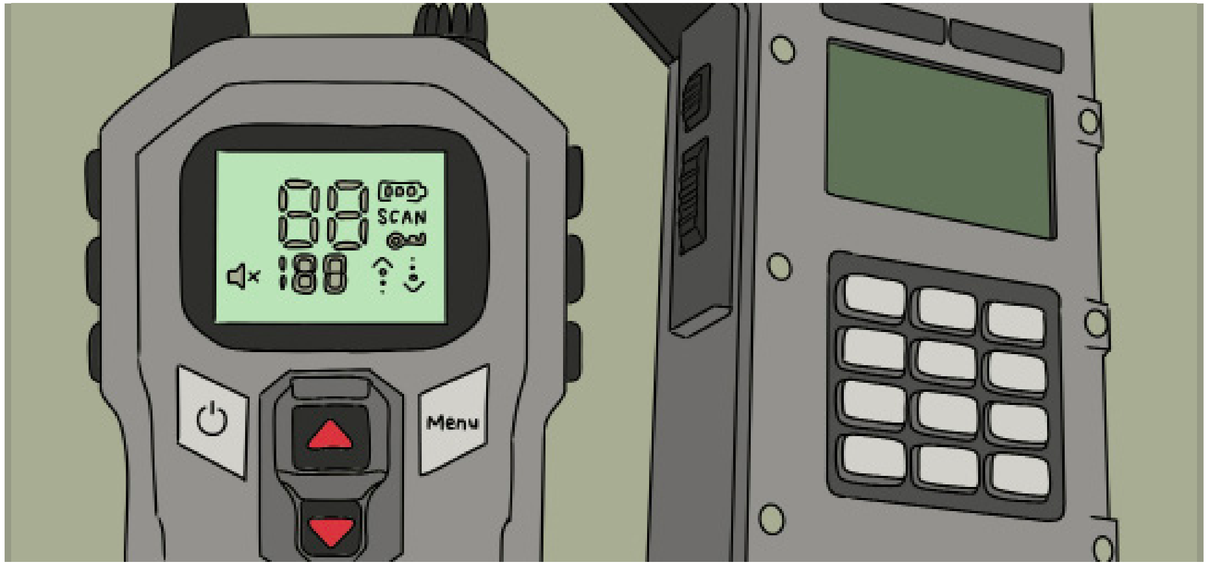
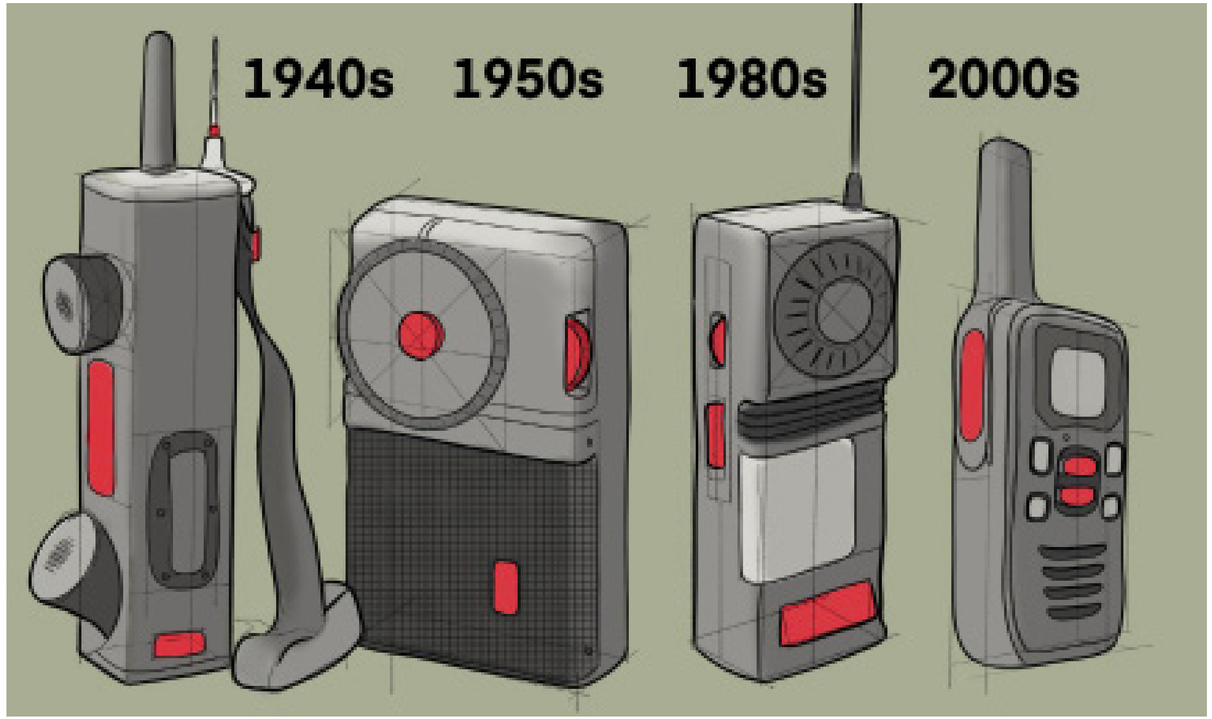
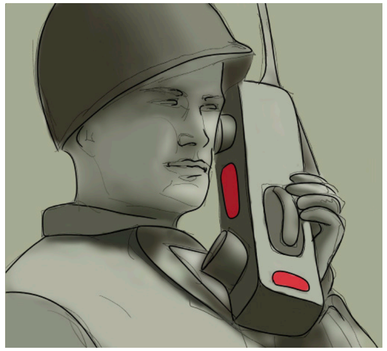
Communication when it Matters the Most.

