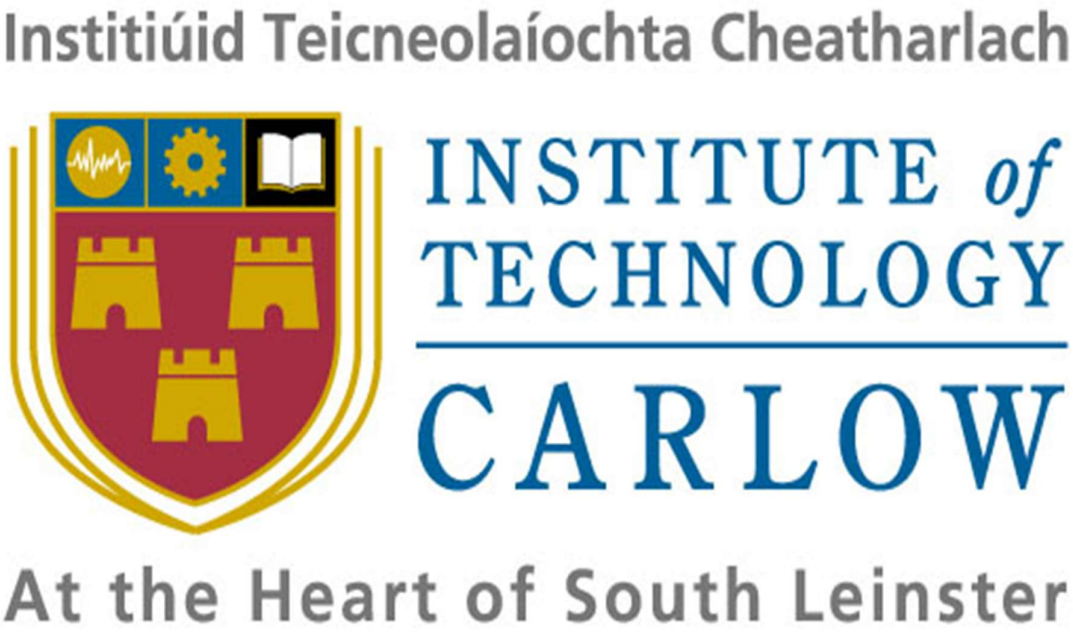

Department of Computing & Networking.

Bachelor of Science (Hons) in Software DevelopmentCW238

Design Manual.

Activity Monitor for Children with Autism.

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Contents

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Introduction

The goal of this document is to lay out the technologies and expand on the functionality described in the functional specification. A developer should be able to readily grasp the internal architecture of this program after reading this document, and thus begin the development of the application. The purpose of this document is to provide a more detailed technical and visual sketch of the application and how it should seem when finished.

The primary goal of the app is to enable parents, guardians, and caregivers track and monitor the activity levels of children with autism spectrum disorders in order to encourage them to engage in a more active daily routine. Java, C++, and SQLite will be used in the development of this application. System Architecture, ER Design, Use Cases, UI Design, Screen Navigation, and a description of the technology to be implemented will all be included in this design document.

System Architecture.

Below is the system architecture for my project . The architecture consists various technologies which are listed below.

- Android OS.
- Java & XML.
- SQLite
- Bluetooth Low Energy
- Arduino / MPU-6050 sensor / Bluetooth module.

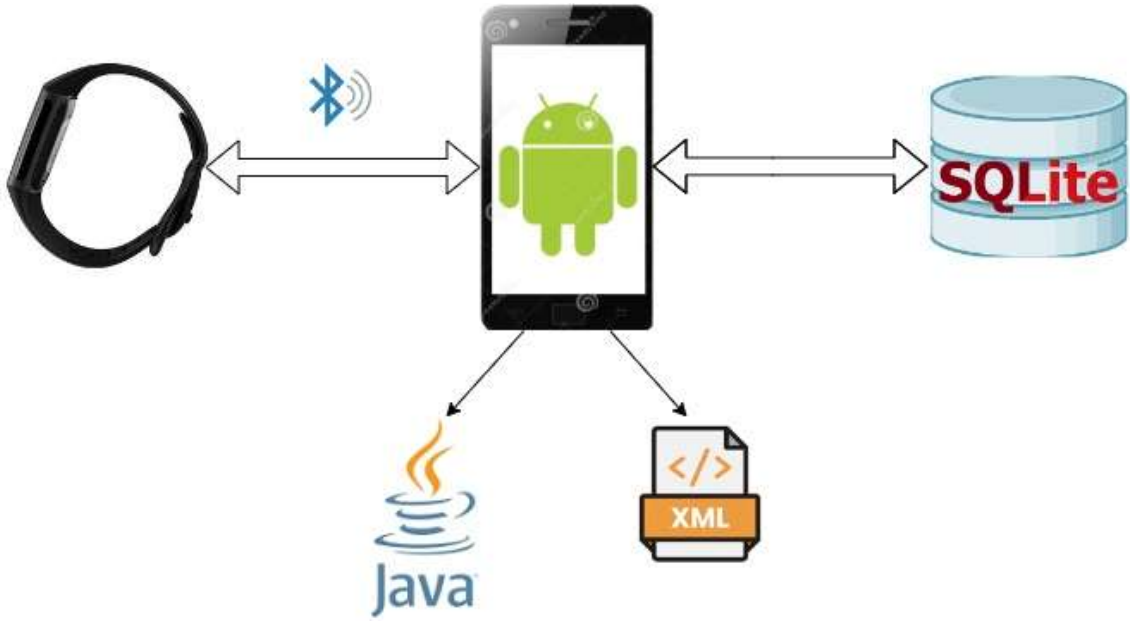


Fig 1. System Architecture

As previously mentioned in my research and functional specification documents, this project consists of two distinct parts, the hardware which includes the components of which the activity tracking device will be assembled with and then the accompanying app which will receive the activity data from the device and process it within the application.

