DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION
ENGINEERING

UNIVERSITY OF MORATUWA

ELECTRONIC DESIGN REALIZATION

EN2160

Conceptual Design Report

NAME	INDEX NO
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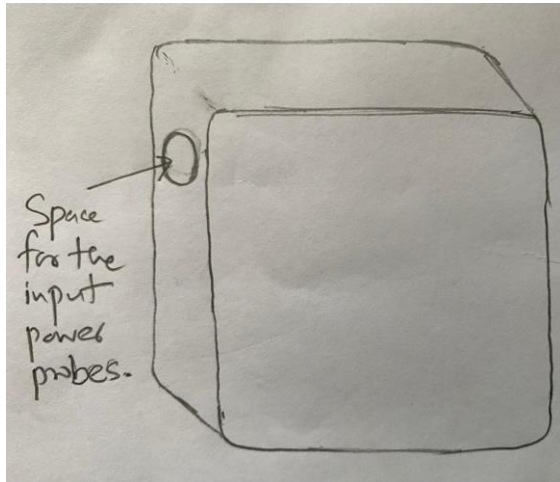
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Hand Sketches

Sketch 1
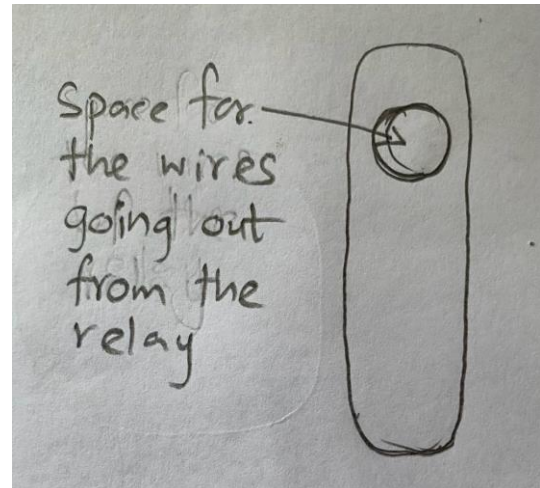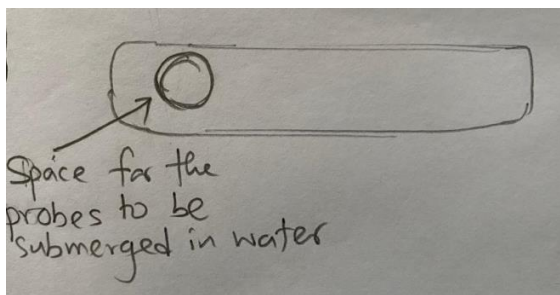

Figure 1: 3D view

Figure 2: Side view
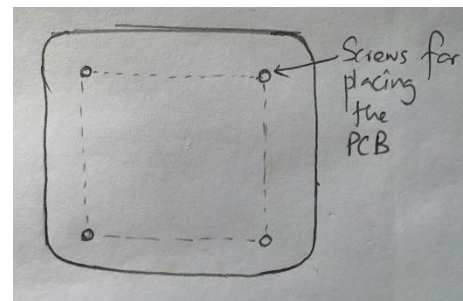

Figure 3: Bottom view

Figure 4: Inside view

Initial sketch, done like a box to place the PCB and necessary spaces for the inputs and outputs.
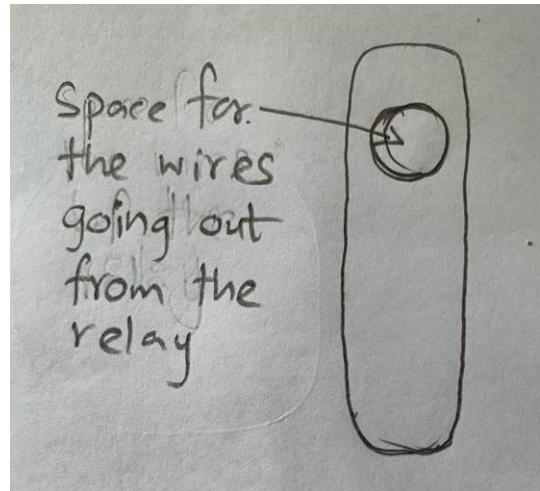
Sketch 2