Handheld Transceiver for Emergency and Safety Services

Handheld transceivers (a.k.a. Walkie-Talkies) are portable radio devices providing critical communication links in emergencies. Used by police, firefighters, and rescue teams, they ensure instant, secure communication, even when conventional networks fail. Designed for durability, clarity, and efficiency, these devices are essential for coordinating swift, effective response actions.







Background Research

Handheld transceivers, first developed during **WWII** for military communication, rapidly evolved post-war as essential tools for emergency and safety services. Early models were bulky and limited in range, but advancements in transistor technology during the **1950s** enabled more portable designs. By the **1980s,** digital processing improved voice clarity and encryption, increasing their utility for public safety. In the **2000s**, integration with GPS and digital networks transformed them into versatile multi-function tools.

Influence on Design

This investigation reinforces the need to design for resilience and adaptability. The evolution of Walkie-Talkie, from bulky, basic units to sleek, multifunctional tool, shows how crucial it is to respond to user feedback and operational challenges. I'm going to focus not just on technical specs but on usability in extreme, unpredictable conditions. Building a product that people can depend on under stress means prioritising durability, intuitive design, and considering how it will perform in the various contexts of use.

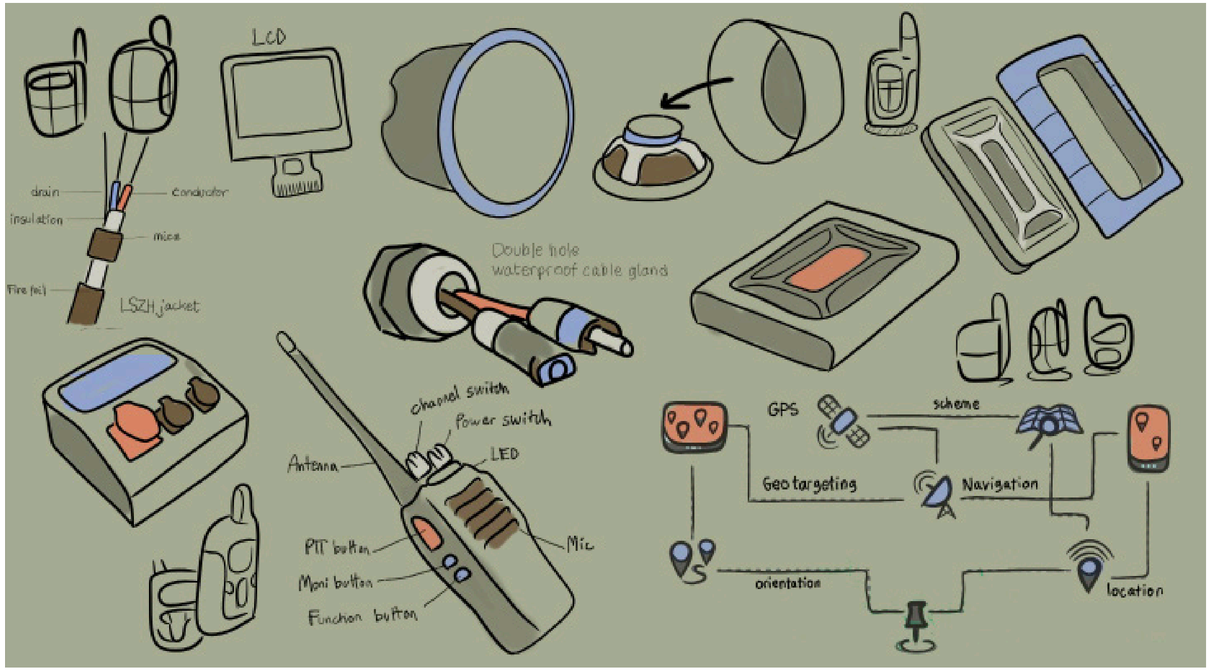
Title	Description	User Needs	Evaluation Method	Source	Priority
Durability	Withstand drops, moisture, tempurature, and dust.	Reliable performance in all settings	Laboratory testing under simulated extreme conditions	Review of the Fire Service	High
Long Battery Life	Operate for long periods, ideally for a 24-hour shift.	Continuous availability	Battery endurance testing in active usage	Emergency work schedules	High
Clear Audio Quality	Clear sound, even in noisy environments.	Precise communication	Decibel and clarity testing in controlled lab	User trials with others	High
Simple UI	Easy to navigate, accessible buttons.	Ease of use under stress	Usability testing in simulated tasks	Ergonomics research	Medium
Connectivity	Reliable over a wide range/ in remote areas	Consistent coverage	Field testing in rural, urban, and remote environments	Search & rescue needs	High
Security	Secure, encrypted channels.	Confidentiality and security	Encryption testing with cybersecurity protocols	standards of police	Medium

Operating Environment
Will often be used in challenging environments: inside burning buildings, on disaster sites, in dense forests, or across urban settings. It must function reliably in extreme temperatures, moisture, dust, interference, and physical impact.

Target users
The primary users are emergency and safety personnel, including firefighters, police officers, search and rescue teams, and paramedics. User market can be extended for non-emergency purposes such as for ski patrol or event security teams.

Necessary functions
Clear, instant, and secure communication between team members during emergency operations. It allows users to send and receive instructions, relay situational updates, and ensure coordination across various distances

