



Department of Electronic and Telecommunication

University of Moratuwa

EN2160 - Electronic Design Realization Conceptual Design Report

200117T – Deshan K.A.G.D.

Bicycle speedo meter with electric horn

The conceptual design for a bicycle speedometer and electric horn involves integrating two essential components into a compact and user-friendly device. The speedometer would feature a clear digital display that shows real-time speed, temperature and humidity of an environment, real time-time, while the electric horn would provide a loud and attention-grabbing sound for signaling. The speedometer could be attached to the handlebars or stem of the bicycle, powered by a rechargeable battery, and designed for easy readability. The electric horn would be conveniently positioned within reach of the rider's hand and activated by a button or switch, with adjustable different sounds. This integrated design aims to enhance safety and convenience for cyclists, combining essential features into a single device.

List of team members who contributed to this conceptual design.

200068R M.M.K.R.Bandara

200148M D.P.C.L.Dombawala

200396U C.M.C.C.Miranda

200117T K.A.G.D.Deshan

200431B B.Nirushtihan

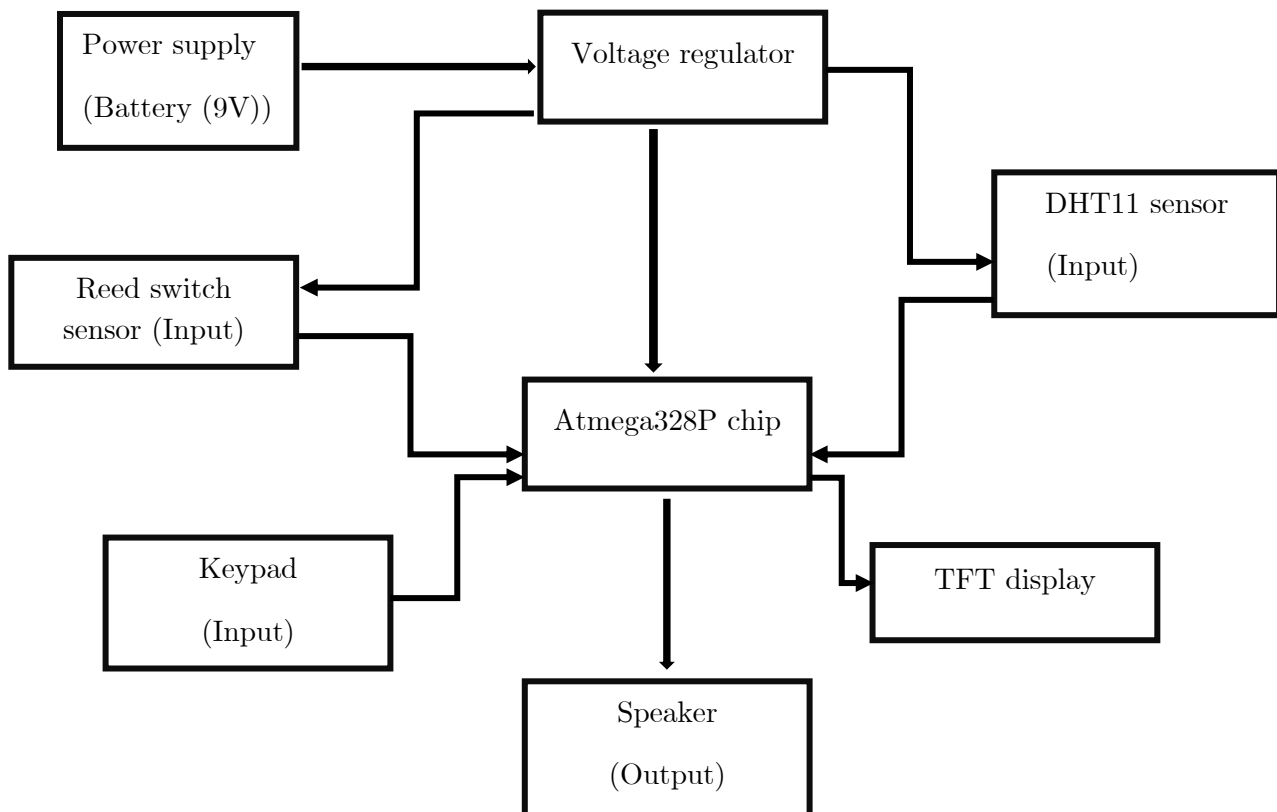
200377M T.Manimohan

200094R L.G.S.Clarance

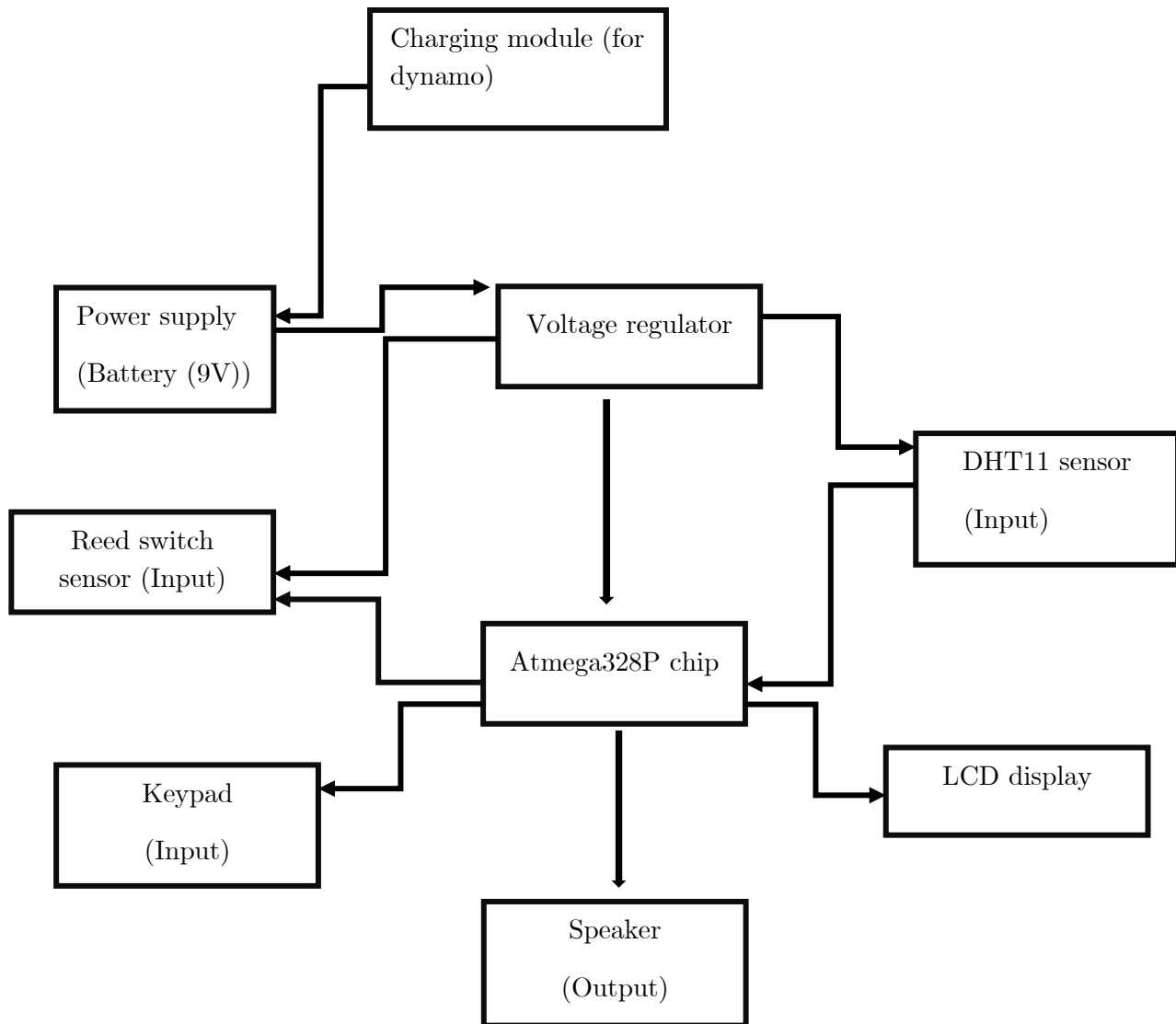
200331T V. Kurrshanth

Functional block diagrams for schematic design

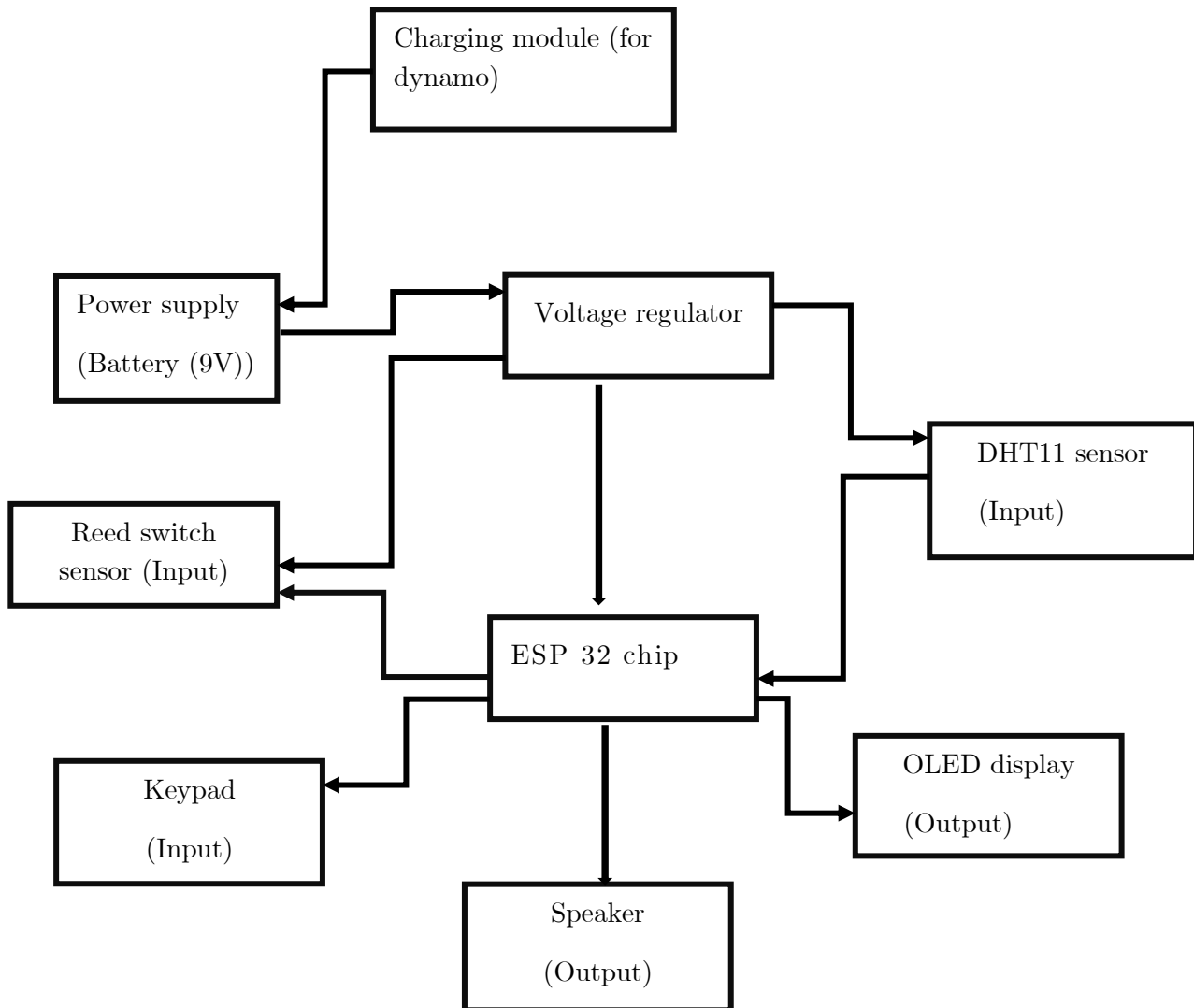
Design 1:



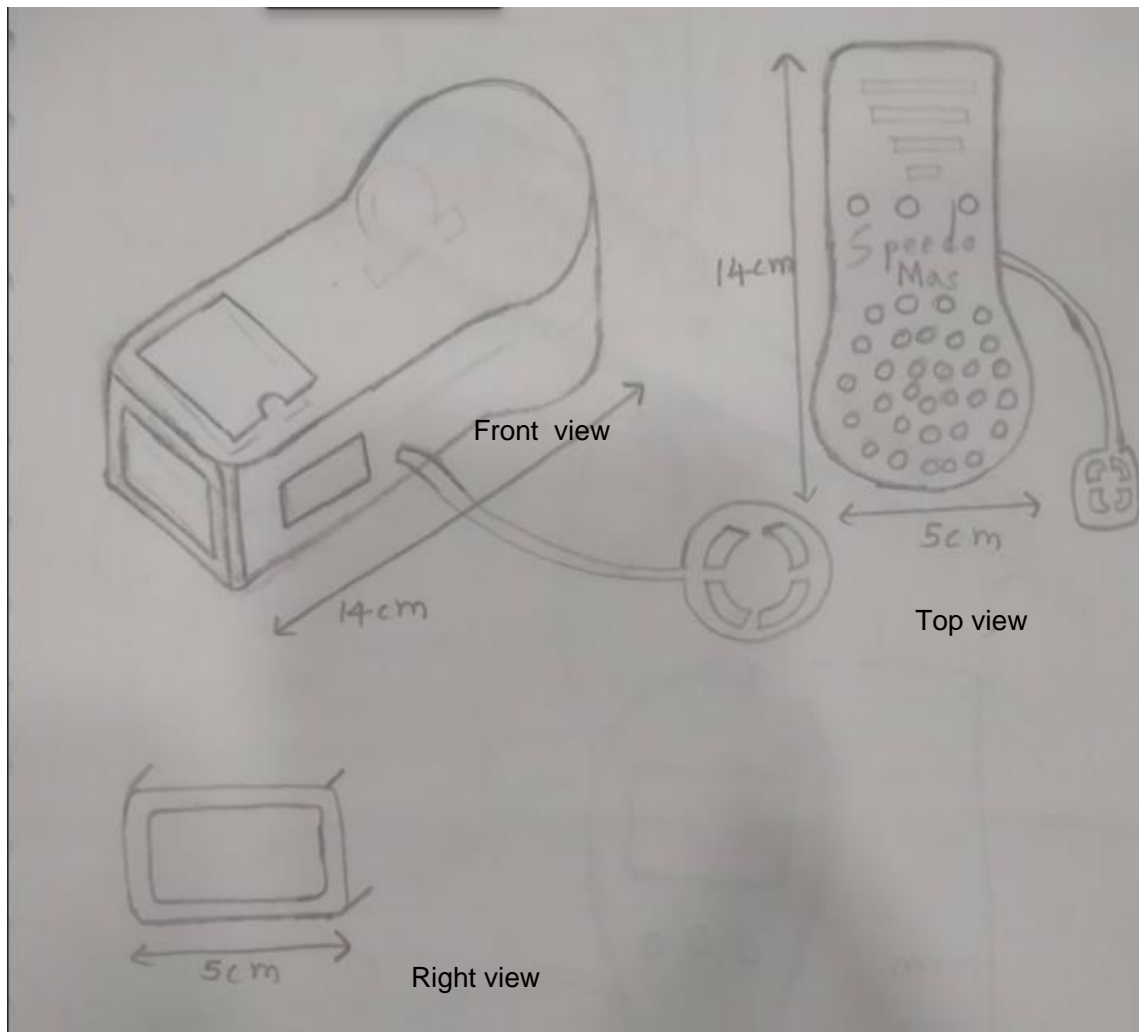
Design 2:



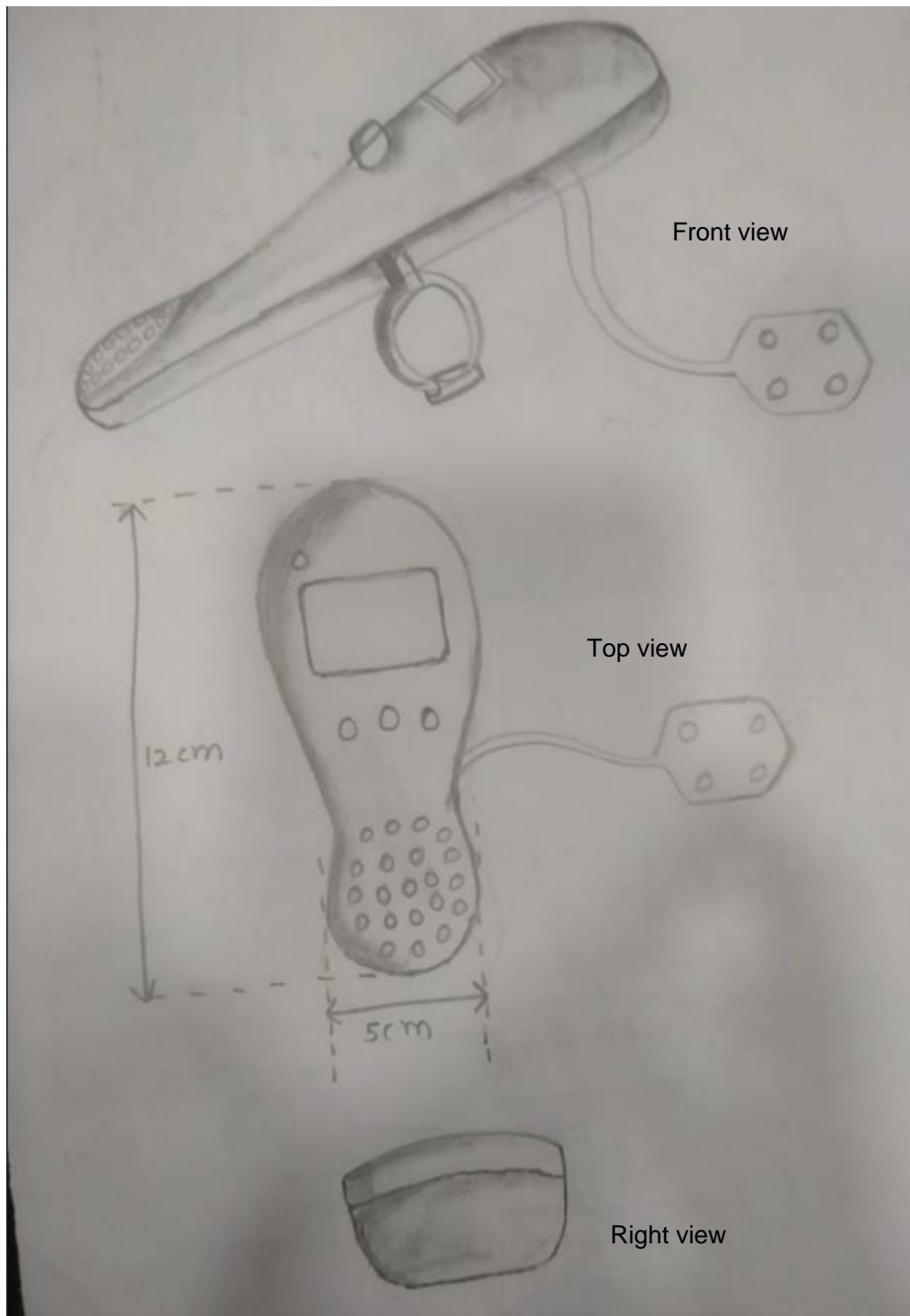
Design 3:



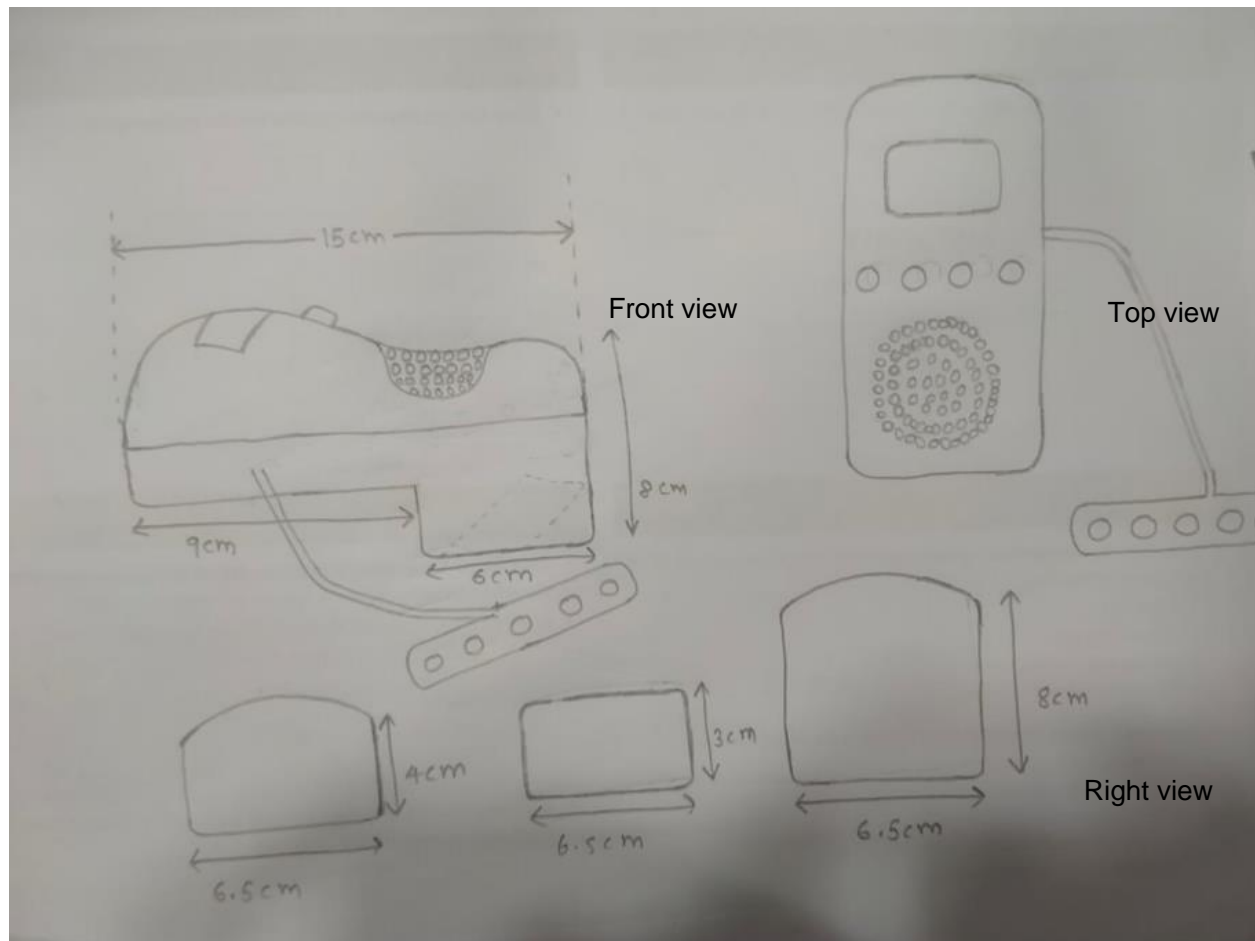
Sketches for enclosure design 1:



Sketches for enclosure design 2:



Sketches for enclosure design 3:



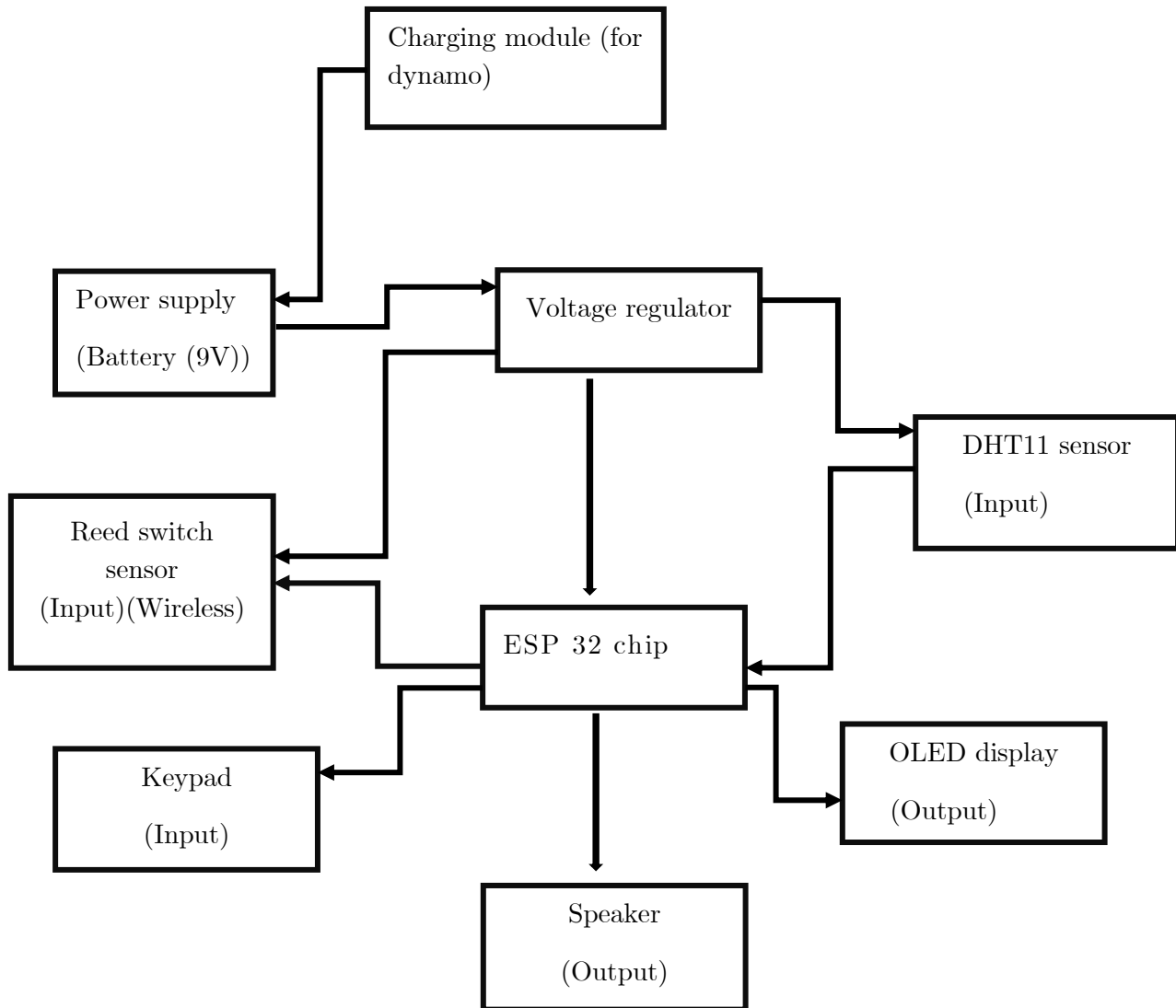
● User-Centered Design

Based on the user needs survey, valuable insights have been gathered regarding the expectations and requirements of users for a bicycle speedometer. The feedback received has aided in refining the design and incorporating features that align with user preferences. Here is a description of the user design for the bicycle speedometer:

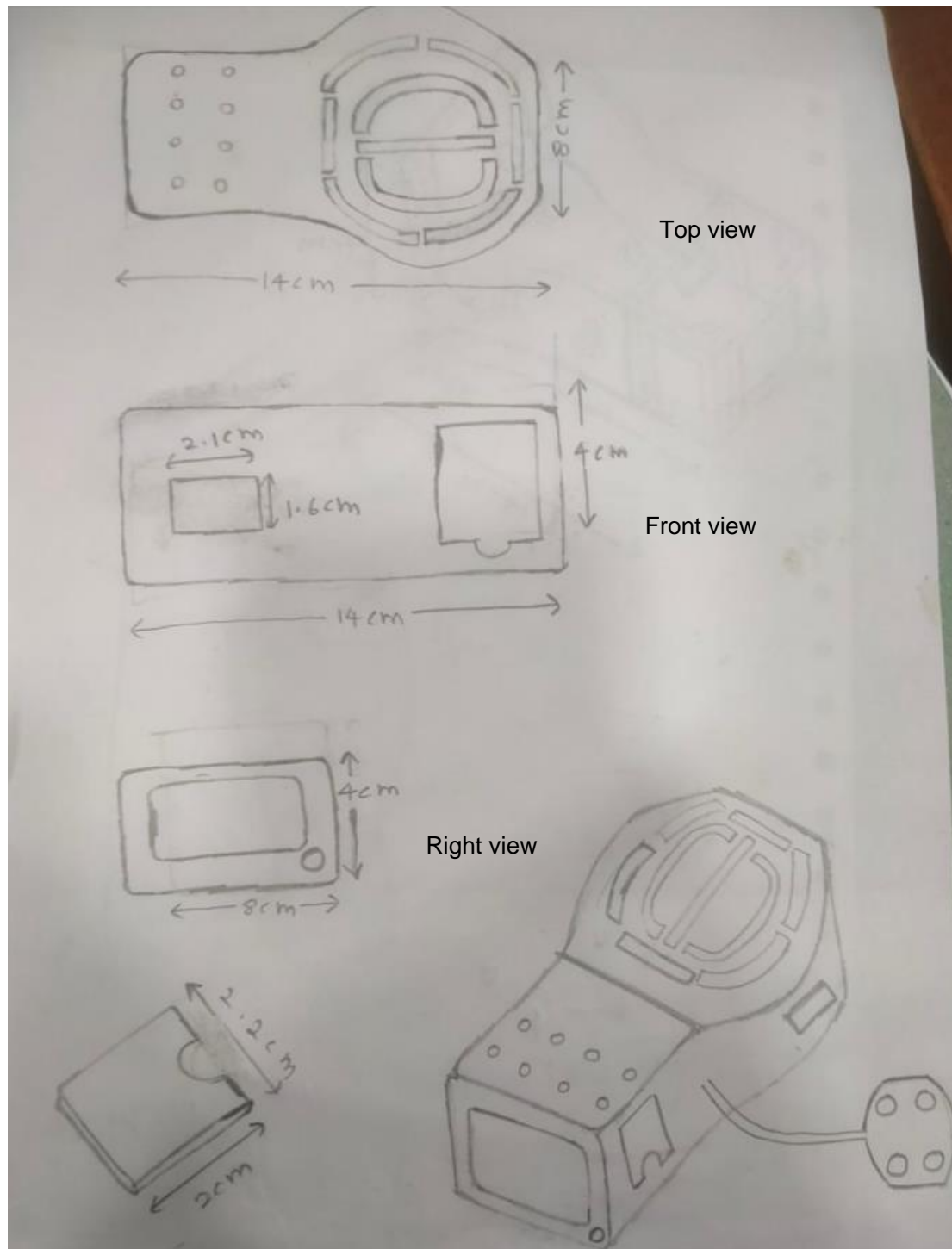
1. **Wireless Sensor:** Users expressed a desire for a wireless sensor that can be easily installed on the bicycle. This feature eliminates the need for messy wiring and simplifies the installation process, making it more convenient for users.
2. **Accurate Speed Measurement:** Users emphasized the importance of accurate speed measurement. The speedometer should provide precise and real-time speed readings, enabling cyclists to track their performance effectively.
3. **Multi-Function Display:** Users highlighted the need for a multi-function display that can show various metrics such as speed, distance traveled, elapsed time, and possibly additional data like average speed or cadence. This feature provides cyclists with comprehensive information about their rides.
4. **Waterproof and Shockproof Design:** Given the outdoor nature of cycling, users emphasized the requirement for the speedometer to be waterproof and shockproof. This ensures durability and reliability, even in challenging weather conditions or bumpy terrains.
5. **Easy Mounting and Adjustments:** Users requested a design that allows for easy mounting and adjustments of the speedometer on different bicycle handlebars. This feature ensures compatibility with a wide range of bicycles and enhances user convenience.
6. **Battery Life:** Users expressed a desire for a long battery life to minimize the need for frequent replacements. Efficient power management and possibly rechargeable batteries would contribute to a sustainable and user-friendly solution.
7. **Backlit Display:** Users highlighted the importance of a backlit display, especially for night rides or low-light conditions. This feature enhances visibility and readability, ensuring the speedometer remains functional in various lighting situations.

