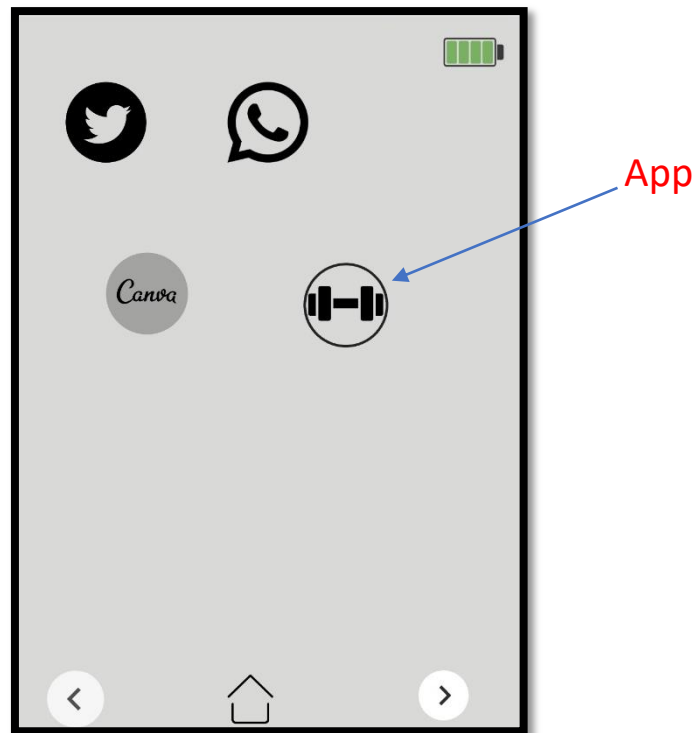
2. CHECK STATUS OF YOUR DAILY GOALS

- Switch on your phone.

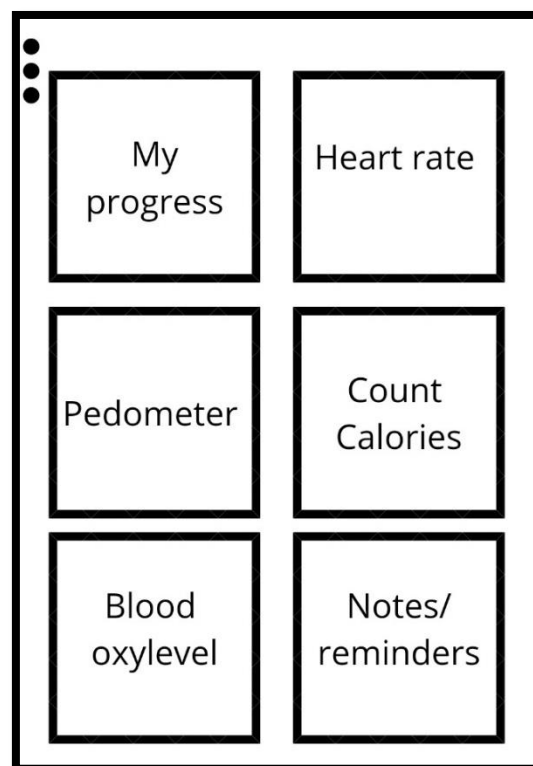


Home screen of your mobile phone

- Select the fitness app

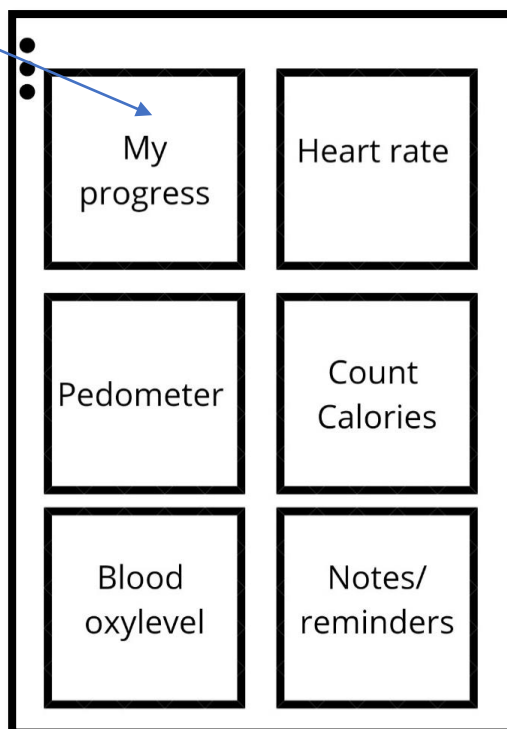


- home screen of the app will appear.