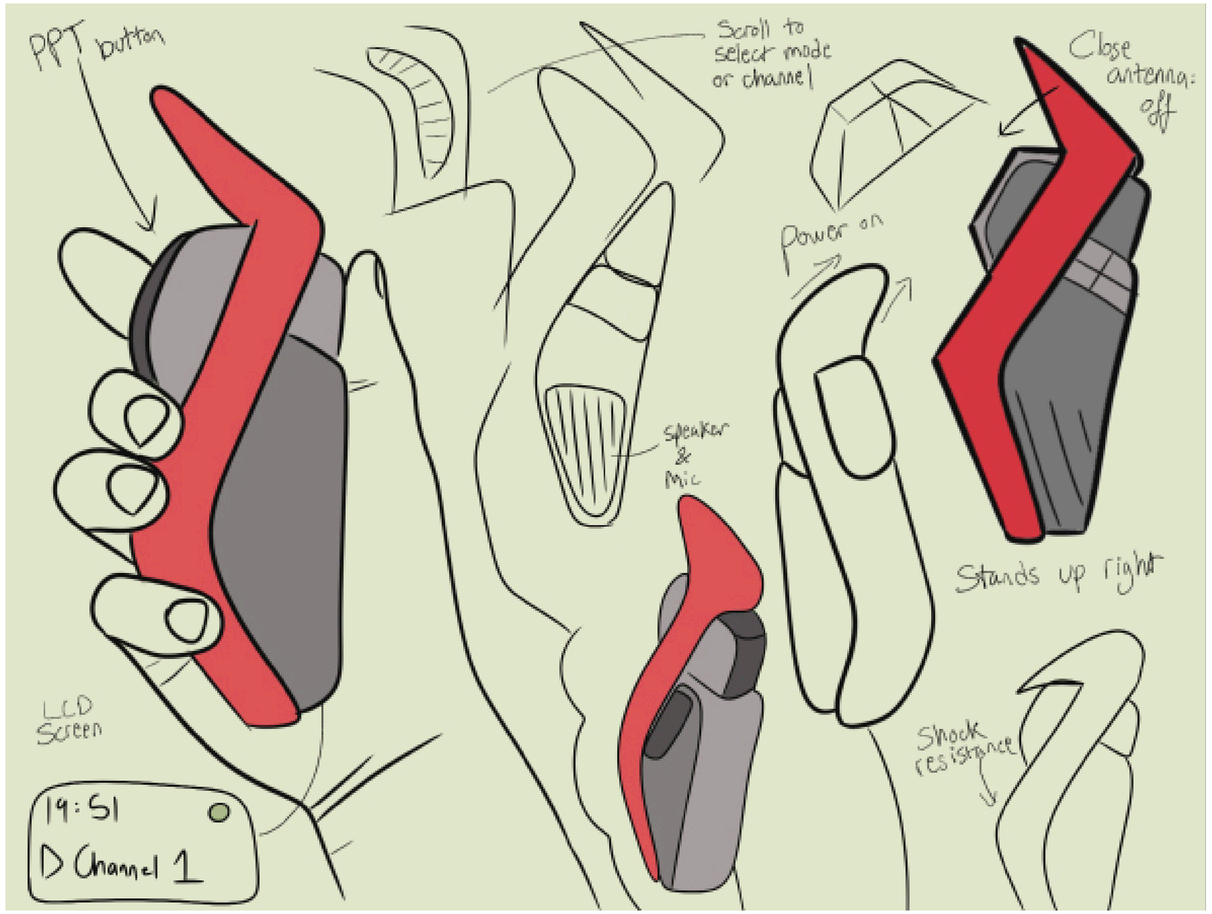
Place, People, Process and Requirements.