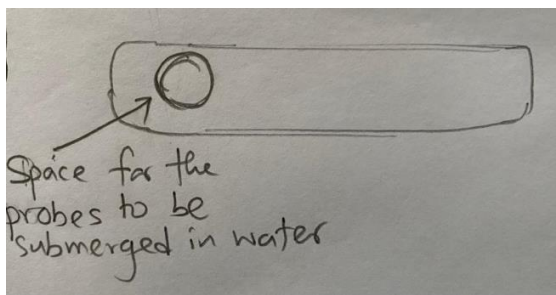Figure 5: 3D view

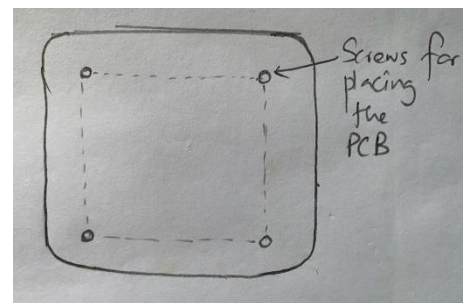

Figure 6: Side view

Figure 7: Bottom view

Figure 8: Inside view

Sketch 2 is an improved version of the sketch 1, taking feedback from my colleagues. The controller needs to be hanged closer to the water tank. For that, two handles are added.
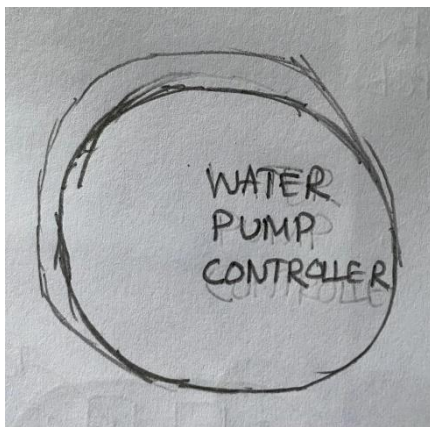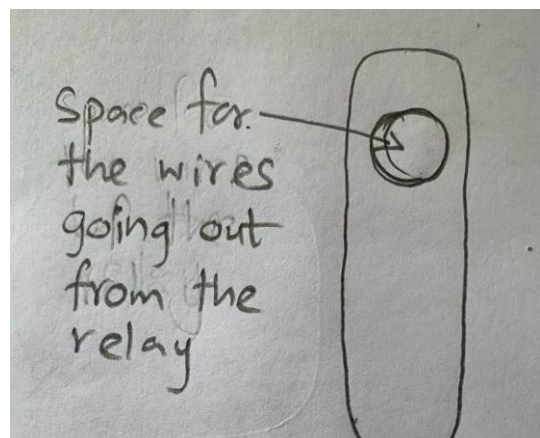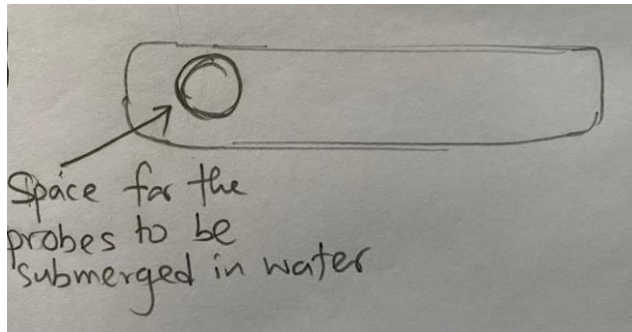
Sketch 3