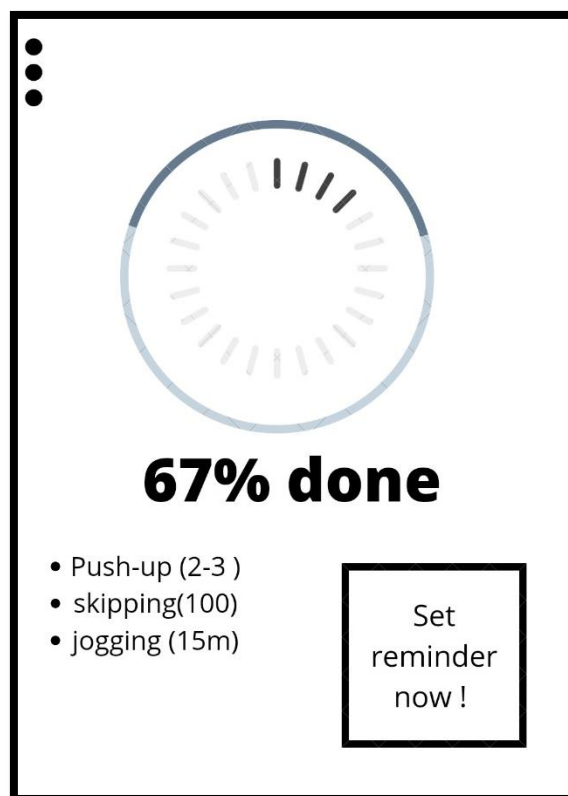


- choose “My progress” tab.

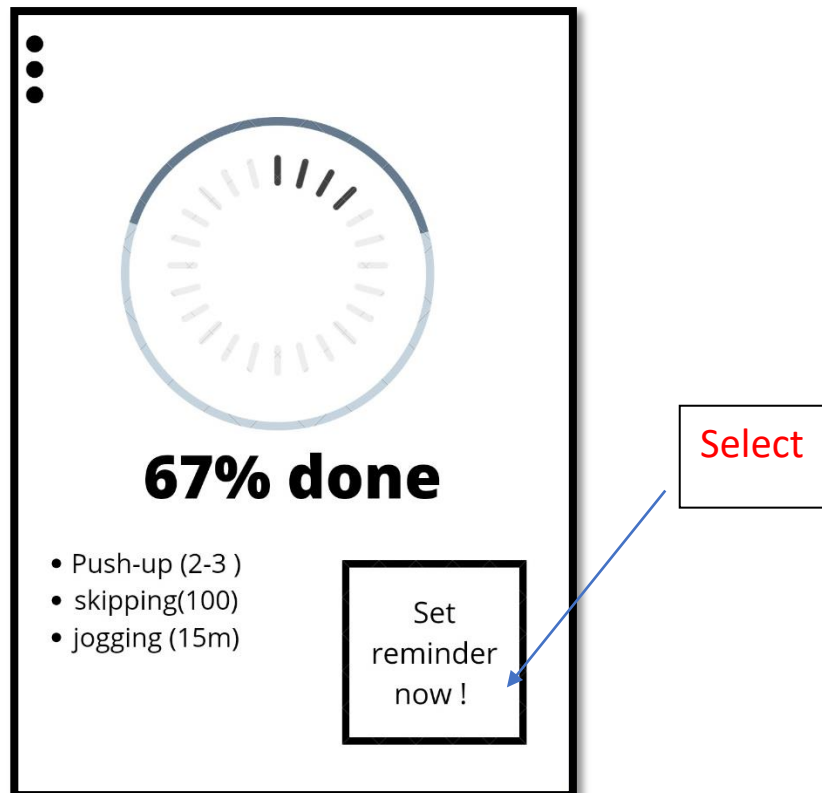
Select



- A screen will appear which shows your percentage of completed tasks of the day also lists out your incomplete task.



- You can select “set reminder now!” option, then the app will remind throughout your day to complete your tasks.