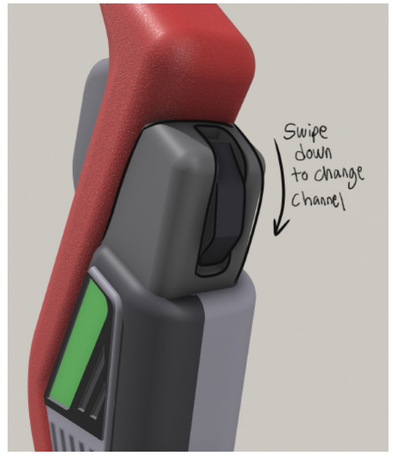


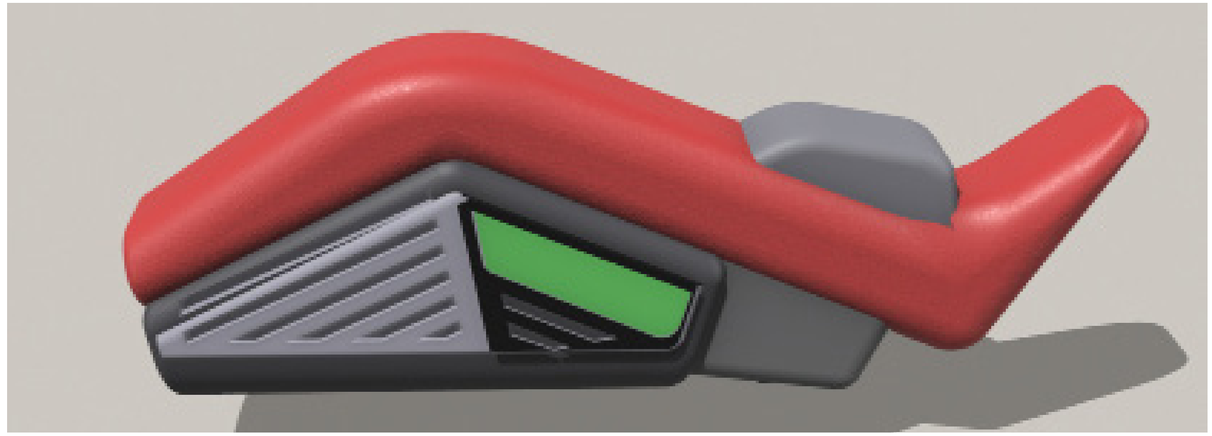
Initial Concept: Resistance

Durability in Extreme Conditions. With large , easy access buttons to be used with thick gloves and in low visibility.

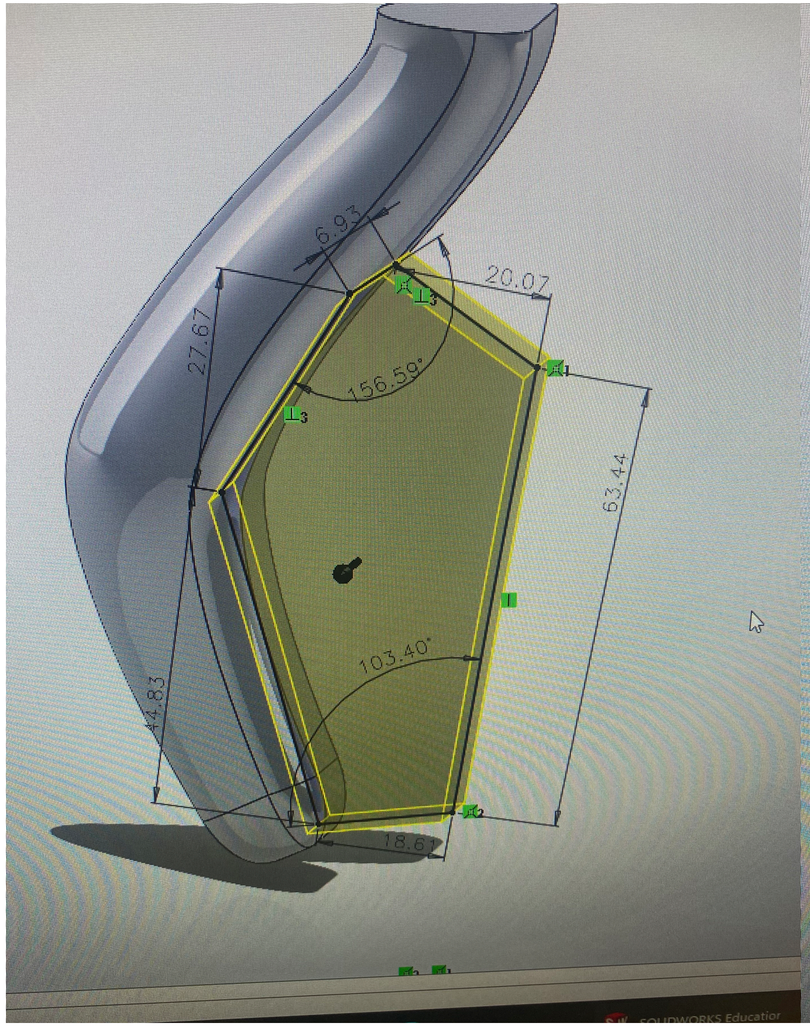
This design prioritises adaptability and durability for extreme conditions for better resilience across challenging environments. Designed to withstand harsh weather and rugged terrains, this walkie-talkie is fully waterproof, enabling communication even in heavy rain or after water submersion. It is also fire-resistant, with heat-tolerant materials that can endure high temperatures, ideal for emergency responders and firefighters. Additionally built to be shock-resistant, it is equipped with reinforced casing and internal cushioning to absorb impact, allowing it to function in all contexts.