Figure 9: 3D view

Figure 10: Side view
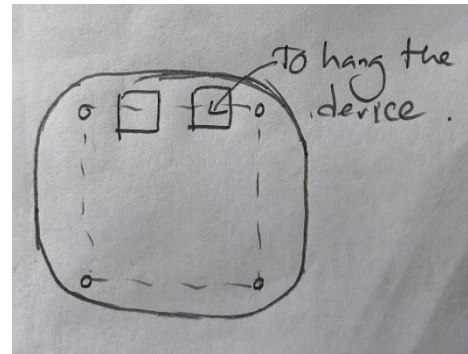
Figure 11: Bottom view

Figure 12: Inside view

Sketch 3 is an improved version of the sketch 1. Some of my colleagues express their interest in having a round shaped object and not having two external hangers to hang the controller. Hence two rectangular holes are made to hang the controller.

Sketch 4 – User Centered Design
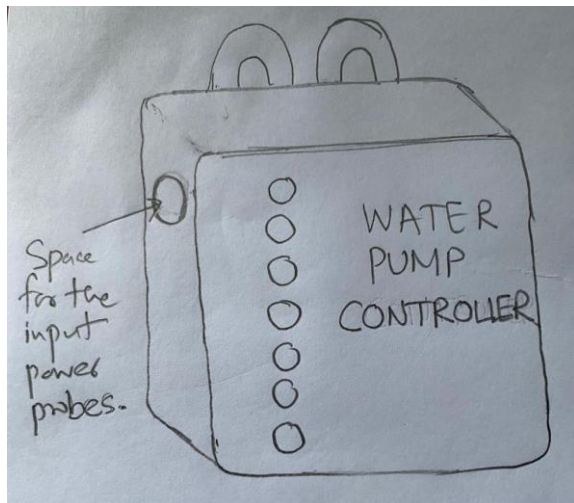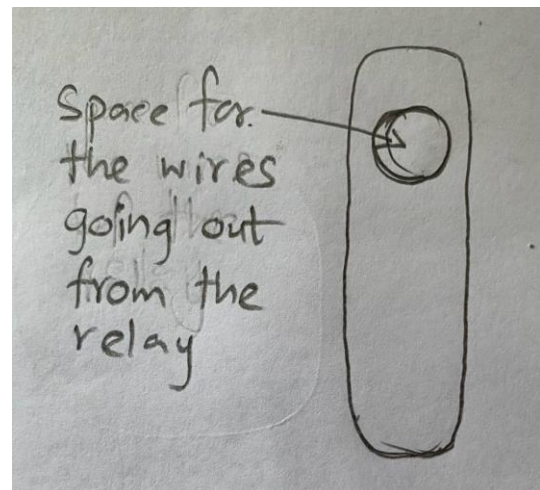

Figure 5: 3D view

Figure 6: Side view

In the survey, my potential users suggested one major upgrade. They asked whether it is possible to indicate the current level of water, since multiple probes are used inside the tank. 7 LEDs are used to indicate the level of water inside the tank. Rising water levels are represented by more LEDs blinking starting from the bottom most LED.
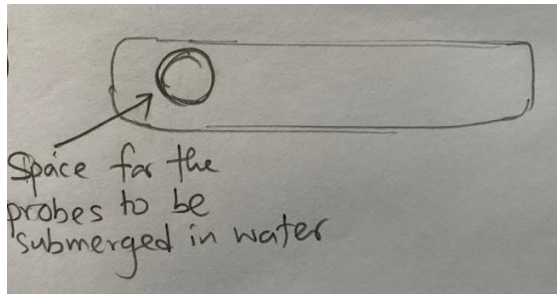
Figure 7: Bottom view

