HOCHSCHULE SCHMALKALDEN
UNIVERSITY OF APPLIED SCIENCES

MERO Project Work

Portable Soap Dispenser – Project Dossier

M.Eng Mechatronics & Robotics

Presented by

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Supervisor

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November 29th, 2022

Acknowledgment

We would like to express our gratitude to all those who provided us the possibility to complete this project. A special thanks to our supervisors Prof. Dr. Stefan Roth whose contribution in stimulating suggestions and encouragement, helped us to coordinate our project especially in writing this dossier. Prof. Dr. Stefan Roth had been doing whatever he could to inspire us and provide us all the necessary knowledge and tools, thanks to his guidance and constant feedback, we had fulfilled our project and time, but more important is that we got real engineering and teamwork experience under his guidance.

Furthermore, we would also like to acknowledge with much appreciation the role of all those teachers whose teachings gave us knowledge which helped us in the making of this project. Last but not the least, many thanks to all group members, we together had an amazing experience where we learned from each other, which at last gave us great results.

TABLE OF CONTENTS

1. Introduction:

To live healthy, we need to maintain our hygiene. We know that there are various types of hygiene, cleaning our hand is one of them. As we know that our hands are major cause for the spread of COVID 19, because we touch a various kind of objects. A liquid soap dispensing system includes housing and a discharge mechanism for dispensing repeated doses of liquid soap from an associated cartridge. Soap dispenser in washrooms commonly require a user to press a nozzle or lever in order to dispense a quantity of soap.

This project is a hand free device which we can use in any public places such as office, institute, and schools etc. The main purpose of the Automatic water, sanitizer and liquid soap is to stop the spread of the virus as it is hand free device. IRsensors were used to sense the hand when it is placed under the device. By using this device, we can change our life in a smart way and also, we are recommended by different health organization like WHO to wash our hand in each an ever minute in a secure way. By observing this situation, we are here with our smart and hygienic project "Automatic Water Sanitizer and Liquid Soap Dispenser".

The design and development process has been conducted based on several idea and concept generation tools which are used to analyze the effectiveness of new product outcome.

2 Task's description

2.1 Description of project

Automatic soap dispenser become more and more popular and can be found in public toilets as well as in home application. So far, no solutions are found for traveling purposes. Hence, a fully automatic dispensing unit has to be developed to be used during traveling. Special requirements,

- Low weight.
- Small dimensions for portability.
- Refillable soap tank.
- Dispensing step must be undertaken by an automatic driven system.

2.2 Set-up of User Requirements and Technical Specification

It is necessary to set up user requirements before starting to make the actual device. They are requirements set by the end user. These requirements express how a facility, equipment or process should perform in terms of the product to be manufactured, required throughput, and conditions in which product should be made. User requirements provide information that serves as the basis for further specification, design, and verification of a manufacturing system (i.e., the design solution from the vendor to meet the user requirements which is evaluated during the design review/qualification process). Commissioning and Qualification activities should be structured such that at the end of the Commissioning and Qualification process there is documented evidence that demonstrates that the user requirements have been met.

After communication between all members of the team we developed the User Requirements first and from the individual points of these comes the technical specification.

User requirement	Title	User requirement	Domain(HW/SW/ME/ALL)
#UR	**Module Function**	**Application**	
UR 1	Intended use	The Poratable automatic soap dispenserr is designed to help to maintain clean facility by reducing cross-contamination between users and they are touchless to help stop the spread of bacteria, germs, and illnesses.	all
UR2	Application	Automatic soap dispensers are a sanitary addition to kitchens, hospitals,restrooms, schools,colleges,universities and offices.	all
UR3	Focus User Group	Male/Female, Age range : 08 - 80 years	all
	Module Function	General Functions	
UR4	Splash - proof base	It should be resistant the splash water & soap to avoid the battery componentfrom erosion.	
UR5	Accuracy	The product should be automatic and sensor oriented so output should be accurate .	all
UR6	Lifetime	Its life time should be 24 months, 600 cycles	all
UR7	Impact resistant	The device should be able to withstand a fall from 1.5 meters	all
UR8	Portability	it should be portable by a single person.	all
UR9	Maintenance	It should be easy to assemble and disassemble and clean the soap dispenser without using special tools.	all
UR10	Weight	The soap dispenser is very simple and easy to set up.	all

	Module Function	**Power Supply**	
UR11	Power sources	The power supply to the soap dispenser should be provided by a battery or power cord.	
	Module Function	**Sensing Unit & Electrical Components**	
UR12	Sensors, Transistor Resistor, switch & Pump	It should be a simple transistor or MOSFET with an IR proximity sensor, switch and Water Pump.	ME, HW
	Module Function	**Housing Unit**	
UR13	Housing	It should be easily mountable.	
	Module Function	**Regulatory Requirements and Standards**	
UR14	Electrical Standards	All electronic components have to be compliant to corresponding electrical standards.	all

Technical specification:

TS#	Ref. to UR#	Title	Technical Requirement	Domain(HW/SW/ME/All)
		Application		
TS1	UR1	Intended use	The Portable automatic soap dispenser is designed to help to maintain clean facility by reducing cross-contamination between users and they are touchless to help stop the spread of bacteria, germs, and illnesses.	all
TS2	UR2	Use case	We will build an automatic soap	all

			dispenser that uses IR sensors to detect the presence of a hand and activates a pump to pour the liquid on the hand.	
TS3	UR3	User	In public places or shared spaces, installing an automatic soap dispenser is very important. in these places, every day thousands of people using the bathrooms and also use the soap dispenser for hand washing . An automatic soap dispenser stops the cross-contamination and ensure hygiene.	all
		General Functions		
TS4	UR4	Splash - proof base	Filters 100% of UV light for increased product stability.	all
TS5	UR5	Product Accuracy	An automatic IR sensor is used to check the presence of hands below the outlet of the soap dispenser machine.	all
TS6	UR6	longevity	14500 AA Li-ion 3.7V 2200mAh Rechargeable battery is used inside this dispenser. Up to 30,000 donations per battery life.	all
TS7	UR7	Protection	Made from durable high density plastic.	all
TS8	UR8	Easy to Carry	Design is so lite so that it can be carried by anyone.	all
TS9	UR9	Maintenance	Using warm water mixed with soap from the dispenser is the best cleaning solution for all soap dispenser parts.	all
TS10	UR10	Weight	The weight should not be more than 700 gram.	all
		IR sensor, Batteries, USB charging unit & Motor		
TS11	UR11	Power sources	We used TP4056 1 A Charging Current for	ME

			3.7 V Li-ion Rechargeable Battery.	
TS12	UR12	Sensors, Transistor Resistor , Water Pump	Using of the BD136 power transistor, mini SPDT switch and 1K resistor and also help of IR Infrared Obstacle Avoidance Sensor Module to complete the circuit. For spraying we used Mini Submersible DC Water Pump.	**ME,HW**
		Housing Mechanism		
TS 13	UR13	Tank & Top cap	It mounted with threading mechanism.	
		Regulatory requirements and standards		
TS14	UR14	Electrical Standards	It should be CE certified dispensers according to electrical safety regulations (LVD) and electromagnetic compatibility (EMC).	all

3. Project Planning

3.1 Presentation of Team: Roles and Responsibilities of team members

The team was formed based on the interests of the team members and the requirements of the project. The given project work required knowledge and skill in the field of mechanical engineering and electrical engineering.