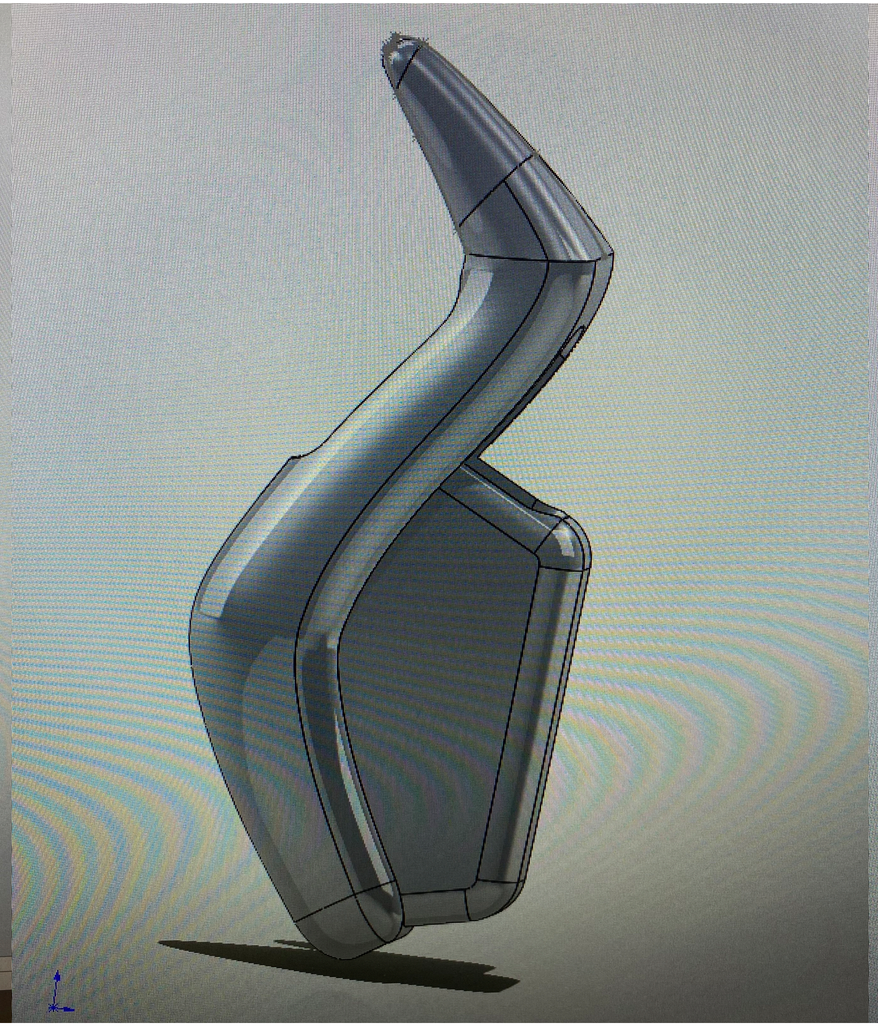


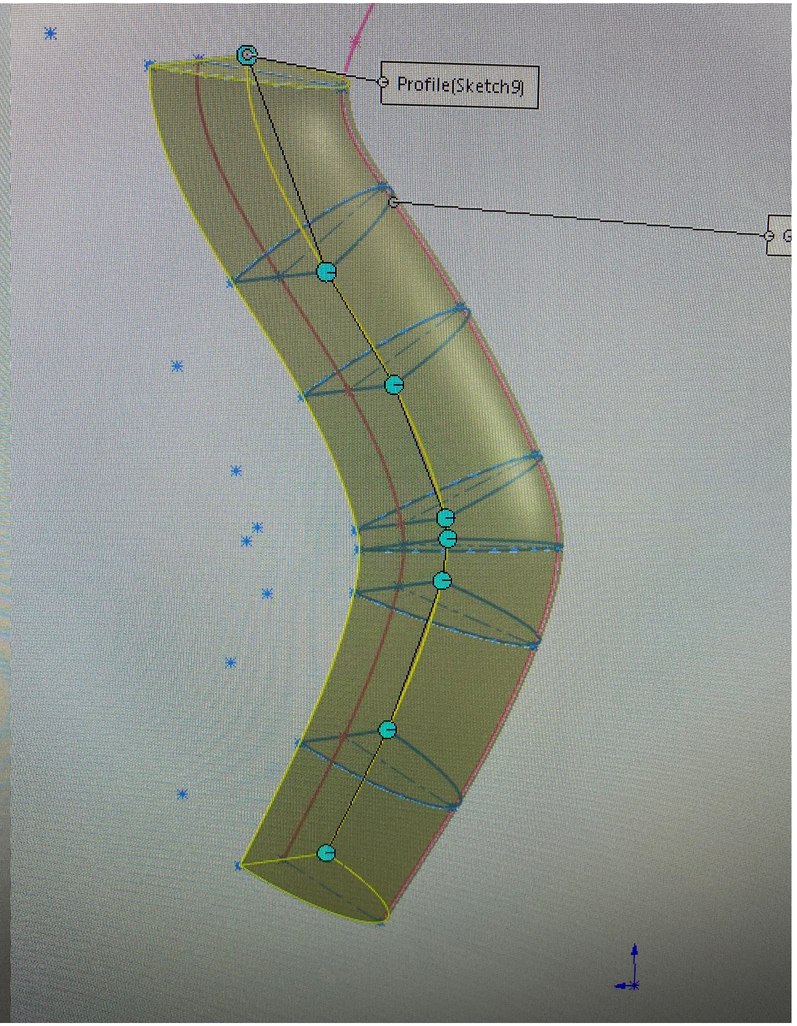




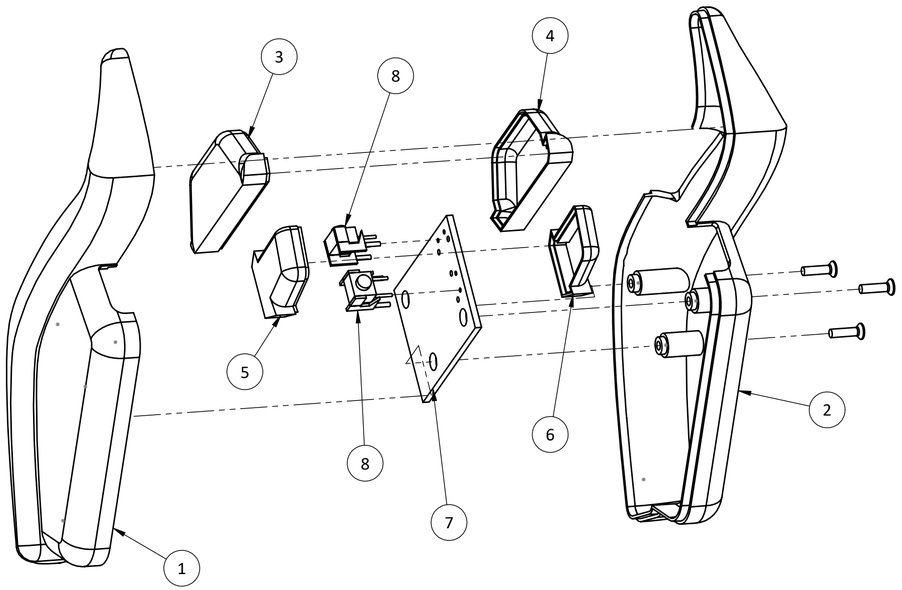
Part 2: Detailed Design (CAD Modeling for Manufacture)







General Assembly: Exploded Drawing



Number	Name
1	body casing 1
2	body casing 2
3	back button 1
4	back button 2
5	thumb button 1
6	thumb button 2
7	PCB
8	switch

DO NOT SCALE IF IN DOUBT ASK

UNLESS OTHERWISE STATED 1) MACHINE AT ▽ TO 3.2 um Ra MAX 2) TOLERANCE ON MACHINED DIMENSIONS AS FOLLOWS: 0-500 ±0.2; 500-1000 ±0.4