Hardware

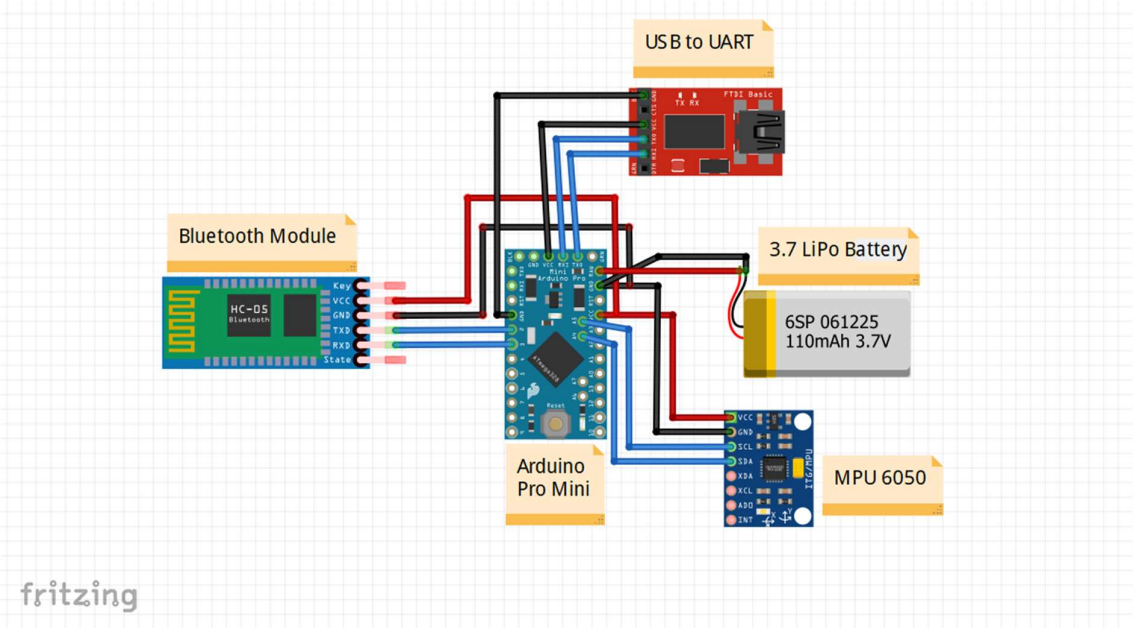


Fig 2. Circuit Diagram for wearable

The circuit diagram above was made using Fritzing, an open-sourced tool that can be used to assemble circuits and prototype electronics. The components are connected as follows

Firstly, the Bluetooth HC-06 module is connected to the Arduino Pro Mini by connecting the:

- VCC pin on the HC-06 to the VCC pin on the Arduino.
- GND pin on the HC-06 to the GND pin on the Arduino.
- TX pin on the HC-06 to the D2pin on the Arduino.
- RX pin on the HC-06 to the VCC pin on the Arduino.

Secondly, the MPU 6050 is connected the Arduino Pro Mini.

- VCC pin on the MPU 6050 to the VCC pin on the Arduino.
- GND pin on the MPU 6050 to the GND pin on the Arduino.
- SDA pin on the MPU 6050 to the A4 pin on the Arduino.
- SCL pin on the MPU 6050 to the A5 pin on the Arduino.

Next, the USB to UART is connected to the Arduino Pro Mini.

- VCC pin on the USB to UART to the VCC pin on the Arduino.

- GND pin on the USB to UART to the GND pin on the Arduino.
- TX0 pin on the USB to UART to the RX1 pin on the Arduino.
- RX1 pin on the USB to UART to the TX0 pin on the Arduino.

Finally, The LiPo Battery is connected to the Arduino Pro Mini.

- The (+) on the LiPo Battery to the RAW pin on the Arduino.
- The (-) on the LiPo Battery to the GND pin on the Arduino.

Software

The stepC system consist of an Android application developed in Java, with the apps UI being designed using XML and will supported by an SQLite database in the backend. The application will be connected to the wearable device via Bluetooth.

When the user opens the app, the first step to take is to connect the wearable to the application. Once connected the user navigates to the Settings screen. Here the user inputs specific data which will be passed to the Session page to be used later for the calculations required. The user then starts a new session. After receiving the activity data from the wearable, the raw accelerometer data is processed and converted to steps to be counted. When the session is finished by either pressing the pause button or by reaching the set goal, the users then saves the session data into the SQLite database which can be view later on the View Data Page as well as viewing the session data as a graph. The program will display a message to the user indicating whether the session data has been successfully inserted into the database or not.

Sequence Diagram.