Most of the work was done in a group work instead of individual roleplay but the following major roles were divided among all members of the team,

Task/Phase	**Team Member**
Idea brainstorming	Akir, Imtiaz, Sharhan, Tariqul
Budget& resource planning	Imtiaz
Filling user requirements	Akir, Sharhan
Tech. specification work out	Akir, Sharhan
3D Solidworks Design	Tariqul
3D Printed Parts Procurement	Tariqul
Electrical Circuit Design	Akir, Sharhan
Assembly and connection of mechanical parts	Imtiaz
Create disassembly and assembly view of product for presentation	Akir, Imtiaz
V&V of the product	Akir, Imtiaz, Sharhan, Tariqul
Project management & Report compilation	Imtiaz

3.2 V-model methodology

We used V-model method of developing system lifecycle and implemented it into our project. The V-model of VDI guideline 2206:2004 (Figure 1) basically divides the development process into three sections: The decomposition on the left side of the V-model describes the transformation of requirements, which are presented as an input, into a system design. This leads to the second section of engineering in different disciplines, the domain-specific design process. The third section integrates the disciplines on the right side of the V-model during the system integration, verification, and validation. The result or output of the V-model is a product. According to that we have developed our project.

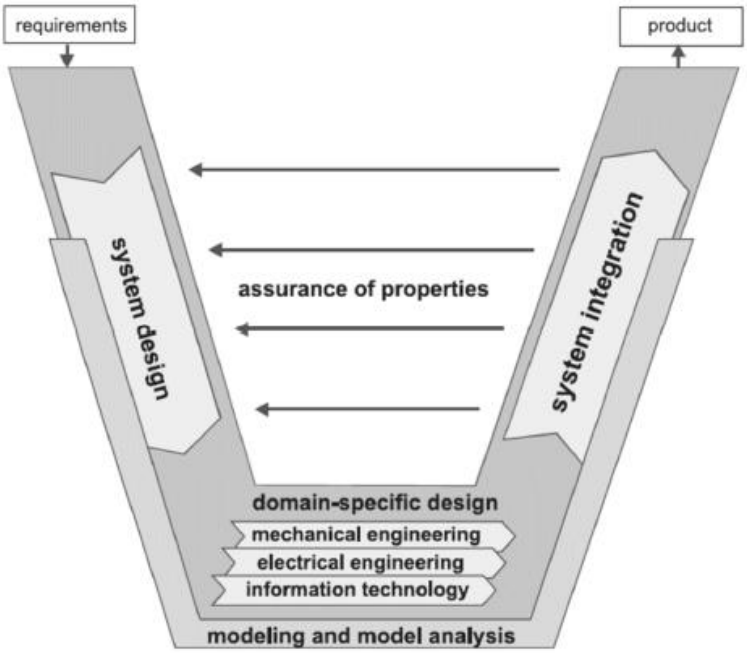
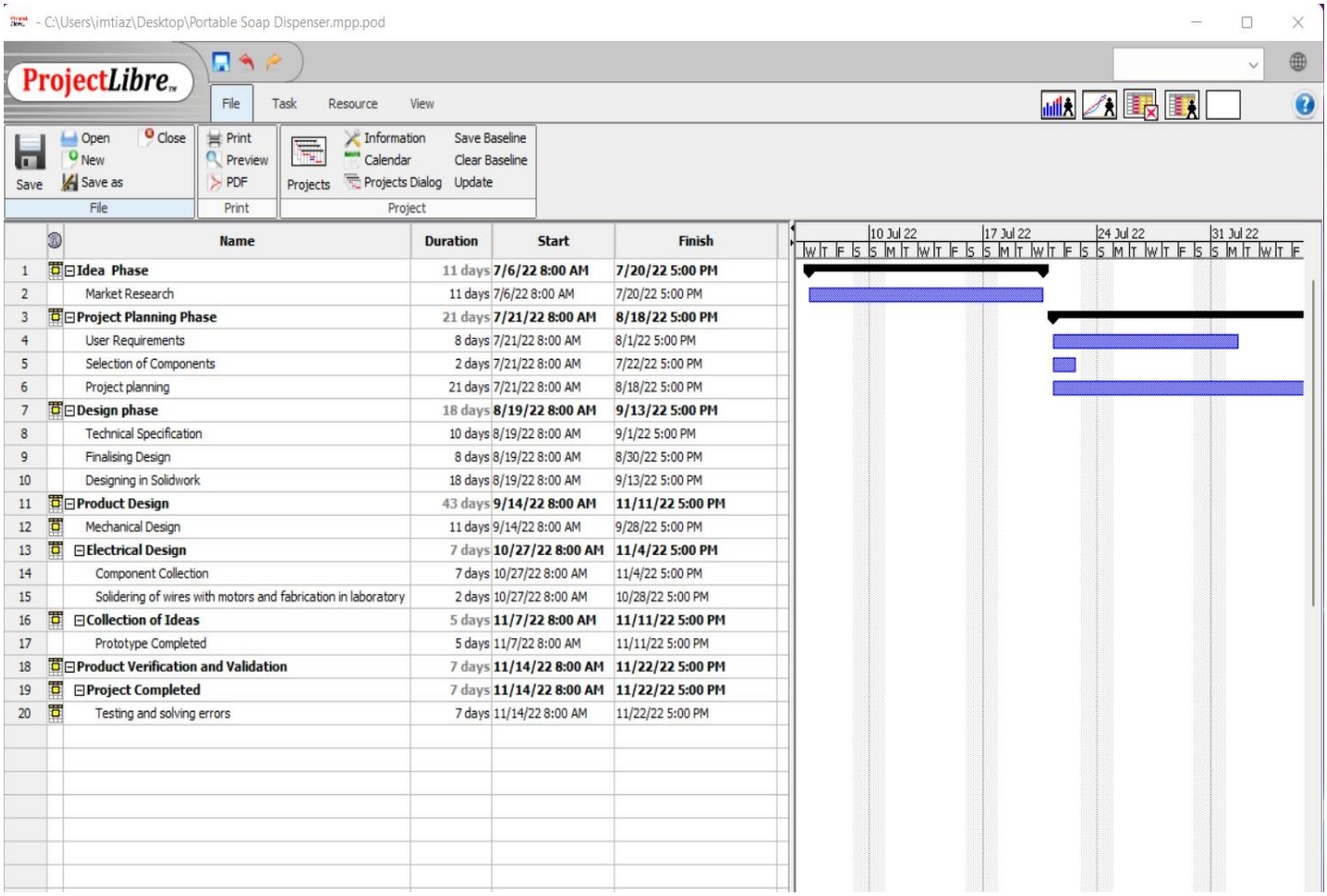


Fig. 3.1: V-model of the VDI 2206:2004 guideline "Design methodology for mechatronic systems"[5]

3.3 Project Plan

The stage of initial planning. On this stage usually costs, resources, budget are calculated, timeline is forming. The planning starts with market research and follows with user requirement which is the major identification aspect on the planning stage and takes the most amount of time. After proper technical specification from the user requirements the product design is formed. The procedure ends with prototype testing with verification and validation based on pre-declared criteria.

Project Libre tool was used to do the project planning of this project.