INPUT OUTPUT DEVICES

Output Devices

1.Screen

Main output device

Shows icons and displays data

2. Speaker

Sound form of the data or instructions sent by device

Increases interaction by including visually impaired users as well

Input Devices:

1.Pedometer

Counts number of steps taken by monitoring movement of hand

One of the parameters in calculating calories burned

2. Microphone

Used for giving vocal instructions to the device

Increases interaction with device

3. Touchscreen

Used for interacting with icons on the screen

Selection, swiping, playing, pausing etc.

4. Touch button on the bottom

Used to wake up the screen/ ending workouts

5. Sensors –

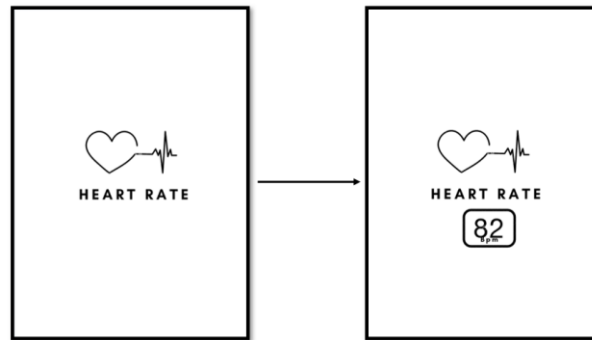
Checks heartrate, oxygen saturation level, body temperature.

SUBTASK	INTERFACE DESIGN CHOICE	JUSTIFICATION
Press power button to switch device on	<ul style="list-style-type: none">• Touch button• Bottom of screen/round in shape	<ul style="list-style-type: none">• Familiar interface• Catch attention
Selecting/ changing different features in band.	<ul style="list-style-type: none">• Swipe up on the screen.	<ul style="list-style-type: none">• Familiar interface.
Change music through connected band.	<ul style="list-style-type: none">• Next button on the right• Previous button on the left	<ul style="list-style-type: none">• Cultural consideration (moving from left to right)
Conforming/ submitting your choice	<ul style="list-style-type: none">• Confirm option in either bold or enclosed in box in red• Confirm button in center	<ul style="list-style-type: none">• Familiar interface• In bold or in box to catch attention.
Giving commands through voice recognition option	<ul style="list-style-type: none">• Microphone	<ul style="list-style-type: none">• Familiar interface• Improves interaction
Display any information to user	<ul style="list-style-type: none">• Screen display	<ul style="list-style-type: none">• Show status• Familiar interface
Showing completed tasks on app	<ul style="list-style-type: none">• Show on a page/screen image with condensed instructional content.	<ul style="list-style-type: none">• Present condensed content.
Display information mostly in the form of graphics.	<ul style="list-style-type: none">• Screen display	<ul style="list-style-type: none">• Grabs user's attention• Easily understandable

HEURISTIC EVALUATION

1. VISIBILITY OF SYSTEM STATUS

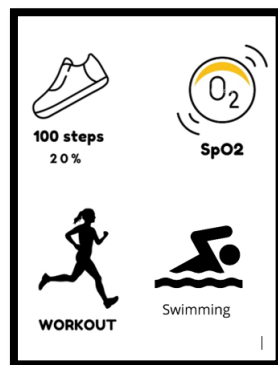
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time. As soon as the icon of heart rate is clicked which is used to count heart rate of a person wearing the watch in that particular instance, the heart rate gets displayed as required. The users are aware of this operation and can easily check their heart rate any time.



The icon is visible so that the users are completely aware of its presence and availability. Also the heart rate value shown on the screen after 2-3 seconds as soon as the user touches the icon is the system response.

2. MATCH BETWEEN SYSTEM AND REAL WORLD

The system should speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.



Here you can clearly see that the system's display contains human interpretable language. The icons displayed are easily understandable by the users. Users be able to understand its meaning without having a good lookup of any word definition

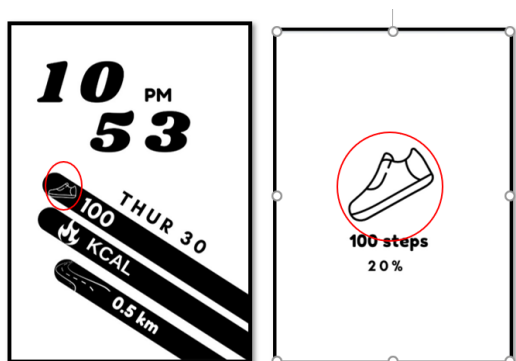
3. USER CONTROL AND FREEDOM

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

By sliding through different features one may skip the desired option in a hurry in such case he/she can easily slide back up or down to select the desired option. The scope of error is very low as it is all about selecting an option and getting displayed what is desire .