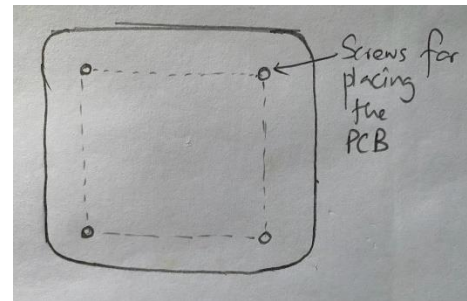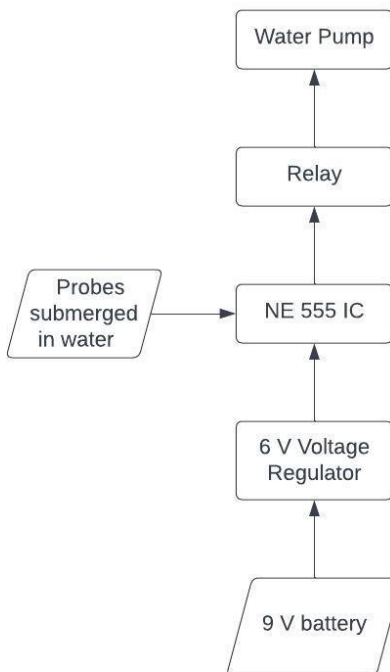*Figure 8: Inside view*

Block Diagrams

Block Diagram 1

Circuit is powered using the domestic power supply. PCB received power through a barrel connector, which outputs a 12V DC voltage. 12V is regulated to 6V using the LM7806 voltage regulator. 6V powers IC NE555. NE555 get input from ten submerged probes at different depths. NE555 then drives a transistor through which a relay is triggered.

Block Diagram 2
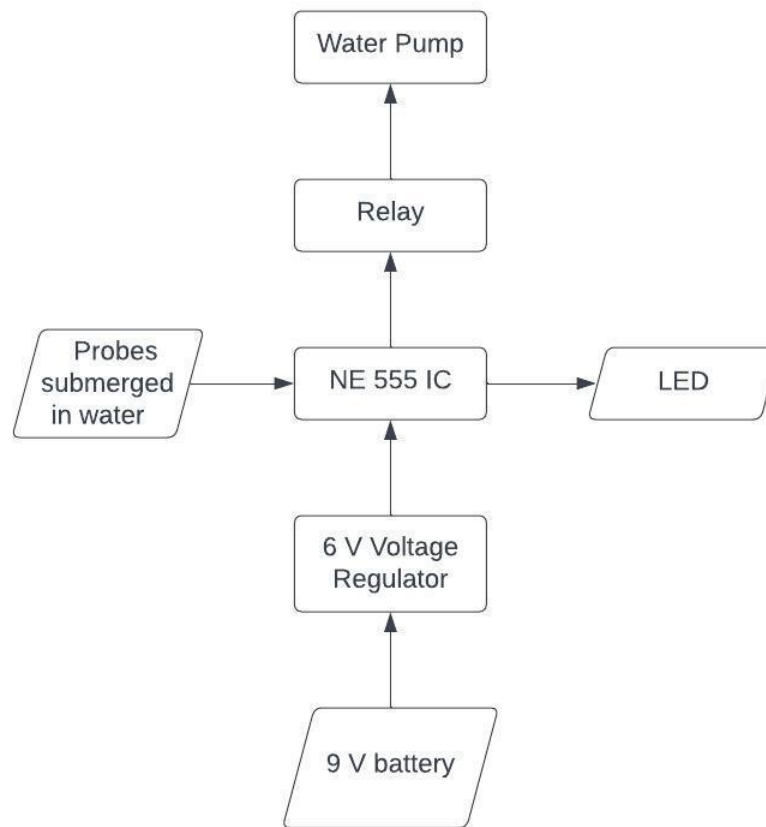
Suggestions were made to power the circuit using a 9V battery instead of the 230V AC power supply and to indicate the operation of the circuit for easy debugging.