	Name	Duration	Start	Finish
1	**Idea Phase**	11 days	**7/6/22 8:00 AM**	**7/20/22 5:00 PM**
2	Market Research	11 days	7/6/22 8:00 AM	7/20/22 5:00 PM
3	**Project Planning Phase**	21 days	**7/21/22 8:00 AM**	**8/18/22 5:00 PM**
4	User Requirements	8 days	7/21/22 8:00 AM	8/1/22 5:00 PM
5	Selection of Components	2 days	7/21/22 8:00 AM	7/22/22 5:00 PM
6	Project planning	21 days	7/21/22 8:00 AM	8/18/22 5:00 PM
7	**Design phase**	18 days	**8/19/22 8:00 AM**	**9/13/22 5:00 PM**
8	Technical Specification	10 days	8/19/22 8:00 AM	9/1/22 5:00 PM
9	Finalising Design	8 days	8/19/22 8:00 AM	8/30/22 5:00 PM
10	Designing in Solidwork	18 days	8/19/22 8:00 AM	9/13/22 5:00 PM
11	**Product Design**	43 days	**9/14/22 8:00 AM**	**11/11/22 5:00 PM**
12	Mechanical Design	11 days	9/14/22 8:00 AM	9/28/22 5:00 PM
13	**Electrical Design**	7 days	**10/27/22 8:00 AM**	**11/4/22 5:00 PM**
14	Component Collection	7 days	10/27/22 8:00 AM	11/4/22 5:00 PM
15	Soldering of wires with motors and fabrication in laboratory	2 days	10/27/22 8:00 AM	10/28/22 5:00 PM
16	**Collection of Ideas**	5 days	**11/7/22 8:00 AM**	**11/11/22 5:00 PM**
17	Prototype Completed	5 days	11/7/22 8:00 AM	11/11/22 5:00 PM
18	**Product Verification and Validation**	7 days	**11/14/22 8:00 AM**	**11/22/22 5:00 PM**
19	**Project Completed**	7 days	**11/14/22 8:00 AM**	**11/22/22 5:00 PM**
20	Testing and solving errors	7 days	11/14/22 8:00 AM	11/22/22 5:00 PM

Budget planning for an estimated cost of all the components used for the project.

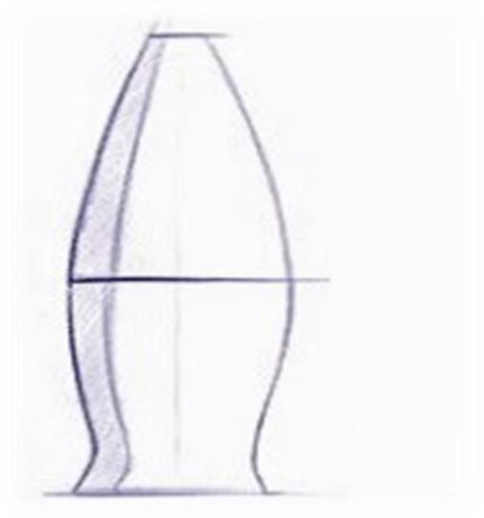
	Name of Component	Price(EUR)
1	IR Infrared Obstacle Avoidance Sensor	1,2
2	TP4056 Micro USB 5V 1A Charge Controller Lithium Li - Ion Battery Charger	3,5
3	Mini Water Pump Submersible Pump Micro Motor Pump DC 3V-5V	4,2
4	3M Transparent Hose	1
5	Li-Ion Battery 2600 mAh (3.7 V)	15
6	Transistor BD136 PNP	1
7	SPDT soldering switch	1
9	Stranded Tinned Plated Copper Wires	1
10	Resistor 1k Ω	.1
11	3D Printed Prototype	--
TOTAL		37

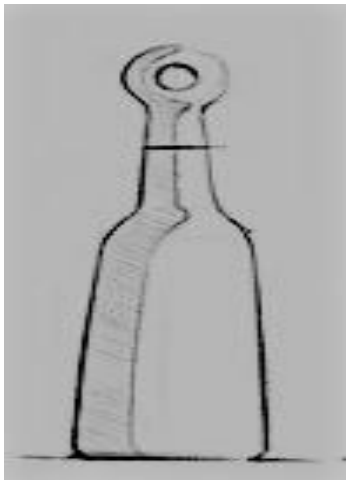
4. Concept Phase

4.1 Presentation of various draft concepts

(i). Sketches of portable soap dispenser:

These are basic sketches of our portable soap dispenser during the draft concept stage.





(ii) Principal of work of our soap dispenser:

Technology has been in our homes for so many years now. It was a matter of time until it would get into bathroom and kitchens to cover basic hygiene needs. The best automatic soap dispensers now finally manage to wash our hands without forcing users to touch them even for a second. Automatic soap dispensers have an amazing visual appeal. They come in metallic, transparent, or colourful design and look modern and appealing. Soap dispensers now can successfully accessorize minimalist, tech-oriented, and even bohemian homes. The Mechanisms Behind the Best Automatic Soap Dispensers – It's not hard to find the best automatic soap dispensers which harmoniously match your faucet. There are products which best-fit home kitchen and bath use, welcoming public institutions, or restaurants and even hospitals. They clean your hands, remain clean and let you control the amount of soap, antibacterial agent, foam, or gel you will use.

Why Do Soap Dispensers Feature Modern Mechanisms?

• Their hygienic role is only accomplished if you don't touch the dispenser before washing your hands. In the past years, you could have a touchless wash, but their use lead to a dirty sink and a dirty pump. They now come with silicone valves which avoid spills and touches.

• You can increase the efficiency of germ prevention by adding using antibacterial soap with the dispenser. Flight terminals designers usually choose such mixes to minimize pathogens distribution from one tourist hand to another.

• Automatic soap dispensers are usually simple to install and use. You clean them as per the instructions without damaging their layers.

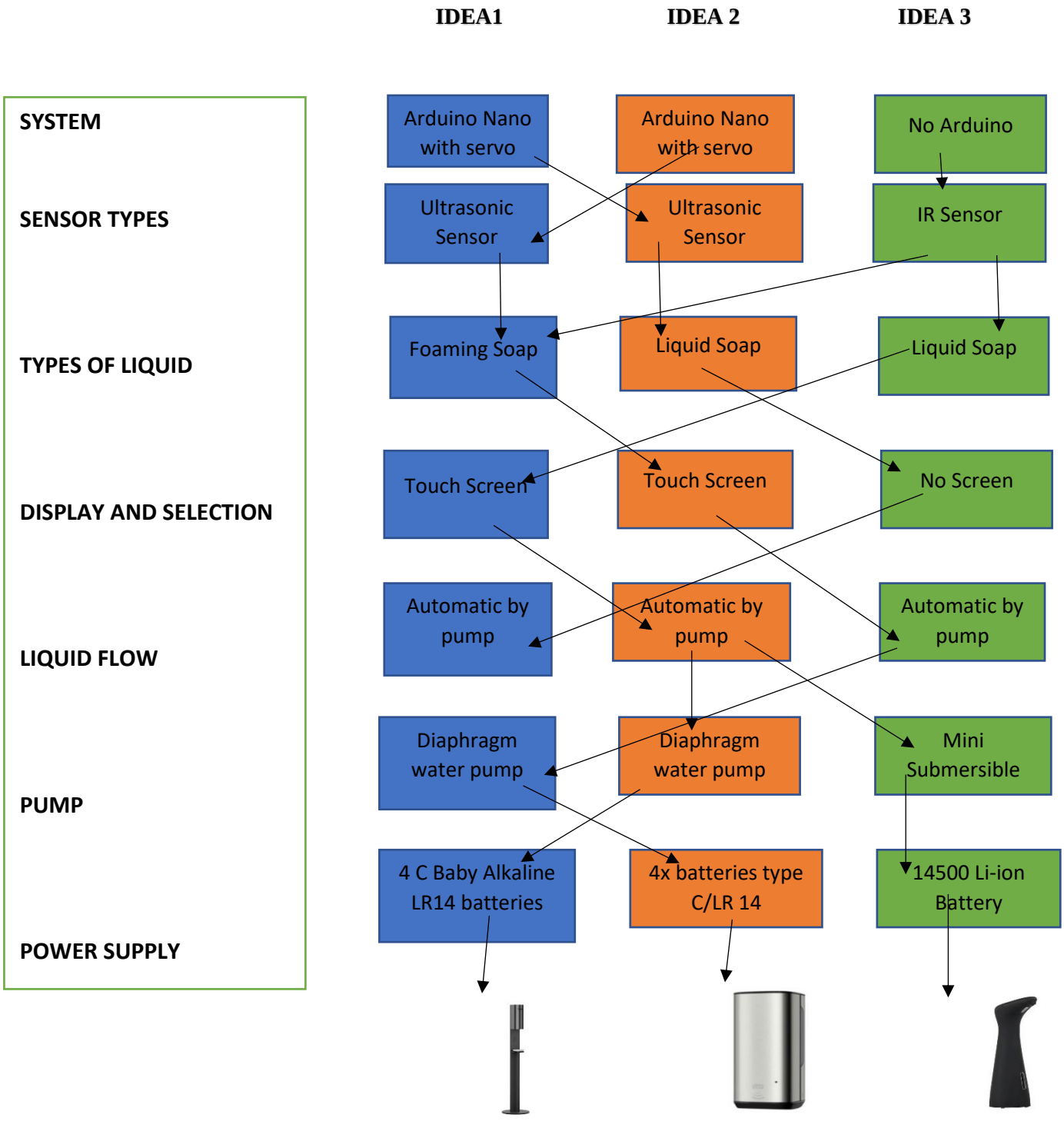
• Soap dispensers are built to minimize hassle. If you don't use them in a while, you don't need to clean up random spills. They can also be placed in the kitchen and help cleaning up during the cooking process.