4. CONSISTENCY AND STANDARDS

It is to be ensured that both graphic elements and terminology are maintained across similar platforms. The icon that represents one category should not represent a different concept when used on a different screen.



It can be seen that that icons vary according to different functionality but they hold the same design pattern throughout. the fonts, icon's design style, its size remains same in each interface.

5. ERROR PREVENTION

Eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action. The scope of error has been reduced to maximum but even if it occurs it can be easily rectified. If any errors in sliding, selecting, etc. is done errors can be indicated by a vibration of the system and a simple prompt following the standard design patterns and minimalism principles in order to reduce any confusion that can be caused.

6. RECOGNITION RATHER THAN RECALL

Rather than creating new design wheel patterns for the interface we adopted design patterns and mental models that people were already familiar with if they have used a touchscreen mobile. Such as viewing apps on the screen, being able to navigate smoothly, etc. Also icons like showing no. of steps walked, calories burned, are displayed on the main screen to to incorporate in the target audience a context to remember.

7. FLEXIBILITY AND EFFICIENCY OF USE

The device allows users to tailor frequent actions. It allows quick navigation and faster navigation with less interaction. The section shows the no. of steps walked even when the device is actively being used.

8. AESTHETIC AND MINIMALISTIC DESIGN

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility. The interface design keeps clutter to the minimum and only displays the components necessary for the functioning of the application smoothly any component that can inhibit memory retrieval or can cause ambiguity has been either eliminated or kept to the minimum as can be seen in the image of the prototype. No component on the screen causes any ambiguity to the navigation and shows only content that is requested.

9. HELP USERS RECOGNISE, DIAGNOS AND RECOVER FROM ERRORS

Although the scope of error has been reduced to maximum, but still if an error occurs device prompts a simple and short message with a slight vibration and offers detailed help in "i" section. No error codes are displayed only messages to reduce any confusion that can be caused

10. HELP AND DOCUMENTATION

By clicking on the "i" tab, the user can easily gather information about anything regarding interface and its functionality. A step-by-step guide is made available to user to reduce the chance of error. It is provided in the interface of every functionality to ease access.

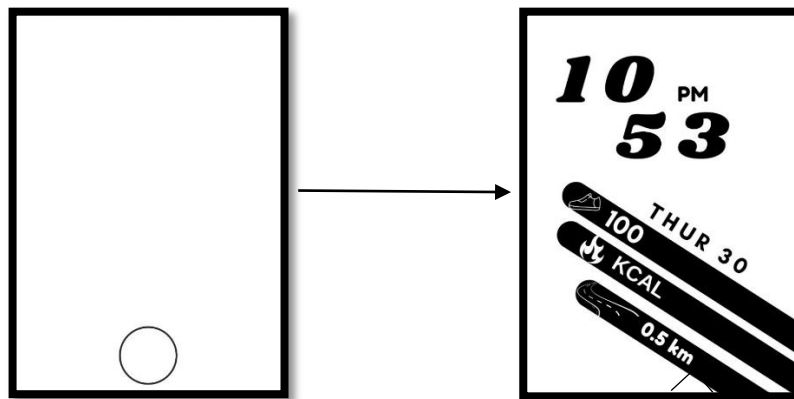
COGNITIVE WALKTHROUGH

TASK: DETERMINING HEART RATE

The task is to get displayed the heart rate of the user. These get displayed on how sensitively the sensors detect the activities. Once the icon on screen gets selected the page showing the heart rate of the user at that instant is shown in BPM. We will assume that the user is familiar with interface design. The next step in the walkthrough is to identify the action sequence for this task. We specify this in terms of the user's action (UA) and the system's display or response (SD).