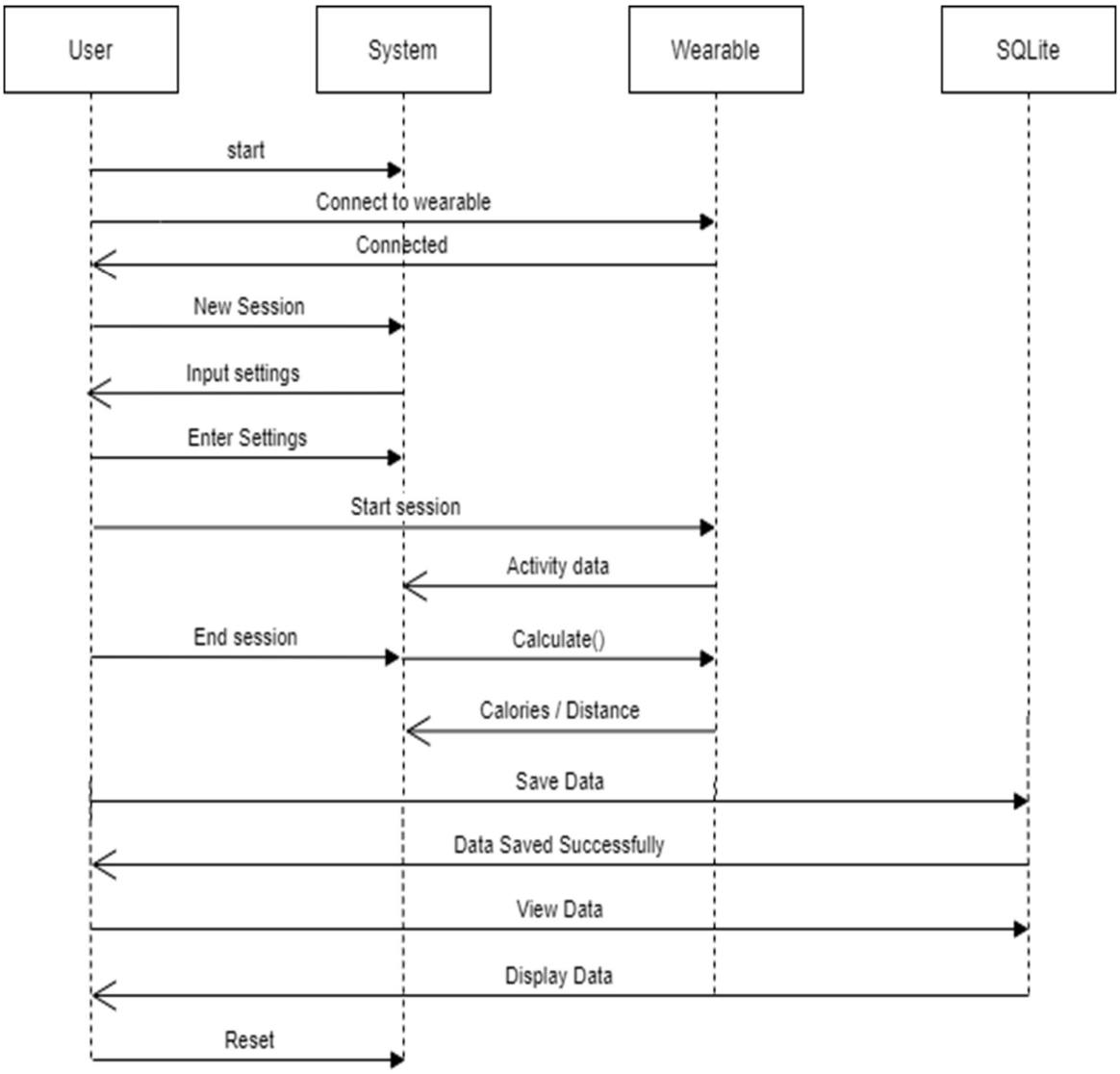


Fig 3. System Sequence Diagram

Class Diagram

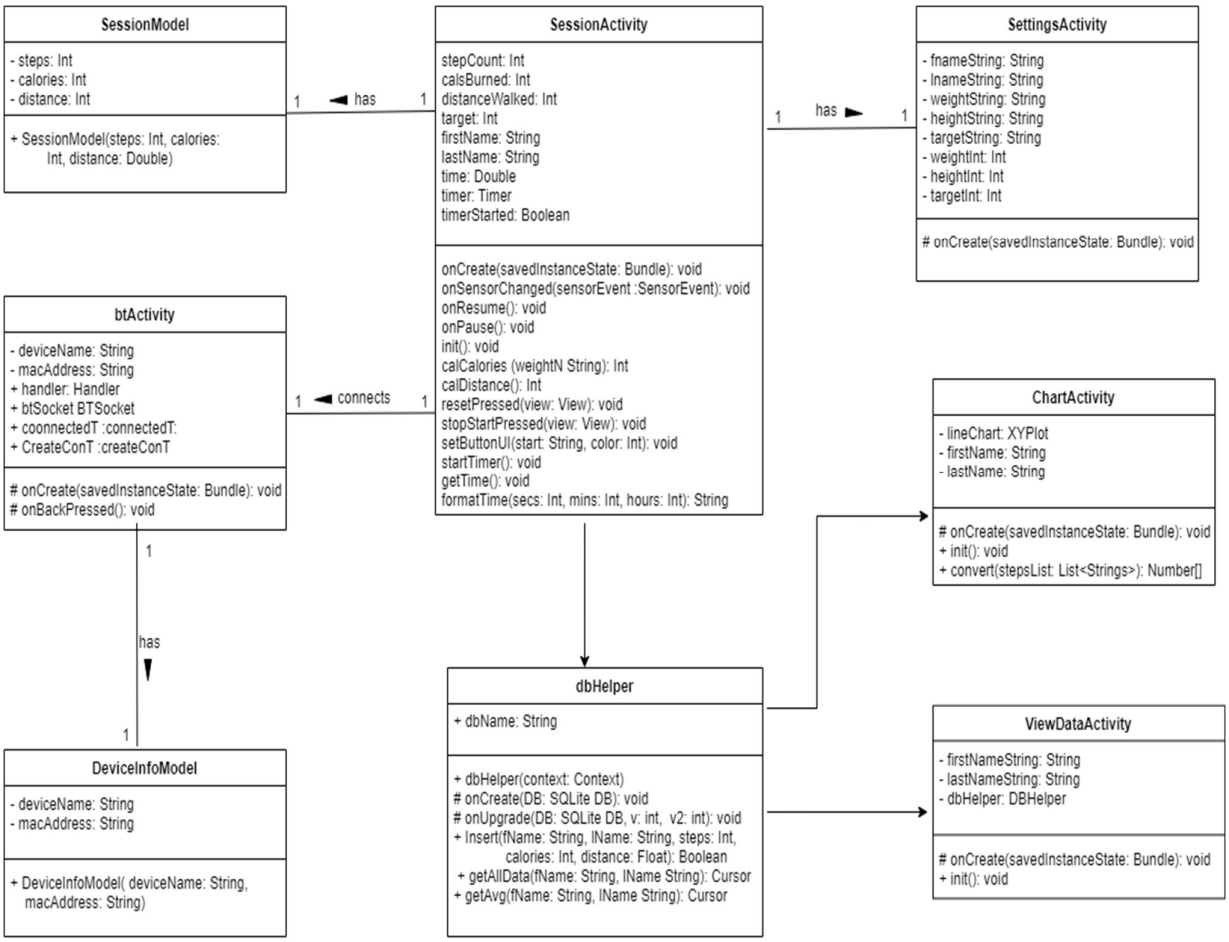
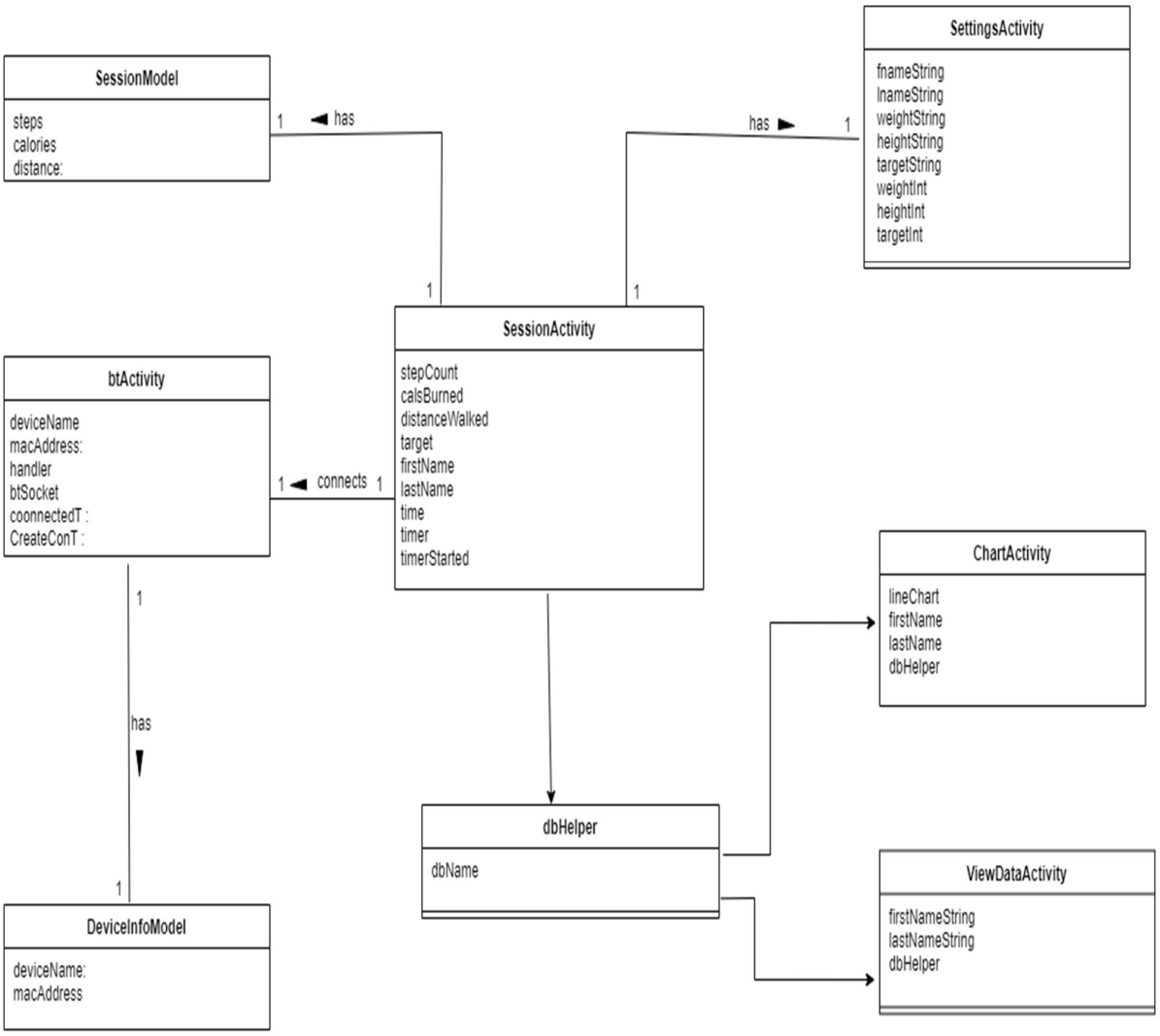