Block Diagram 3
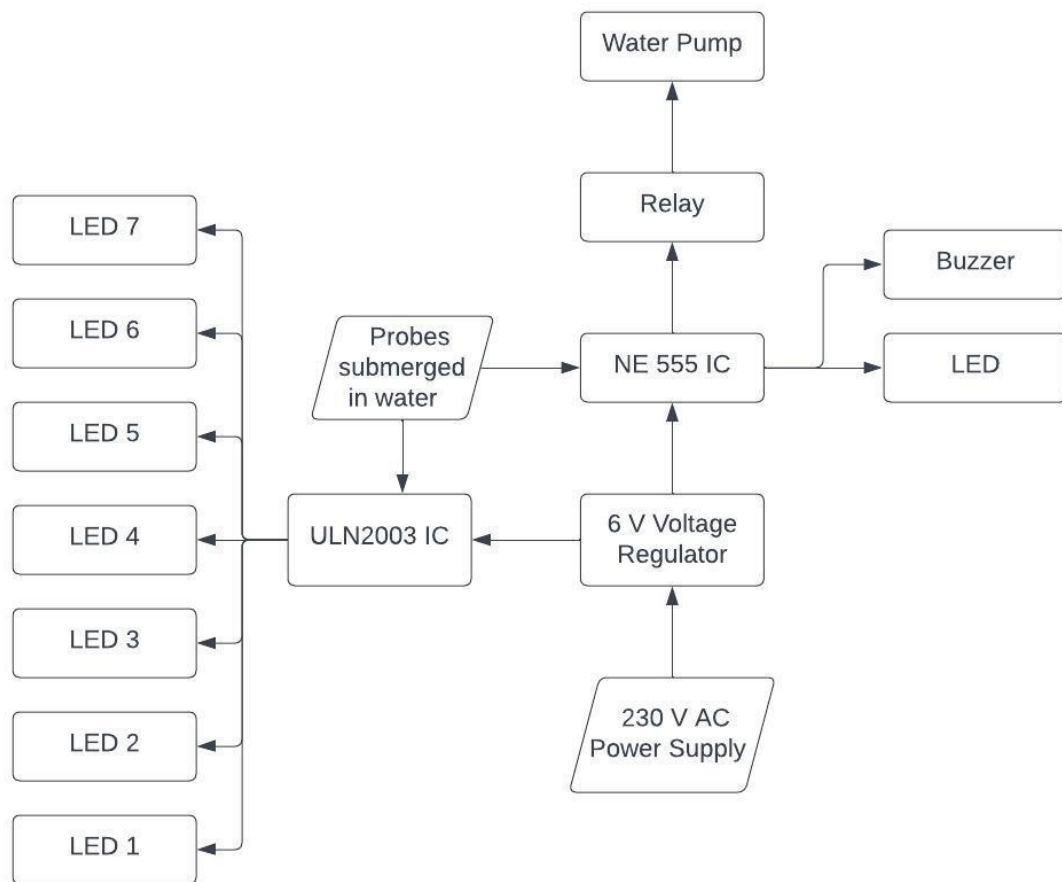
Indication circuit is added. It is powered using the same 6V supply and ULN2003 IC. ULN2003 