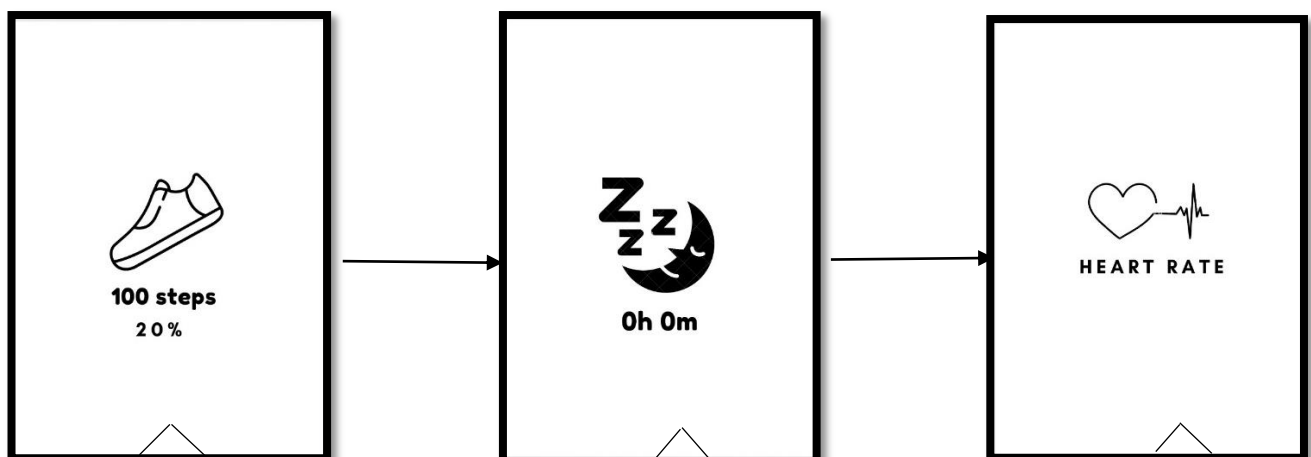
UA 1: Touch the power button to wake the screen

SD1: Main screen gets displayed.



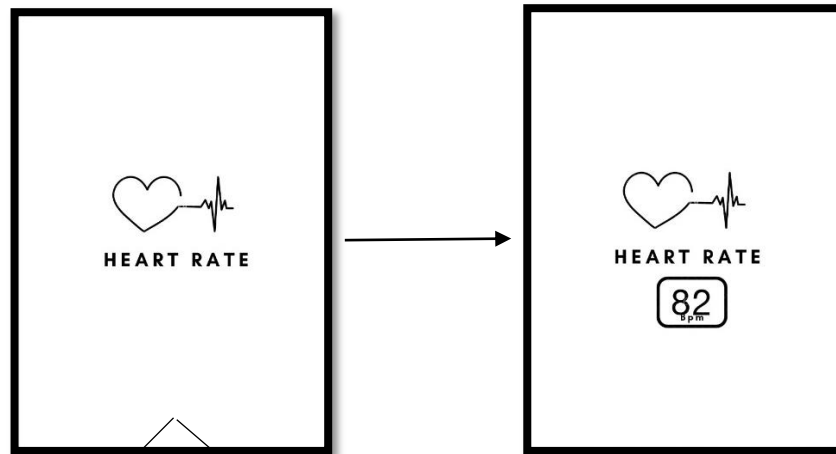
UA 2: Swipe up from the home page to navigate to the heart rate monitor icon

SD 2: The icon gets displayed. Displays several icons on swiping, one of them is heart rate monitor.



UA 3: Select the heart rate monitor icon.

SD 3: Heart rate monitor opens. The heart rate of the user in BPM is shown



UA 1: Touch the power button to wake the screen

QUESTION 1: Is the effect of the action the same as the user's goal at that point?

The power button initiates the main screen of the interface. It is reasonable to assume that the user would be trying to go to main screen as his first goal.

QUESTION 2: Will users see that the action is available?

The power button is clearly visible

QUESTION 3: Once users have found the correct action, will they know it is the one they need?

It is clear that the button visible will wake the screen.

QUESTION 4: After the action is taken, will users understand the feedback they get?

As soon as the user touches the power button the main screen gets displayed as a system response. It is reasonable to assume that the user would recognize these as indicating successful completion of the first action.

So, we do not find any potential usability problem in UA1.

UA 2: Swipe up from the home page to navigate to the heart rate monitor icon

QUESTION 1: Is the effect of the action the same as the user's goal at that point?

As the user now wants to check his/her heart rate he will swipe to select the desired option. When the user swipes various functionalities that can be performed by the interface gets displayed one of them will be the heart rate monitor. The aim of the user was to locate the heart rate monitor icon. The icon gets displayed which is same as the user's goal at that point.