LUMED
THE UNIVERSITY OF LEEDS
SCHOOL OF MECHANICAL ENGINEERING

DATE 05.12.24
SCALE 1:1

TITLE Exploded drawing

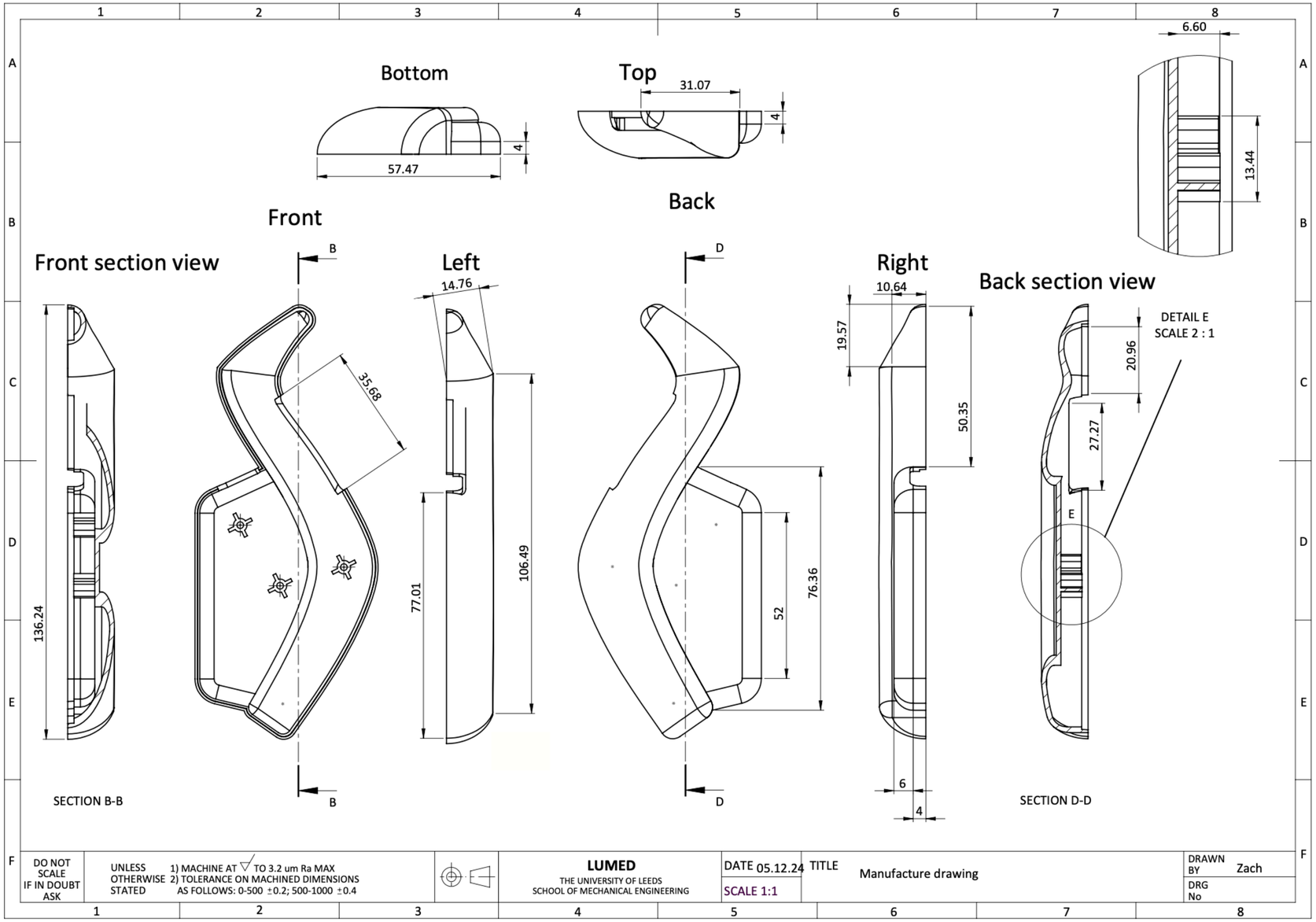
DRAWN BY zach
DRG No

body casing 1&2 is the walkie-talkie (main body) casing,

back button 1&2 is the casing for the button used by the index finger,

thumb button 1&2 is the casing for the button used by the thumb.

Manufacturing Drawing: One side of the casing



PCB 2D Drawing