• The products are eco-friendly and save you money. Batteries are either rechargeable or long lasting.

• They are children-friendly and help them learn to wash their hands correctly while enjoying the automatic soap dispensing. Around 5% of the people wash their hands correctly in the public restroom, according to a study.

• For design purposes, soap dispensers have been developed with modern or friendly looks. You can match them with the faucet or the entire sink.

(iii) Morphological Chart for Concept Design:



4.2 Selection of best concept:

(i) Decision Matrix:

Decision matrix evaluates and prioritizes a list of options and is a decision-making tool. The team first establishes a list of weighted criteria and then evaluates each option against those criteria.

Criteria	Rating range	Weighting	Idea 1		Idea 2		Idea 3	
Weight	1: >2kg 3: 0.5 to 2kg 5: <1kg	3.53%	0.035	1	0.105	3	0.175	5
Ease of Operation	1: >10s 3: 10 to 5s 5: <5s	18.82%	0.94	5	0.56	3	0.189	1
Range of Sensor	By Survey: 1: Too Close 3: Too Far 5: Normal	18.82%	0.56	3	0.94	5	0.945	5
Numbers of Battery	1: Single 3: Double 5: >Double	17.65%	0.88	5	0.52	3	0.177	1
Maintenance	1: >15mins 3: 10 to 15 mins 5: <10mins	3.53%	0.105	3	0.105	3	0.175	5
Price	1: >100 Euro 3: 50 to 100 Euro 5: <50 Euro	14.11%	0.14	1	0.42	3	0.75	5
Total Amount of Liquid	1: >100ml 3: 500ml to 100ml 5: <500ml	23.53%	0.70	3	0.70	3	1.18	5
Sum		100%	3.36	21	3.35	23	3.59	27

(ii) Pairwise Comparison:

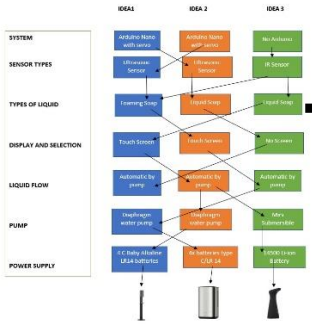
	A	B	C	D	E	F	G	H	I	J
1		Criteria A	Criteria B	Criteria C	Criteria D	Criteria E	Criteria F	Criteria G	SUM	%
2	Criteria A		B:5	C:5	D:5	A:3	F:3	G:5	A=3	3,53
3	Criteria B			B:3	B:5	B:3	F:3	G:5	B=16	18,82
4	Criteria C				C:3	C:5	F:3	C:3	C=16	18,82
5	Criteria D					D:5	F:3	D:5	D=15	17,65
6	Criteria E						E:3	G:5	E=3	3,53
7	Criteria F							G:5	F=12	14,11
8	Criteria G								G=20	23,53
9									Total = 85	Check = 100%
10										

(iii) Idea Finalization:

PAIRWISE COMPARISION

	A	B	C	D	E	F	G	H	I	J
1		Criteria A	Criteria B	Criteria C	Criteria D	Criteria E	Criteria F	Criteria G	SUM	%
2	Criteria A		B:5	C:5	D:5	A:3	F:3	G:5	A=3	3,53
3	Criteria B			B:3	B:5	B:3	F:3	G:5	B=16	18,82
4	Criteria C				C:3	C:5	F:3	C:3	C=16	18,82
5	Criteria D					D:5	F:3	D:5	D=15	17,65
6	Criteria E						E:3	G:5	E=8	3,53
7	Criteria F							G:5	F=12	14,11
8	Criteria G								G=20	23,53
9									Total = 85	Check = 100%
10										

BOX OF MORPHOLOGY



DECISION MATRIX

Criteria	Rating range	Weighting	Idea 1		Idea 2		Idea 3	
Weight	1: >2kg 3: 0.5 to 2kg 5: <1kg	3.53%	0.035	1	0.105	3	0.175	5
Ease of Operation	1: >10s 3: 10 to 5s 5: <5s	18.82%	0.94	5	0.56	3	0.189	1
Range of Sensor	By Survey: 1: Too Close 3: Too Far 5: Normal	18.82%	0.56	3	0.94	5	0.945	5
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Price	1: >100 Euro 3: 50 to 100 Euro 5: <50 Euro	14.11%	0.14	1	0.42	3	0.75	5
Total Amount of Liquids	1: >100ml 3: 500ml to 100ml 5: <500ml	23.53%	0.70	3	0.70	3	1.18	5
Sum		100%	3.36	21	3.35	23	3.59	27

IDEA 3

5 Design Phase

5.1 Design of the Soap Dispenser

The soap dispenser is designed to be an assembly of 3 separate parts.

1. Soap Tank
2. Electronic Housing
3. Top Cap

Soap Tank Design Criterion

- It is designed to contain a soap and water mixture.
- The ground of the tank is suitable for placing the submersible pump.
- The middle part of the tank is kept transparent for visibility
- SP400-L-6 extrude thread type was chosen.