Fig 4. Class Diagram

Domain Model.



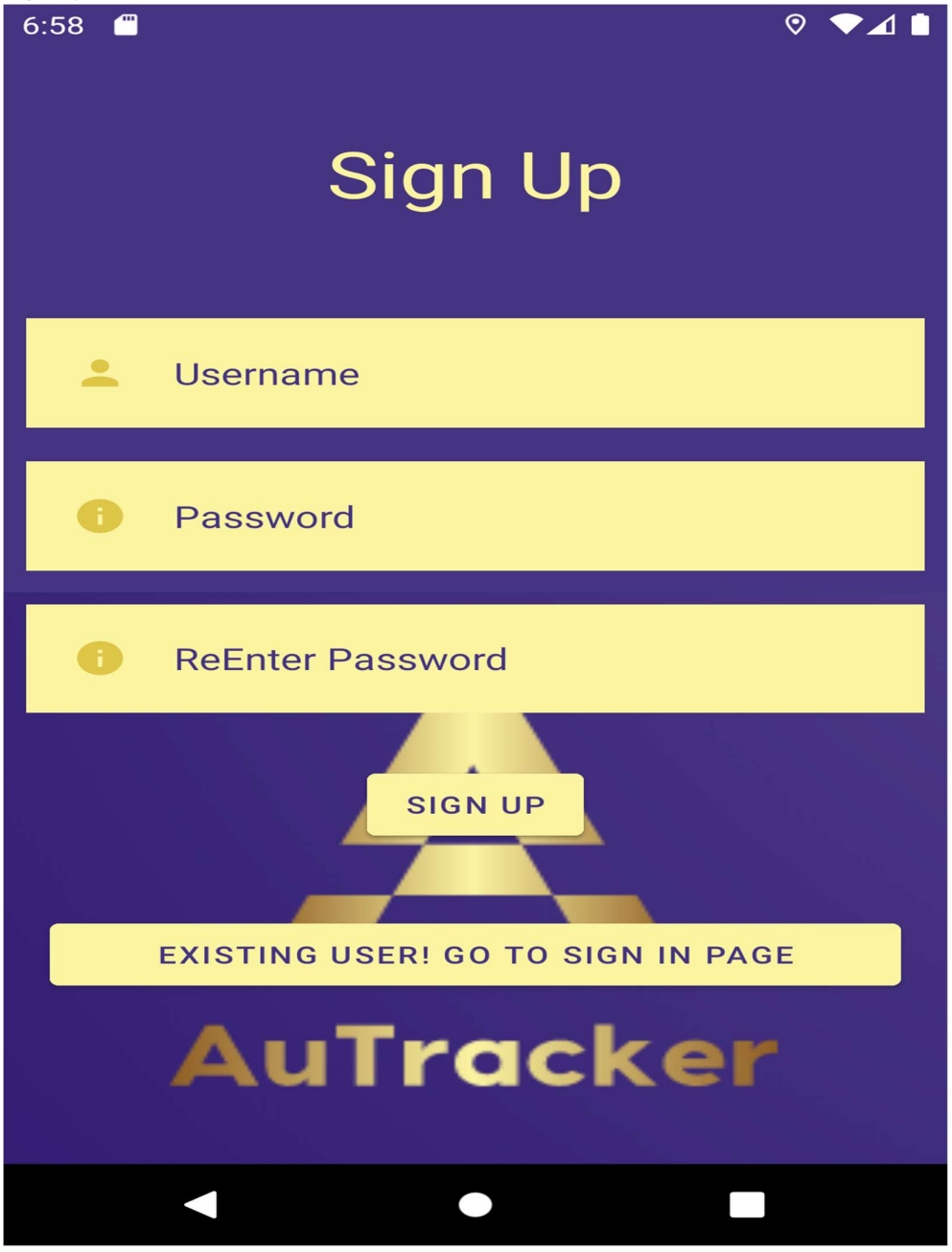
User Interface.

The user interface for this application was designed to be simple and functional, delivering a quick and easy-to-use experience for parents, guardians, and caregivers who would use this application.