QUESTION 2: Will users see that the action is available?

A small arrow mark is displayed all the time by which the user can easily understand that to navigate through pages he/she will have to swipe up.

QUESTION 3: Once users have found the correct action, will they know it is the one they need?

As the user swipes through the different screens various icons appear to the user which makes it clear that to navigate one must swipe up/down. It is reasonable to assume that the user will know that this is the only action they need to perform to accomplish their final task.

QUESTION 4: After the action is taken, will users understand the feedback they get?

Yes, the user will understand the feedback as the screen gets changed whenever the user will swipe up/down showing different functionalities.

So, we do not find any potential usability problem in UA2.

UA 3: Select the heart rate monitor icon.

QUESTION 1: Is the effect of the action the same as the user's goal at that point?

Yes, the effect of the action is same as the user's goal at that point. When the user finally located the heart rate icon then the next ultimate aim of the user will be to get displayed his/her BPM. It is reasonable to assume that the user will select the icon to accomplish his/her task.

QUESTION 2: Will users see that the action is available?

Yes, the icon gets displayed.

QUESTION 3: Once users have found the correct action, will they know it is the one they need?

The option for the heart rate monitor is simply displayed by a simple diagrammatic icon of heart which is easily interpretable by the user.

QUESTION 4: After the action is taken, will users understand the feedback they get?

Yes, the user will understand the system's response. As soon as the user selects the icon his/her heart rate gets displayed in BPM which is the unit of measuring the heart rate.

So, we do not find any potential usability problem in UA3.

TASK ANALYSIS FOR CHECKING STATUS OF YOUR GOALS	
Goal/output	To check status of your daily workout using mobile app interface.
Input	<ul style="list-style-type: none"> The mobile application should have a stable internet connection. The mobile and the fitness watch should be connected through Bluetooth. The both should have adequate battery to function.
Assumption	<ul style="list-style-type: none"> User should know how to use the device. User should know all the functionality it does. User knows the required steps to check the his/her status.
Steps	<ol style="list-style-type: none"> 1. Get your phone. 2. Switch the phone on. 3. Open the app. 4. Go to "My progress" tab. 5. Go to activity you want to check. 6. Close the app.
Time for experts	3-4 minutes
Instructions	Make sure to connect both device and the app before you workout so that the app will collect your data.
Notes	Closely observe the outcome of the process

TASK ANALYSIS FOR LOGGING A TASK ON DEVICE	
Goal/output	To start your fitness band in order to log a task on device.
Input	<ul style="list-style-type: none"> The device and the mobile app should be connected via Bluetooth The device should have adequate charge so that it doesn't get run out of battery during your workout.
Assumption	<ul style="list-style-type: none"> User should know how to use the device. User should know all the functionality it does. User knows the required steps to check the his/her status.
Steps	<ol style="list-style-type: none"> 1. Get the fitness band wear it. 2. Locate the power button and switch the device on. 3. Swipe through screens to reach workout tab. 4. Click on "WORKOUT" menu. 5. Select among various options your desired task. 6. Touch "START" icon to start. 7. Click on "SAVE" option to log your activity
Time for experts	Depends upon users.
Instructions	Make sure to connect both device and the app before you start your workout so that the app will collect your data.
Notes	Pause/resume option is made available to the user for convenience.

User characteristics	Fitness watch user characteristics by group	
	Working adults	Middle age to senior citizens
Age	25-45	45-60
Sex	All genders	All genders
Physical limitations	May have some physical limitations for example- hearing or sight.	May have some physical limitations for example- hearing or sight.
Educational background	May have minimal educational qualifications. No educational qualifications as such are required other than being able to understand English and how health and fitness aspects.	May have only minimal educational qualifications
Computer IT use	May have some prior experience of computer or It USE	May have no experience at all.
Motivation	Could be very motivated to use the watch as people in these age group are more health conscious and will use the device to fullest.	Could be motivated to use the device but they may only limit their activities to check heart rate, oxygen level, no. of steps walked
Attitude	Attitudes may vary over the functionalities offered and the expectations as well as the amount time one takes to learn it or get used it to depending on the experience they've had with similar devices.	Attitudes may vary over the functionalities offered and the expectations as well as the amount time one takes to learn it or get used it to depending on the experience they've had with similar devices.