Soap Tank Sketch

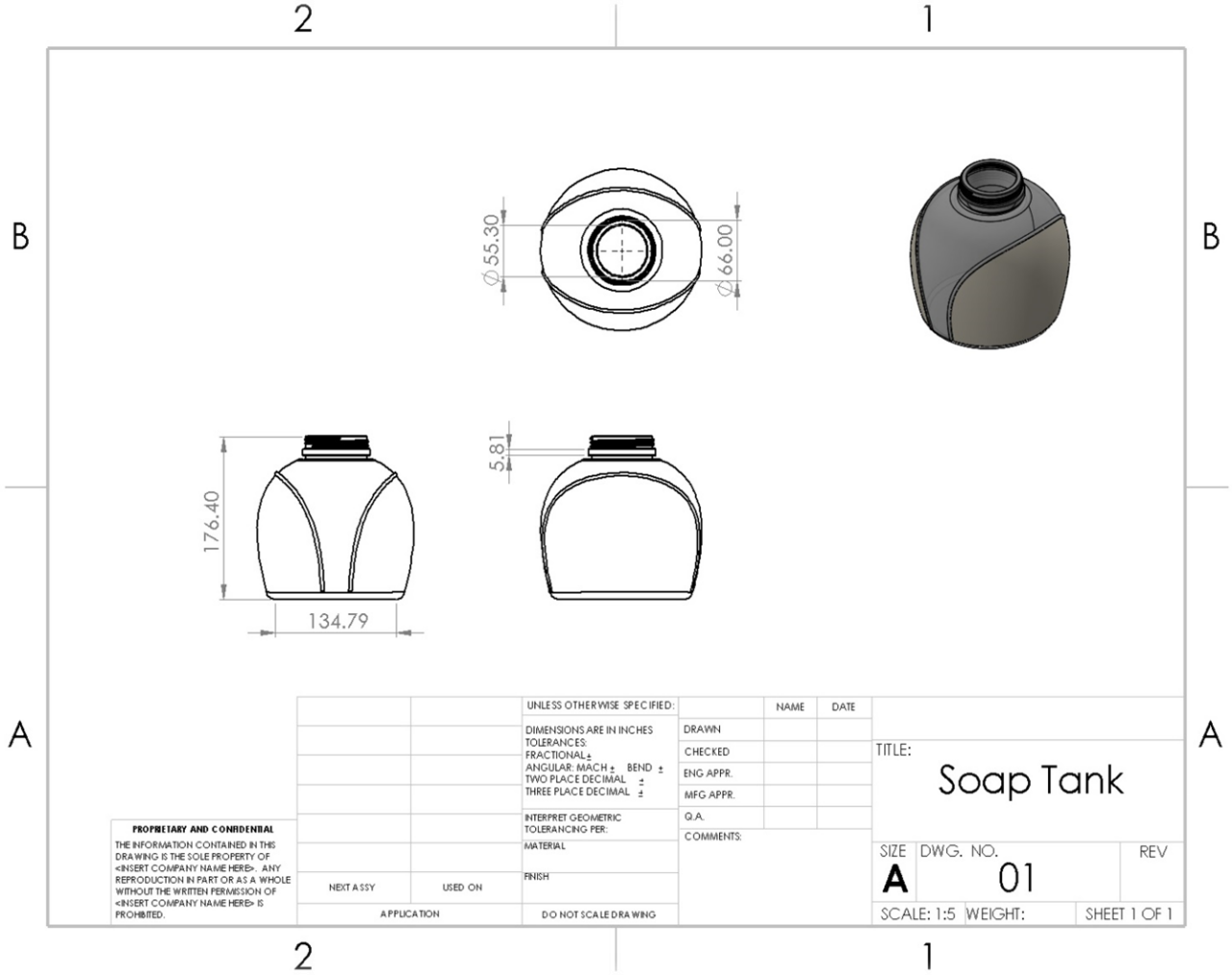


Figure 1: 2D Sketch of Soap Tank and Isometric View

Electronic Housing Design Criterion

- The Housing is mated with the soap tank by threading mechanism
- It has a shell feature
- It has as rubber coating on the edges where the dome feature is used
- The rubber coating is used for a better grip
- Small hole for air is considered so that no negative pressure is induced while the pump operates
- Two plates are on top of the housing which contains the electronic components on it.

Electronic Housing Sketch

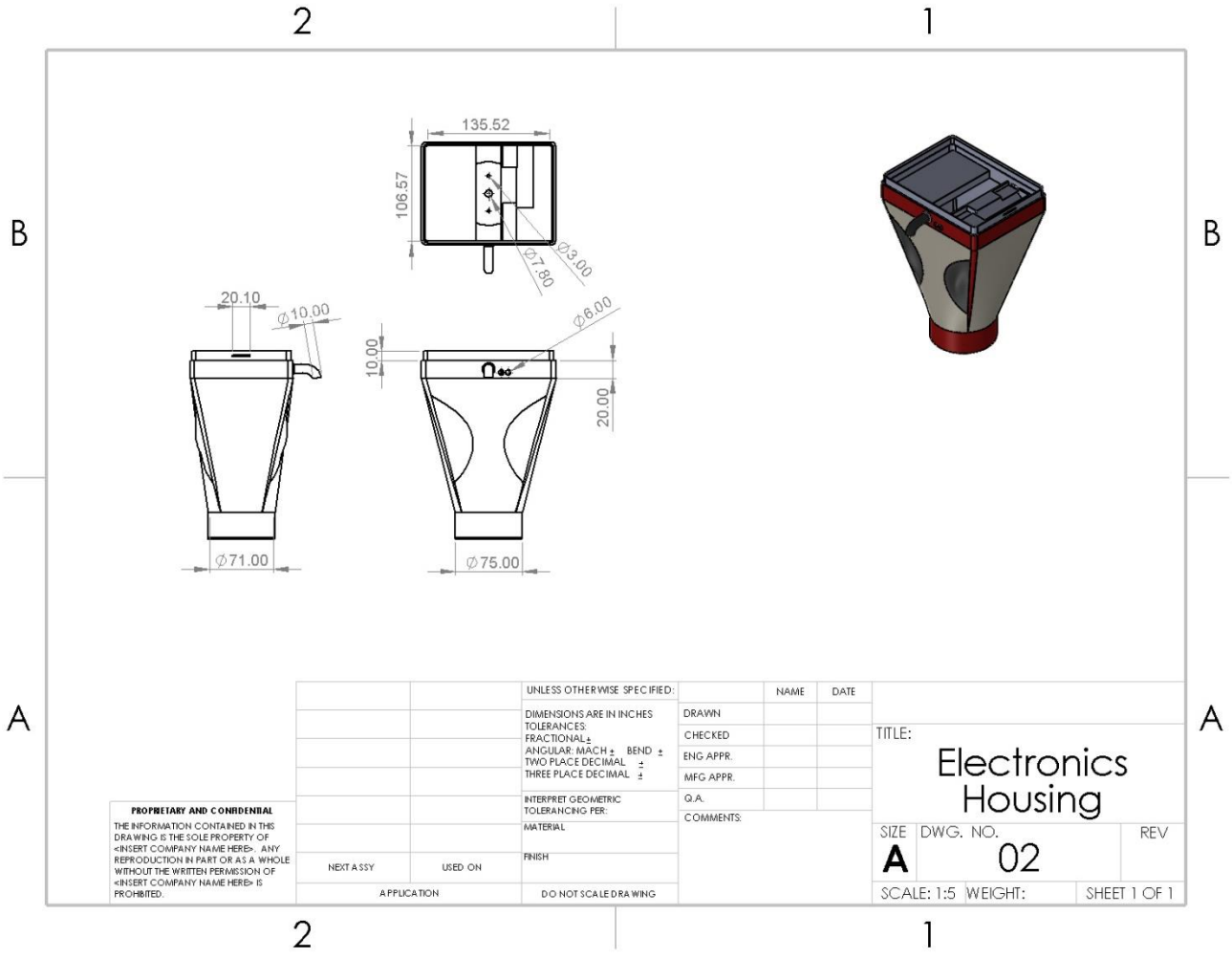


Figure 2: 2D Sketch of Electronic Housing and Isometric View

Top Cap Design Criterion

- The Cap is mounted on top of the Electronic Housing
- It mates with the housing with Clipping mechanism
- It is used for ease of access to the electronics
- It also protects the electronics from water, dust etc.