By incorporating these user-driven design considerations into the bicycle speedometer, you can create a product that meets the expectations of users, enhances usability, and provides valuable insights for efficient tracking of cycling performance.

User centered Design for functionality (Block diagram: Design 4)



User centered Design for enclosure (Enclosure Design 4:)



Selection matrices for block diagram

Criteria	Explanation	Block Diagram1 (Score Out of 10)	Block Diagram2 (Score Out of 10)	Block Diagram3 (Score Out of 10)	Block Diagram4 (Score Out of 10)
Functionality	Does the diagram clearly depict all the essential functions and features of the speedometer?	7	6	7	8
Clarity	Is the diagram clear and easy to understand, providing a visual representation of the circuit's operation?	8	6	9	7
Block Identification	Are the individual functional blocks clearly labeled and identifiable within the diagram?	6	5	8	6
Efficiency	Does the diagram demonstrate an efficient use of components and resources within the circuit design?	8	5	9	9
Safety	Does the circuit design incorporate safety features and considerations, such as	5	6	7	8

	protection against overvoltage or short circuits?				
Reliability	Does the diagram depict a circuit design that is reliable and robust, minimizing the chances of failure or malfunction?	5	8	9	8
User Interface	Does the diagram depict the user interface elements required for user interaction, such as buttons, switches, or displays?	6	6	6	8
Power Consumption	Does the diagram show a clear and appropriate power source for the circuit, considering the required voltage and current levels?	7	7	9	8
Total marks		51	56	64	62

Selection matrices for Enclosure

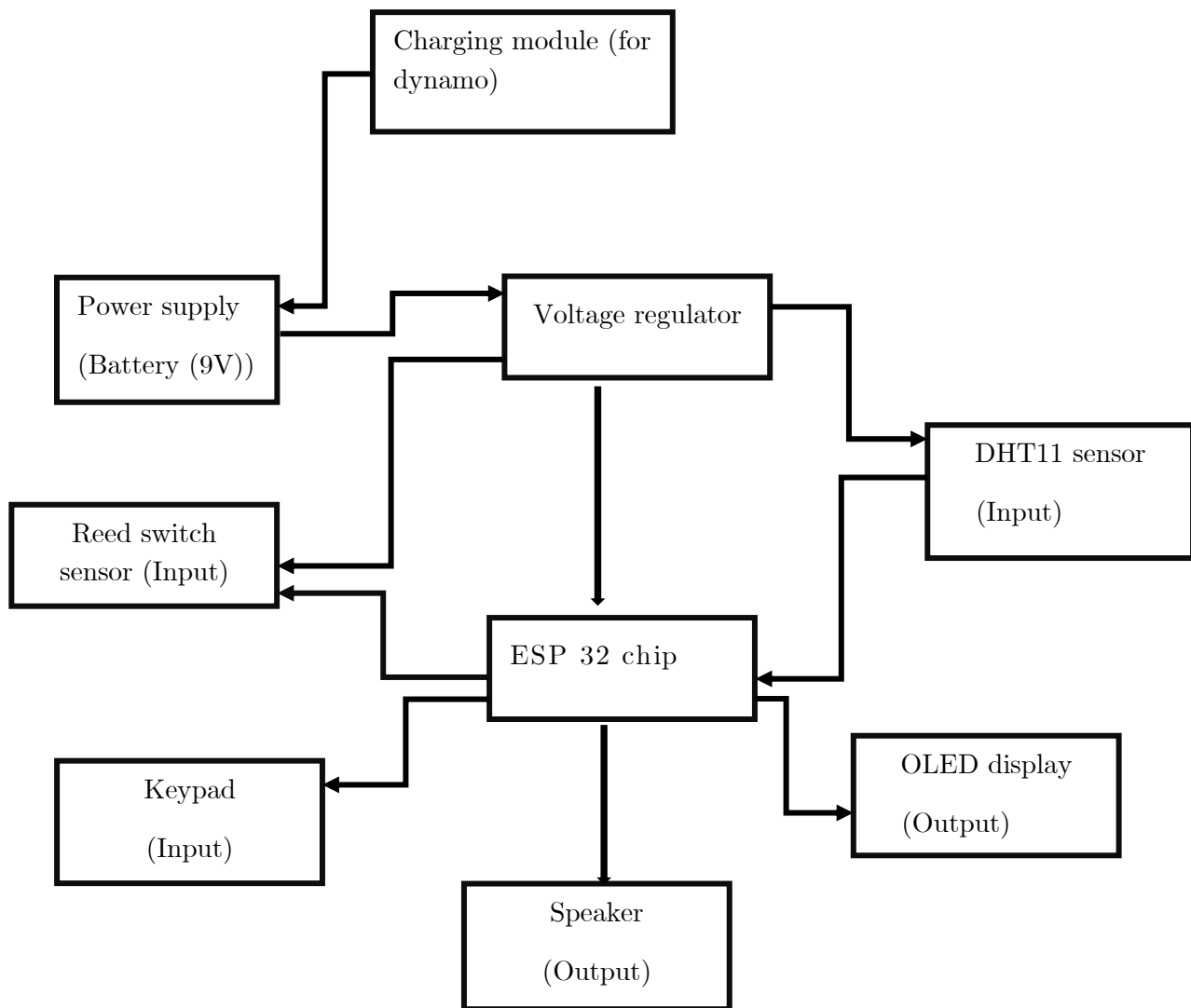
Criteria	Explanation	Enclosure Diagram 1	Block Diagram 2	Block Diagram 3	Score (Out of 10)
Functionality	Does the design meet the functional requirements of the enclosure, including adequate space for components and proper ventilation?	8	6	7	8
Aesthetics:	Is the design visually appealing and aligned with the desired aesthetic of the overall product?	7	8	9	6
Ergonomics:	Does the design prioritize user ergonomics, ensuring comfort in holding, carrying, or interacting with the enclosure?	7	6	8	9
Assembly and Manufacturing	Is the design feasible for manufacturing, considering ease of assembly and the manufacturing process?	3	7	8	6