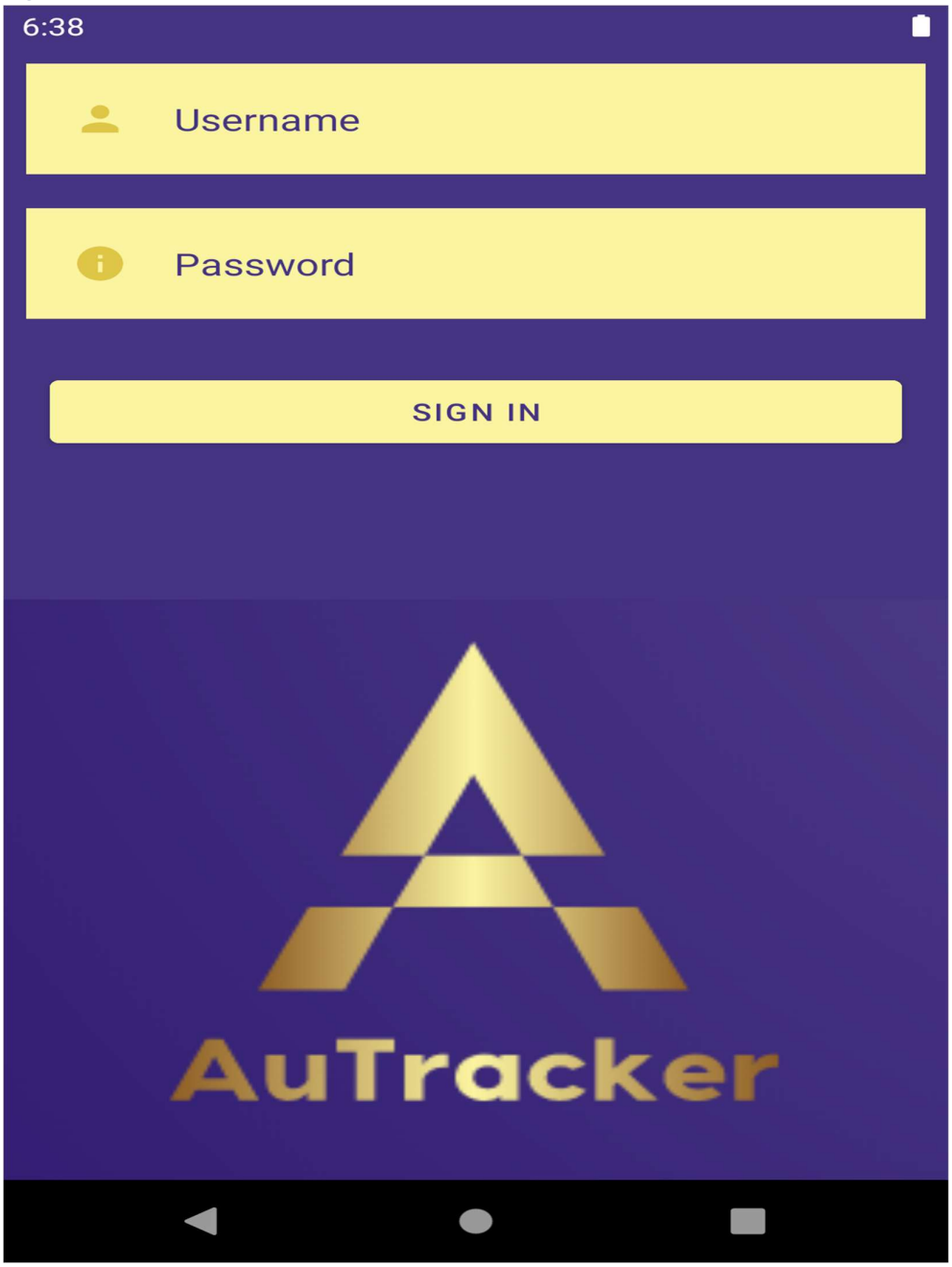
One of the main aims for the UI's design was that it had to be consistent throughout the application, which meant that all data entry forms, buttons and data display panels had to have the same look and feel. This enables the user to quickly grasp how to utilize the application, which is applicable throughout the whole application.

Initial designs.