Top Cap Sketch

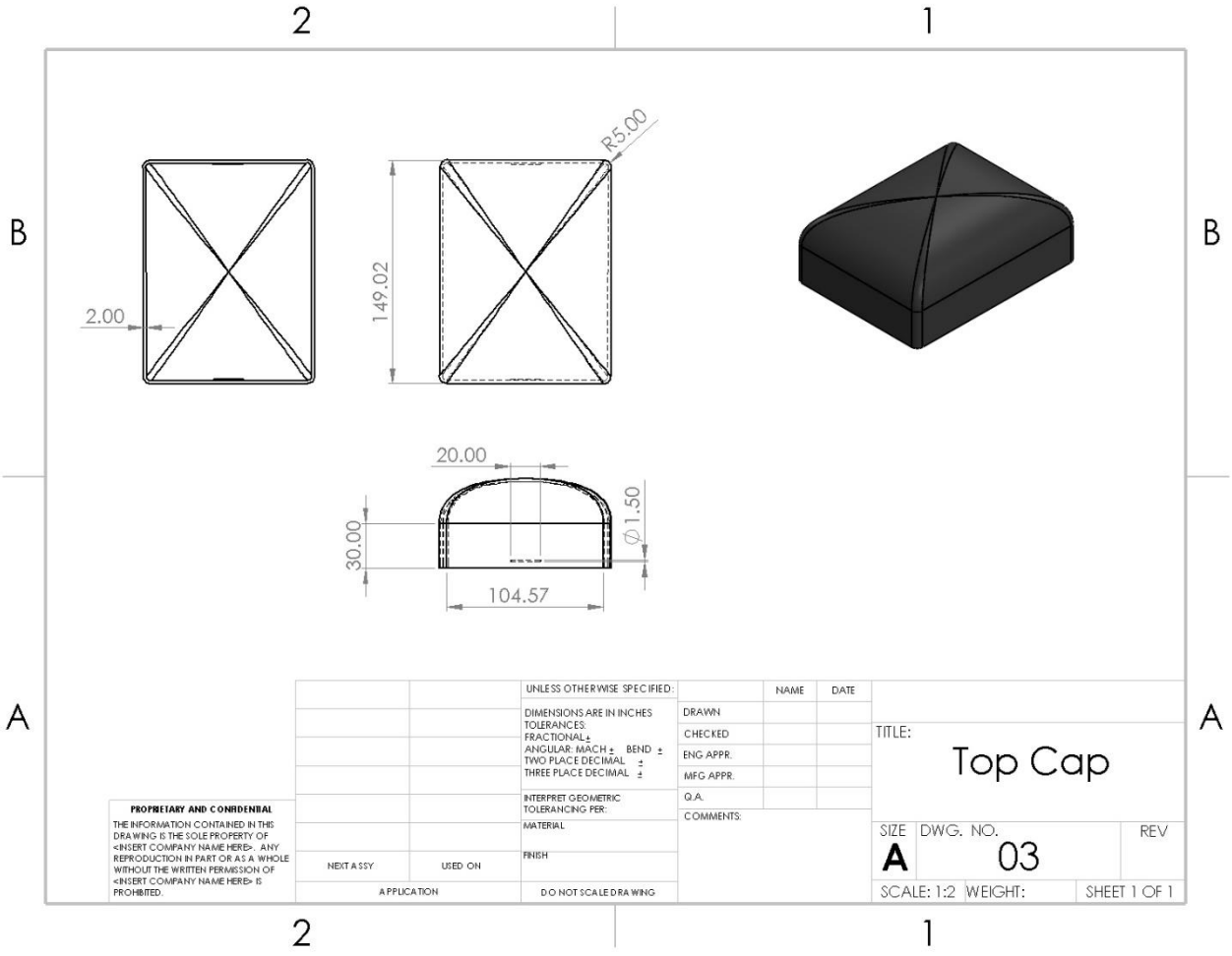


Figure 3: 2D Sketch of Top Cap with isometric view

Assembly with the Parts

Cross sectional view of the Assembly

The cross-sectional view allows us to see the applied features more in depth. Along with all the design criterion mentioned above, it is visible that two different wall thickness are used in the Soap Tank. The thickness on the top is kept higher considering the extensive use.