gets inputs from seven submerged probes at different depths. NE555 triggers a LED and a buzzer.
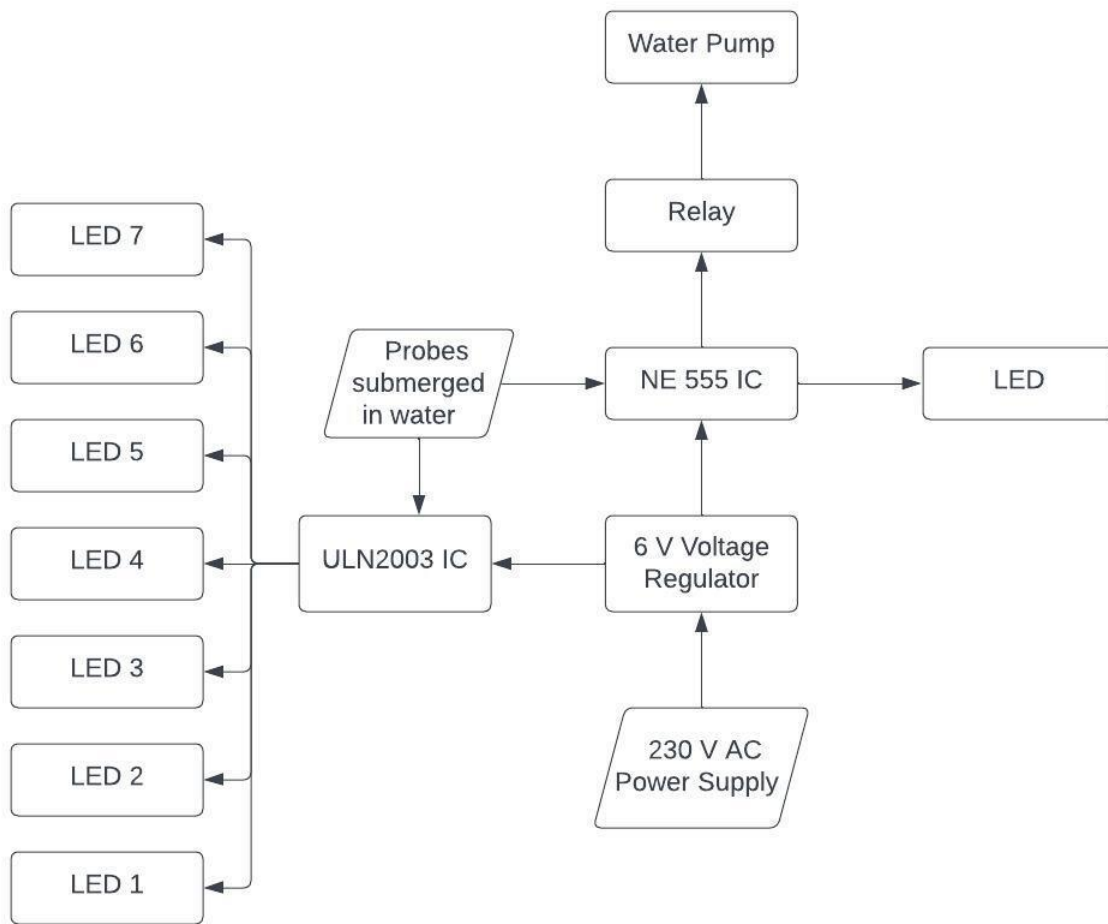
Block Diagram 4