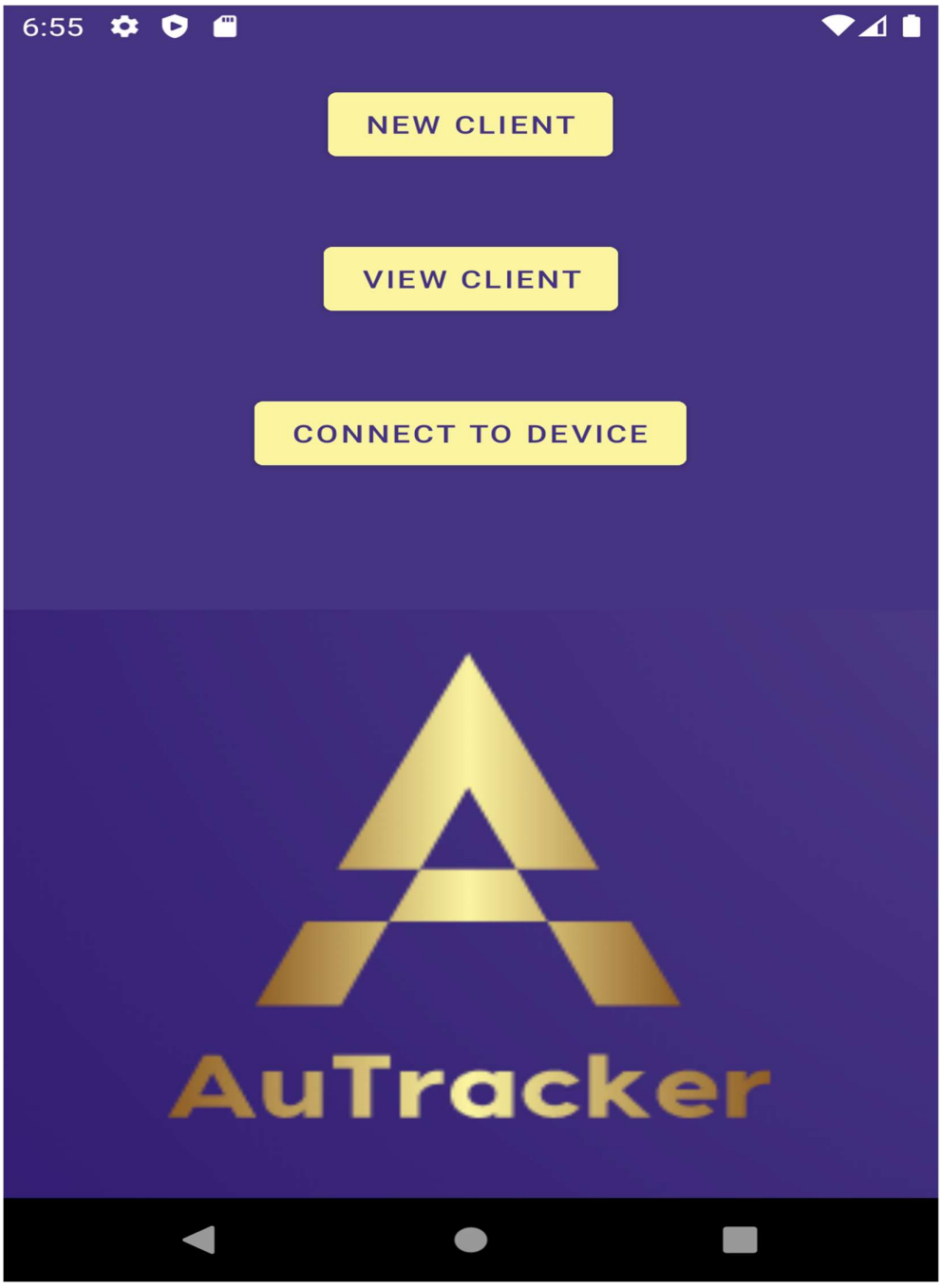
Sign up



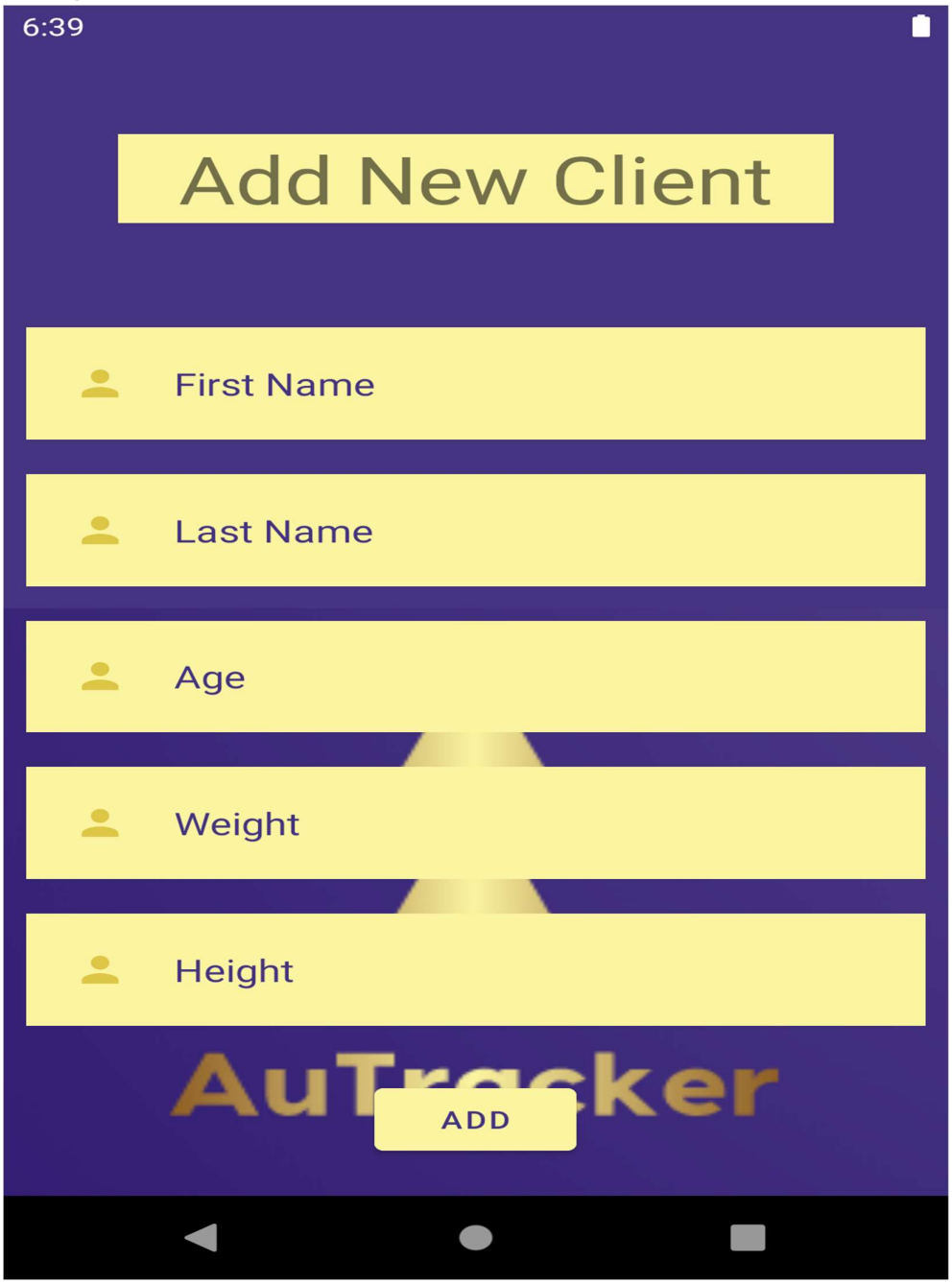
Sign in.



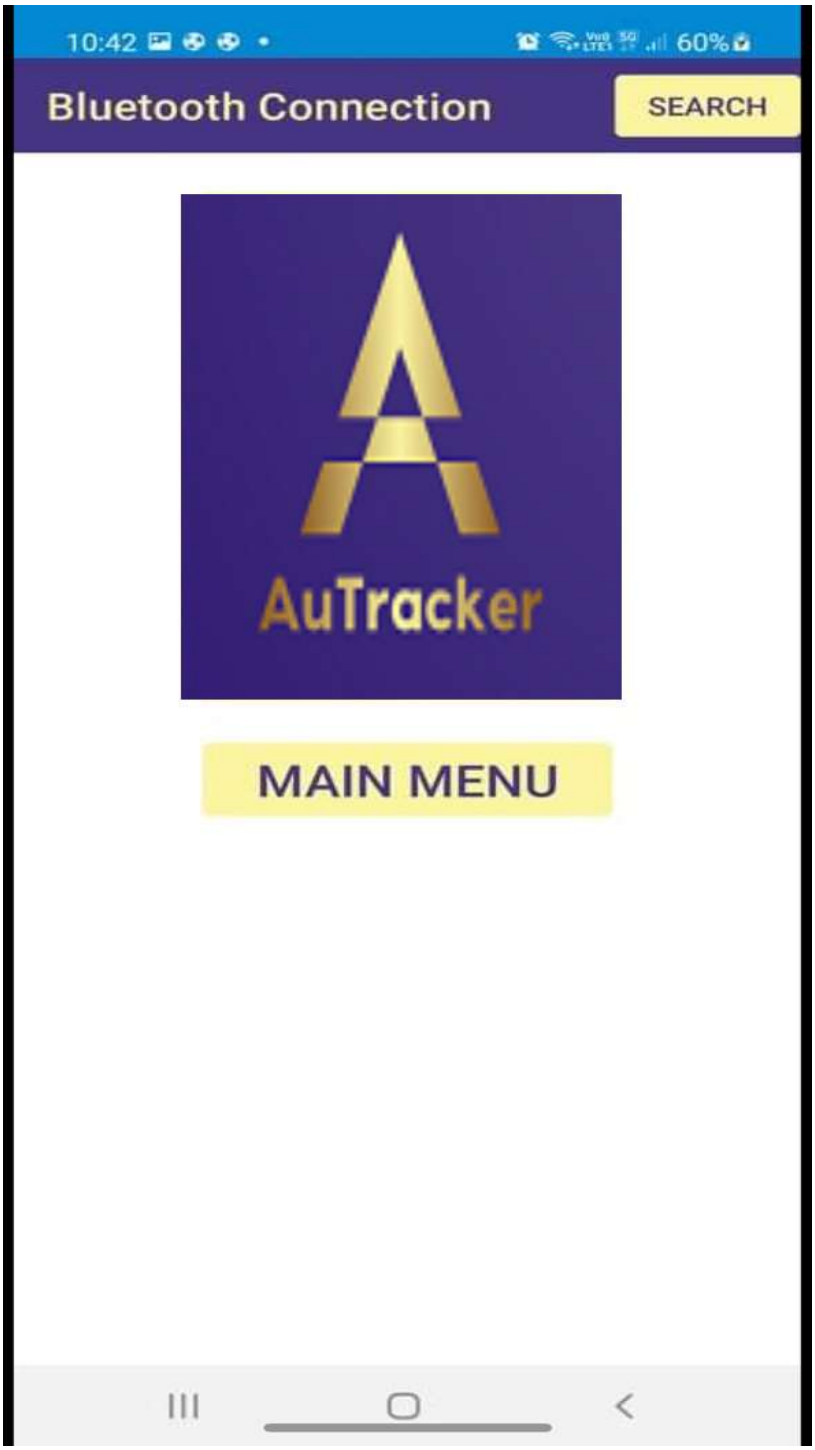
Menu.