Figure 4: Cross-sectional view of the Soap Dispenser

Soap Dispenser Sketch

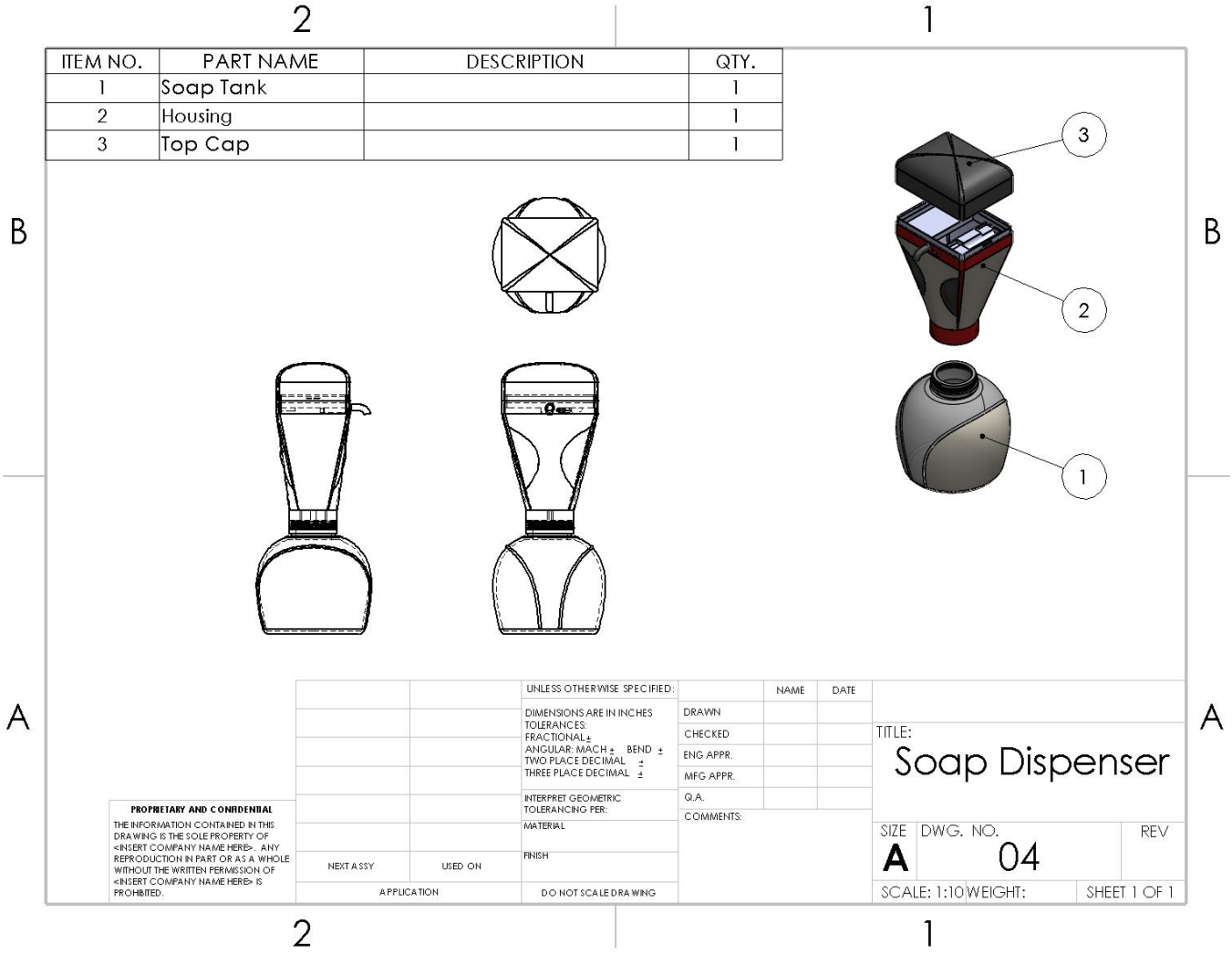


Figure 5: Soap Dispenser Assembly 2D Sketch with isometric exploded view

Rendered View of the Final Design

The rendered image was used using PhotoView 360 add-in in Solidworks. The rendering tool provides a highly interactive environment for viewing the design with high accuracy.

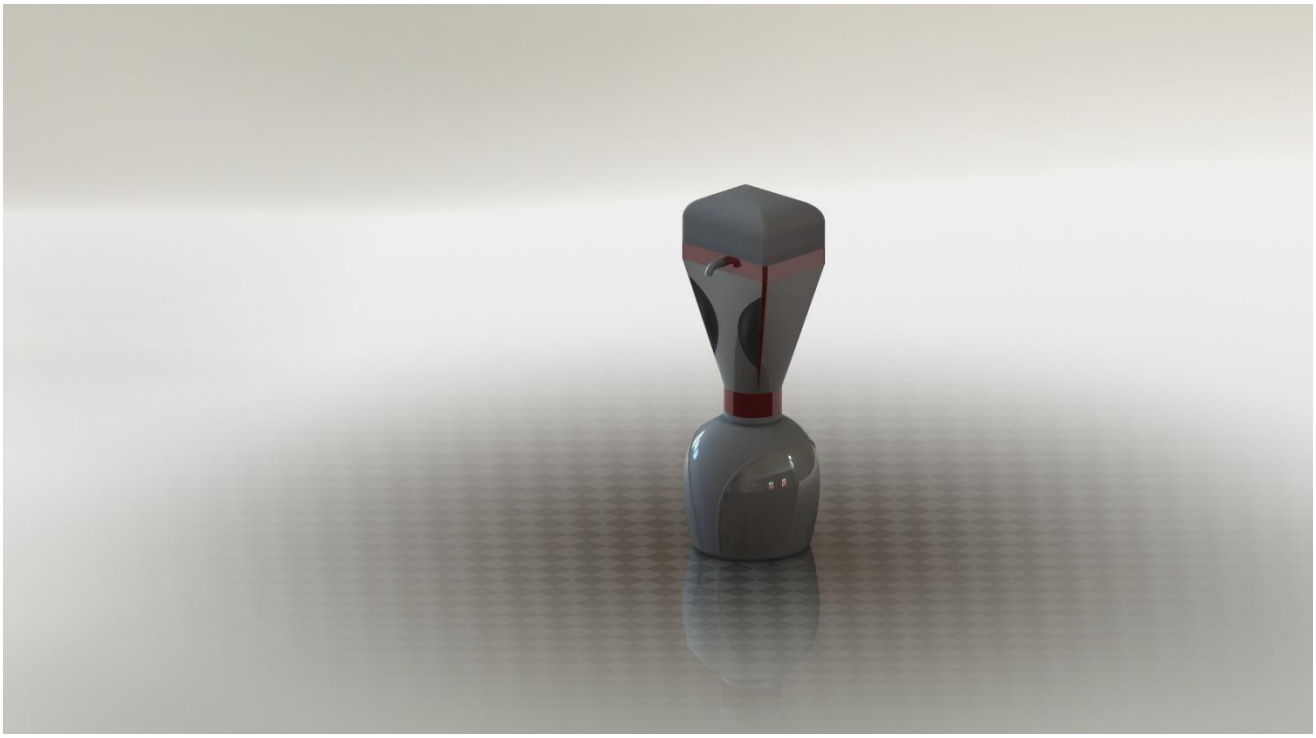
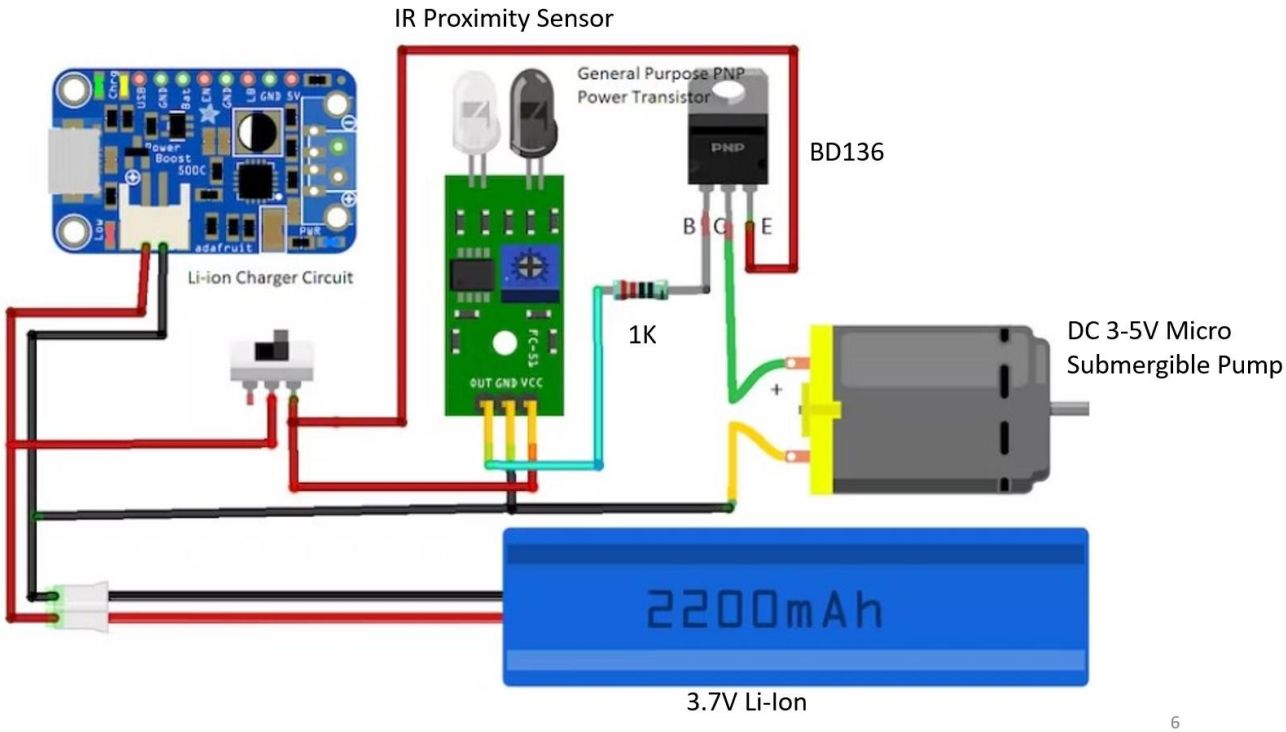


Figure 6: Rendered view of the Soap Dispenser

Electronic layout:



6

5.2 Working principle of final design

The schematic is very simple and easy to understand. IR proximity sensor detects the presence of a hand and makes the OUT-pin LOW. Normally OUT pin keeps HIGH. When it goes low it turns on the PNP transistor and the pump becomes on. We used the BD136 power transistor for the circuit. A 1K resistor is connected between sensor OUT and the base of the transistor. It protects the transistor from burning out.