Durability	Will the enclosure design withstand normal usage and potential environmental factors, offering sufficient protection for internal components?	6	7	7	8
Cost-Effectiveness	Is the design cost-effective in terms of materials, manufacturing, and assembly?	7	8	7	5
Safety	Consider any potential risks associated with the enclosure design, such as sharp edges or exposed electrical components.	7	8	9	7
Total marks		45	48	52	49

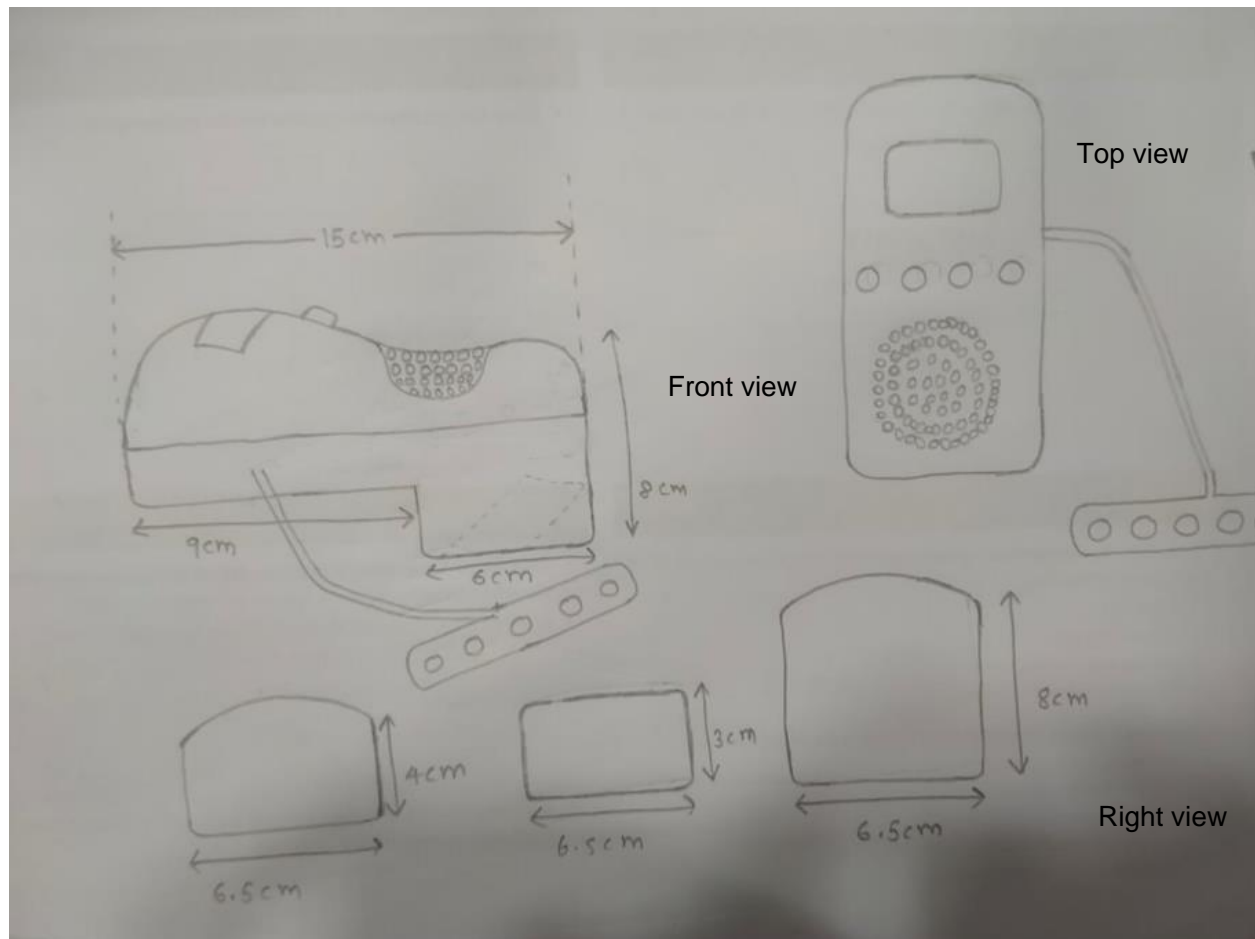
Selected functional block diagram and enclosure design.

According to the selection matrices generated according to evaluation Criteria, I would like to go forward with the designs which taken the highest scores compared to others. Therefore, Sketch-3 and functional block diagram-3 are selected designs.

Block diagram



Enclosure design



Team contribution

Index	Name	Contribution
200068R	M.M.K.R.Bandara	Sketch3, Diagram1,Evaluate
200148M	D.P.C.L.Dombawala	Sketch1, Diagram3,Evaluate
200396U	C.M.C.C.Miranda	Sketch2, Diagram2,Evaluate
200431B	B.Nirushtihan	Sketch1, Diagram2,Evaluate
200377M	T.Manimohan	Sketch2, Diagram3,Evaluate
200094R	L.G.S.Clarance	Sketch2, Diagram1,Evaluate
200331T	Krushanth	Sketch3, Diagram1,Evaluate