Settings.


6:39
Add New Client
First Name
Last Name
Age
Weight
Height
AuTracker
ADD

Bluetooth connection.



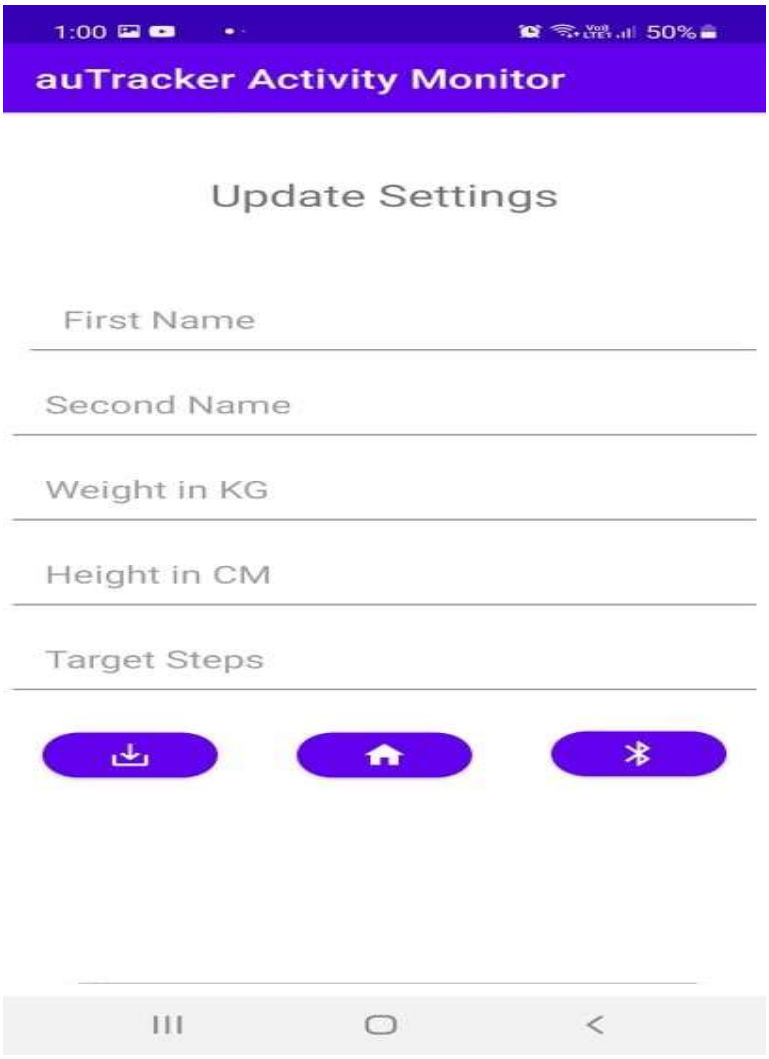
Final Designs.

Splash Screen.

The splash screen will be displayed for 3.5 seconds when the app is opened initially. It display the apps logo.

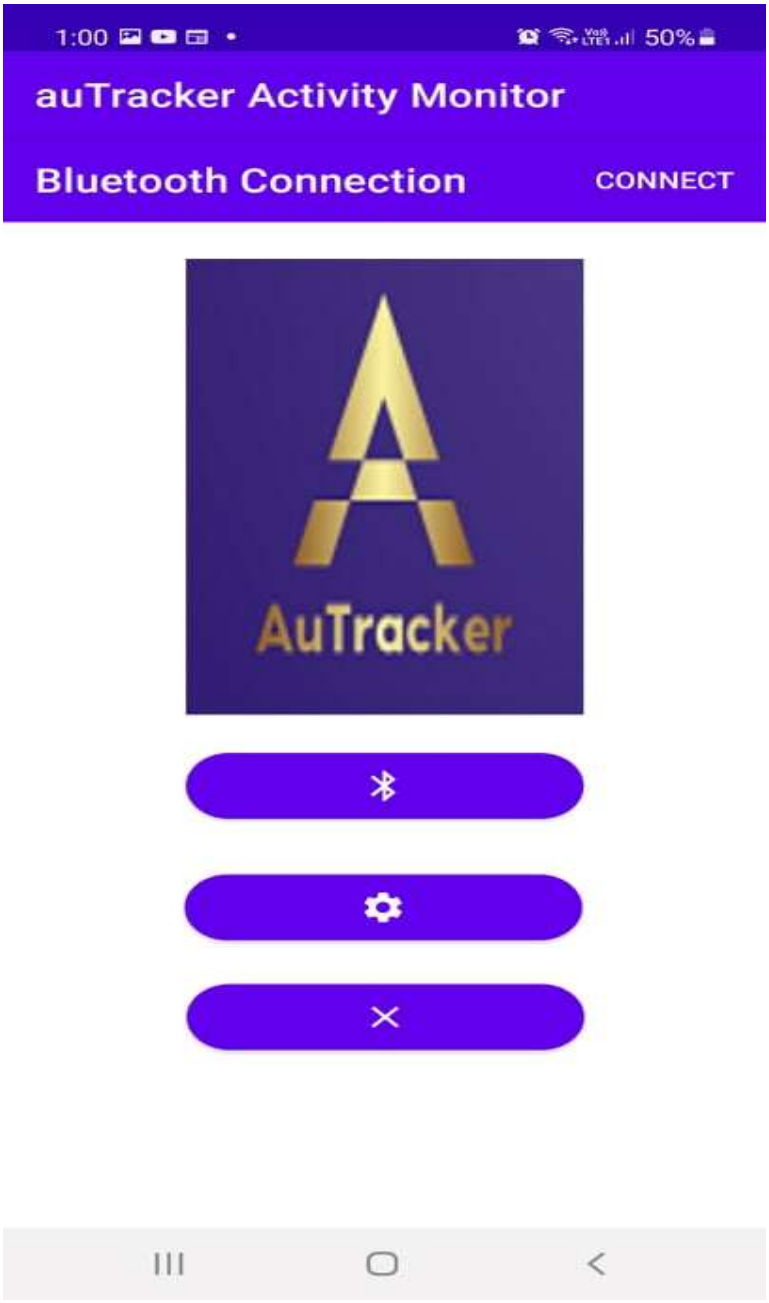
Settings.