Turning the potentiometer of the sensor from the lowest sensitivity level, and slightly increase it to achieve desired detection range. We did not make it too sensitive because the pump might act spontaneously without any trigger!

For powering the circuit and the motor a 14500 Li-ion cell is used and it is connected with a USB charging circuit.

6 Summary

6.1 Wrap-up of project

We have seen several Arduino automated soap dispensers circulating on the web. We find using Arduinos a bit overkill for this specific project. Arduinos are far too expensive. We figured using a simple transistor or MOSFET would do the job, which would also drastically reduce the costs. Obviously, the absence of a microcontroller removes control of over-spilling, but then, we did find out that using a sensor would physically limit the flow of liquid. There are several two-transistor RC circuits that would solve the over-spilling problem but the single transistor design works well, given that we have chosen the proper tube size. We have designed a 3D diagram for our project which made our project succeed. We followed the schematic diagram to gratify our project. The schematic is straightforward and easy to understand. IR proximity sensor detects the presence of a hand and makes the OUT pin LOW. Normally OUT pin keeps HIGH. When it goes low it turns on the PNP transistor and the pump becomes on. We used the BD136 power transistor for the circuit. A 1K resistor is connected between sensor OUT and the base of the transistor. It protects the transistor from burning out. Turn the sensor's potentiometer from the lowest sensitivity level, and slightly increase it to achieve your desired detection range. We did not make it too sensitive because the pump might act spontaneously without any trigger. For powering the circuit and the motor a 14500 Li-ion cell is used and it is connected to a USB charging circuit. For the soap plastic tank, we have selected a plastic tank for soap in our design as per our requirements. We have placed our DC pump in the soap tank. Eventually, we placed our all equipment in the top housing part and connected our circuits and we have successfully done our automatic soap dispenser.

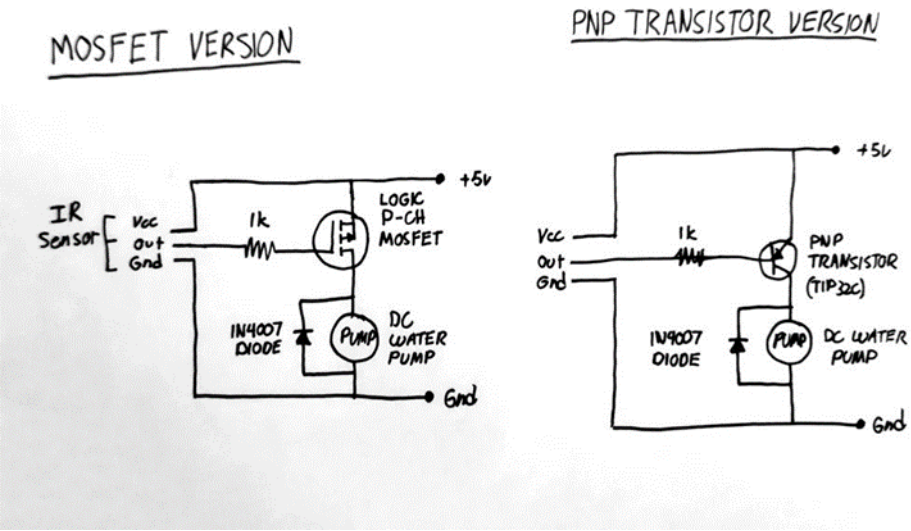


Fig: Schematic diagram of our project

6.2 Project review

a. We successfully did our prototype soap dispenser. At first, we planned our project schedule with our members and then we made our schedule in the project libre. Then we nominated Imtiaz khan as our team manager and host to maintain our full team management. We have collected our equipment. Then, we made a normal prototype soap dispenser later we made a 3D design of our soap dispenser, and then we did a 3D print of our design in the lab. We have faced many difficulties in making our prototype soap dispenser. For example, first, we faced difficulties to choose the proper plastic bottle for our test. Secondly, we have faced collecting our exact equipment. Thirdly, we have faced joining our wire with the sensor, water pump, and switch, Fourthly, in the lab, we need to cut down our 3D print housing and resize it, Fifthly we have faced our connection disruption. Finally, after all, the difficulties, we successfully did our project.

b. In the very beginning, we tried our project with UNO and microcontroller. If we use this for our prototype soap dispenser, it will be expensive and complicated. That's why we used an IR Proximity sensor, a mini submersible DC water pump, a Li-ion battery, a TP4056 Li-ion charging module, mini spdt switch to create our project easy and cost-effective.

c. In the technical part first, we tried out UNO and Microcontroller to complete our project. But we found it will be complicated and expensive. Then we decided we will make our project without a microcontroller. Then our members discussed and found a process without Arduino and it is a simple and very handy process. We have used IR Sensor which works without touch, we used a battery to give power, we used a charging module to energize our battery, a mini spdt switch to on/off our dispenser, we used PNP transistor for signal generate, and finally, we have used 1K resistor in our circuit diagram to protect our water DC pump. Our diagram is simple and effective. We have met up our required output and our project successfully run.

6.3 Outlook: Recommendation of future works based on our topic

We have built the first version of the prototype soap dispenser which is based on an IR sensor, Transistor, Resistor, and Pump. Our proposed version 2.0 will be remote control operated. It will be deck Mounted Automatic Soap Dispensing System that is controlled by a remote.

ARCHITECTURAL SPECIFICATION:

We will use the programming of all individual dispenser units. Hand-held device housing shall be seamless molded plastic case halves closed with concealed snap latches and keypad buttons shall be soft-touch TPR. Four (4) buttons shall allow the selection of dispense volume ranges from 0.007 oz (0.2 ml) to 0.08 oz (2.3 ml). One button allows resetting to factory settings. One button will temporarily disable the sensor to allow service in front of the unit without activation of a soap dispensing cycle, e.g. during cleaning. One button will activate the pump in continuous mode to prime the soap tube after the refill of the soap supply. Each command button press will be acknowledged by the dispenser unit with an indication by LED flashes in unique sequences.

OPERATION:

Remote is compatible with all Soap Dispenser units to adjust programmed dispense amount. Two (2) sector buttons with dual functions allow the selection of dispense volume ranges, identified as “1”, “2”, “3”, and “4” with droplet icons. A separate button, marked “ADJ”, resets the unit to the factory default condition. An additional feature is to assist pump priming after soap refill by button press “FILL”. Continuous run mode (1-minute time-out unless “FILL” is pressed again to terminate the cycle) facilitates delivery of fresh soap to the dispenser. Button press “ON-OFF” to suspend operation for 1 minute or until the button is repressed to restore operation. Hold the remote directly in front of the sensor to avoid possible interference with adjacent dispenser units, at a distance of 5" ± 1" (127 ± 25) to button-press initiate any of the commands. Each successful command implementation will be confirmed by LED flashes.

Advantages:

- Easy to refill
- Easy to maintain
- Automatically detects when low on soap or battery
- Eco-friendly
- Operates quietly
- Includes under-counter control box and refillable container

This is our future proposed soap dispenser version 2.0. This is just a proposal idea but if we work on it, we will do an upgradation and will do many changes as per our requirements.