Buzzer is removed. Rest of the circuitry is similar to that of the block diagram above.

Selection Matrices

Evaluation criteria for enclosure design

Criteria	Sketch 1	Sketch 2	Sketch 3	Sketch 4
Total cost	8	8	8	8
Material	8	8	7	8
Size	8	8	9	8
User experience	2	4	5	9
Aesthetics	5	6	6	9
Durability	8	8	8	8
Disposal	8	8	8	8
Complexity	9	9	9	9
Total marks	56	59	60	67

- Use experience means whether it accomplishes what it is made for.

Evaluation criteria for circuit design (Block diagram)

Criteria	Block diagram 1	Block diagram 2	Block diagram 3	Block diagram 4
Cost	9	9	8	9
Components	3	5	8	9
Power consumption	10	10	8	9
Simplicity	9	9	8	9
Reliability	7	7	9	9
Functionality	5	7	9	9
Maintenance	8	8	8	8
Total marks	51	55	58	62

- Components stands for whether sufficient, available, and cost-effective components are used.
- Functionality stands for whether proper components are used, and whether additional value additions are implemented.

Selected Design

Sketch 4 and block diagram 4 thus selected using selection matrices.
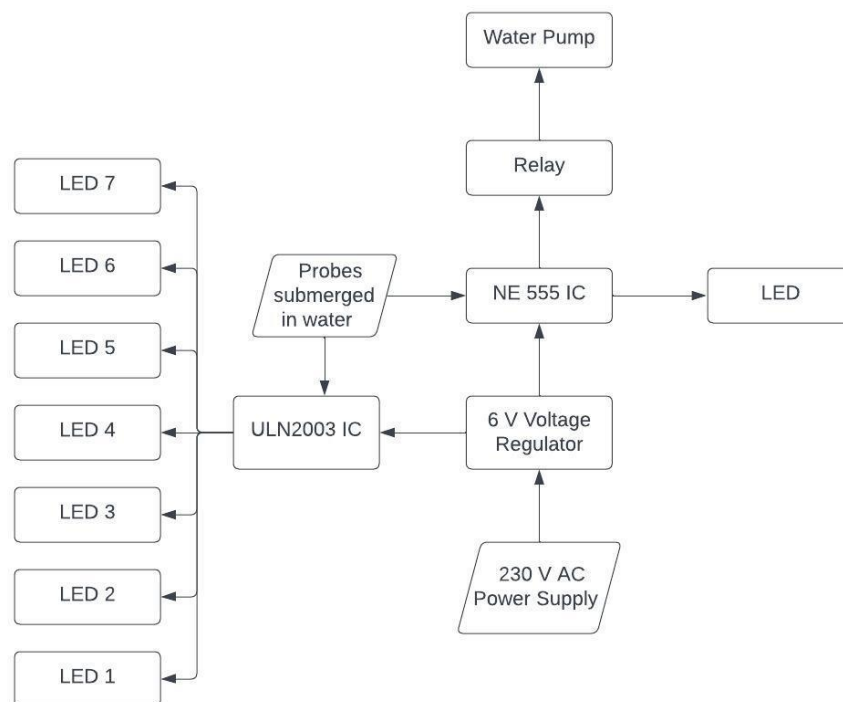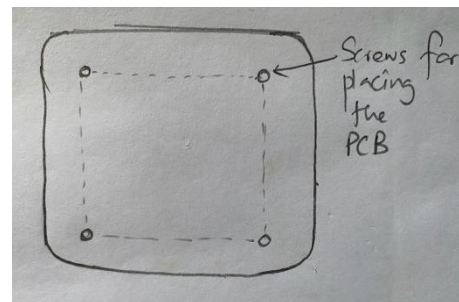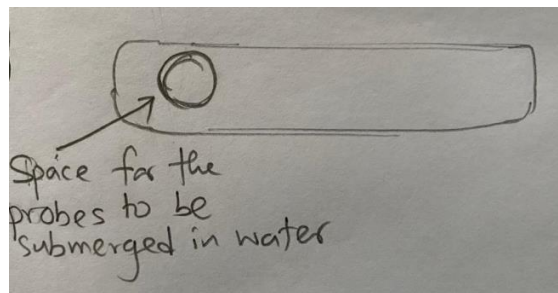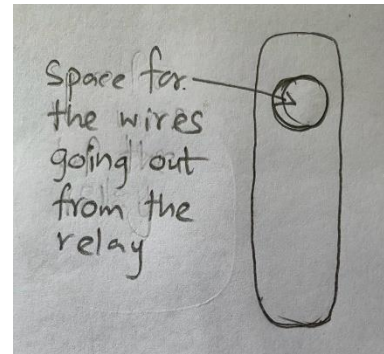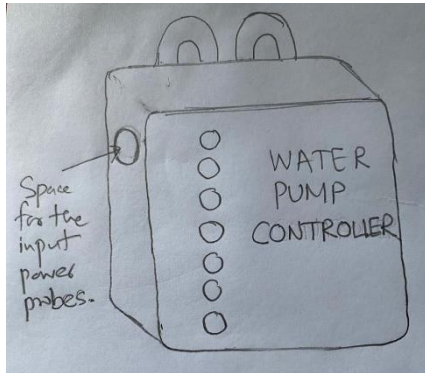
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