The settings page is loaded after the splash screen has finished being displayed. Here the user enters the child's name, height, weight, and the target of steps for each session. Pressing the save buttons saves the settings and passes them to the session activity.



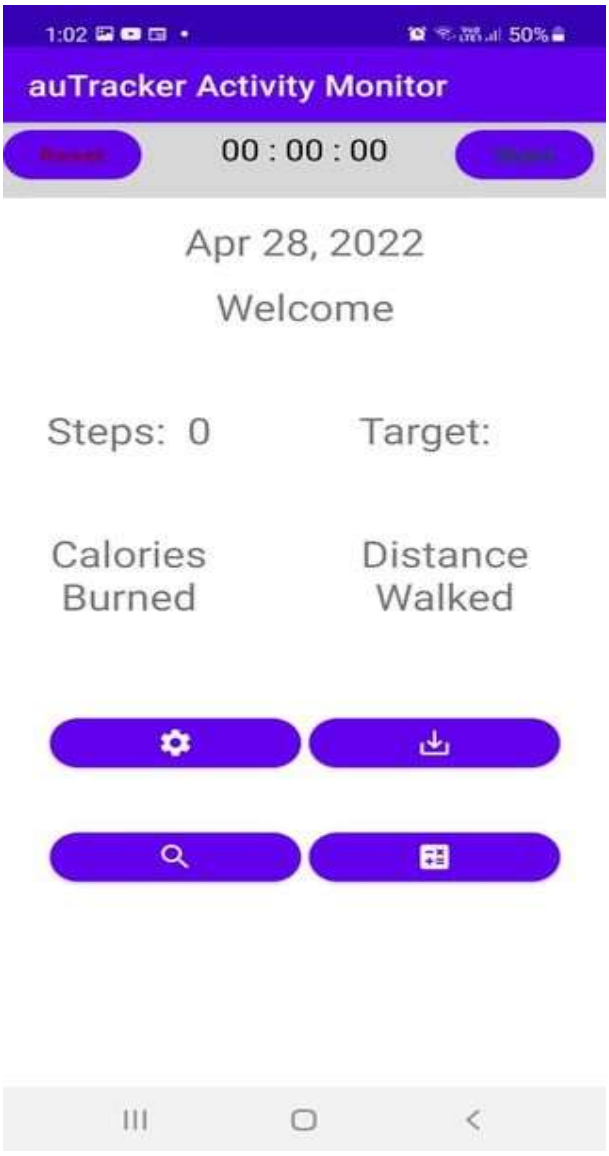
Bluetooth Connection.

The Bluetooth page allows the user to connect to the wearable device via Bluetooth. Pressing the connect button display the devices that been previously paired to the app in a list. The user selects the wearable device from the list.



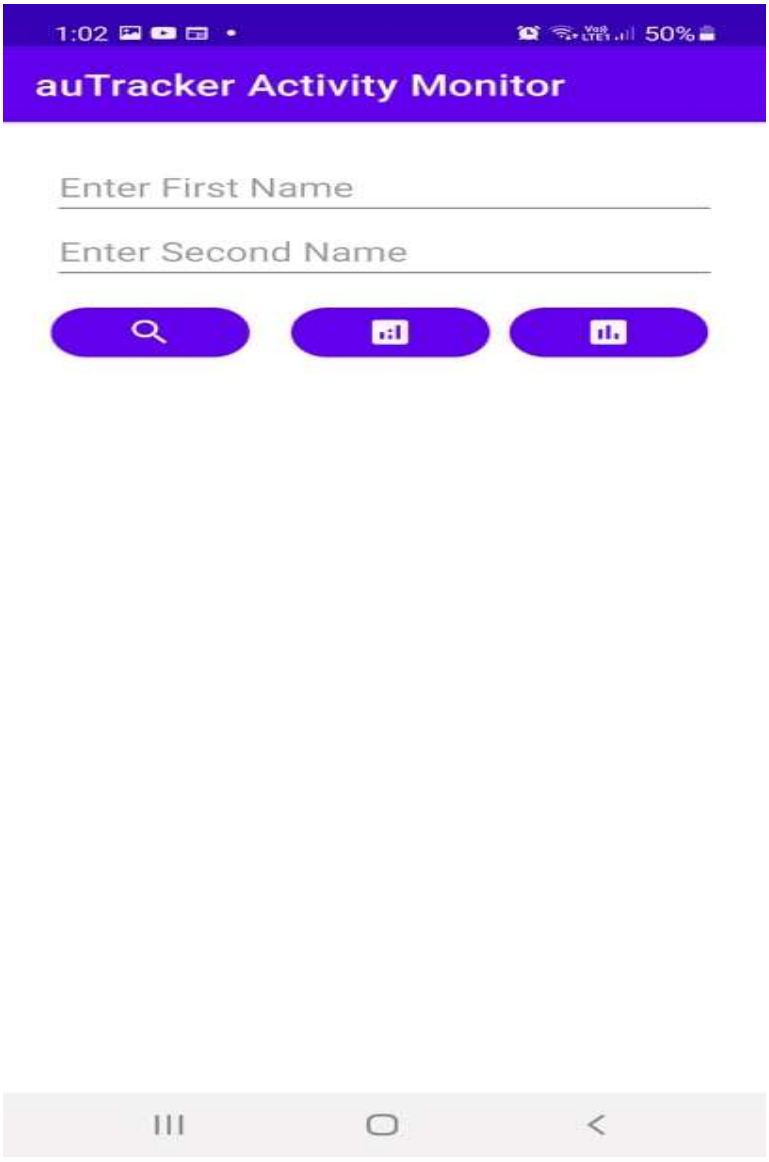
Session.

The session page is the main page of the application. From here, a new session can be started, saved, and then reset. The number of steps are recorded here. Pressing the calculate button calculates the number of calories that have been burned and the distance that has been walked in kilometres. Pressing the save buttons opens the view activity page where the user can search the applications database for previous sessions.



View Sessions.

Here the user enters the name of the child whose previous sessions they wish to view.
Each of the session's steps, calories and distance are displayed. They user can also calculate the average steps, calories, and distance for each child by pressing the average buttons in the middle.
The final buttons allows the user to view session data in the form of graphs.



Graphs.

Here the user is able to view session data in the form of graphs. They have two options, to view as a line graph or to view as a bar chart. The middle button displays the session data in a bar chart and the right most button displays as a line chart

Plagiarism Declaration.

- I declare that all material in this submission e.g., Thesis/essay/project/assignment is entirely my/our own work except where duly acknowledged.
- I have cited the sources of all quotations, paraphrases, summaries of information, tables, diagrams, or other material; including software and other electronic media in which intellectual property rights may reside
- I have provided a complete bibliography of all works and sources used in the preparation of this submission.
- I understand that failure to comply with the Institute's regulations governing plagiarism constitutes a serious offense.

Student Name: Dylan Scott

Student Number: C00242050

Signature: