SPARK CHALLENGE 22/23

SPARK

Electronic and Telecommunication Engineering

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1. Details of the Team

1.1. Group Name

- Team Asymmetry

1.2. Group Leader's Name

- S.A.P.U. Satharasinghe

1.3. Group Members Information

Name	Index Number	E-Mail	Contact Number
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Nipun Pushpakumara	200489H	pushpakumarasn.20@uom.lk	+94 769455621

1.4. External Support

Mr. C. J. Kurukulasuriya – He is from our senior batch and was a member of the group who won last year's SPARK challenge. He helped us by giving his experience through this challenge and showed us how to identify a problem, and how we can derive a solution for that corresponding problem. Also, he helped us with how the work that must be done was distributed among the team.

2. Problem Description

2.1. Primary Area of Development

- Healthcare improvement

2.2. Other Supporting Areas of Development

- Transportation and transport efficiency

2.3. Problem Statement

- Fishing industry accounts for 2% of the whole economy of Sri Lanka. Numerous job opportunities are centered around this industry as well. Even though most of the jobs centered around this industry are not risky as such but sailing is considered to be the riskiest job in this industry.

- However, People have chosen this risky job as their living. Despite severe weather conditions such as heavy rain, gale wind situation which causes fisherman's life in danger. But still, they go fishing. Fishing is categorized in several ways based on the time they spend in the sea. They can be illustrated as multi day fishing cruises and one day fishing cruises. According to the people we interviewed, multiday fishing cruises is not risky as such. Because multiday fishing ships rarely get encountered in fatal accidents. In one-day, fishing cruises they are the ones who face those dangers mentioned above. Most of the interviewees stated that the difficulties they encounter beyond the reachable distance from lands can be mentioned as follows

    - lack of communication facility
    - overcome the difficulties that arise with the strength of waves.

2.4. How our solution does impact the causes of climate change.

- With the increasing global warming, we all know that the ocean water level is rising more than ever currently. You might be wondering how this can be related to our problem in any way. With the above-mentioned facts, a lot of lives of people who are related to ocean in any way might be in danger. Furthermore, islands can be drowned, and people have to hang in there until some support comes. So, these kinds of facts can be mentioned as how our problem is related to climate change.

3. Solution Description

3.1. How we arrived at our solution

- After doing our research near the Negombo area among several fishermen, we concluded that there is a great necessity of designing such a life jacket which would be helpful to survive fishermen lives. In the deep ocean there are several problems can happen when communicating with the fishermen with any of the authoritative parties regarding emergency situations. Because communication using cellular connections is difficult due to the

boats are far beyond the coverage area of 4G,3G even 2G. Due to rough sea waves many boats are toppled according to the experiences of the fishermen. So, it is better to put on a jacket with the fishermen themselves and if anything, dangerous happened. Some fishermen complain that some of already existing lifesaving Jackets are sort of messy to wear. Because sometimes jacket attaching clips are entangled with fishing nets. We had to think about in that aspect to give the fishermen a pleasant experience when designing the garment architecture. We had to come up an idea of designing a live saving jacket which can be used to communicate with respective authorities or nearby ships (some sort of a way to make the fishermen survived.) by minimizing the awkward facts brought up by them. Since we are plaining to operate this product in sea water. We had to select special garments for designing the jacket assuming that this garment can hold electronic devices unharmed.

3.2. Proof Of Concept

- When an emergency situation occurs, the communication system designed in the suit will be turned on when necessary. This communication mechanism would be based on SSB VHF signals. Using that VHF signals, we can communicate with nearby ships. VHF signals are low frequency compared to cellular networks. Therefore, this signal would travel around 100km radius. Even though these signals are propagated larger distances compared to cellular signals, power consumption could be critical when a fisherman sails on the sea. So that our design would be adjusted based on a mechanism with which we can trigger the distress signal only when an emergency occurs. The place where the person is located would be determined using GPS co-ordinates. To preserve the battery usage, we have to include auto charging as well. GPS and many other tracking and sensors will be activated only when an emergency occurs, or a person mistakenly fall onto the sea. Just after measuring the instability other sub sensors will make sure that, it is really an emergency and external aid that the wearer needs in essential. VHF SSB signals are being applied in this product in order to communicate with the navy or coastal guards. Also, the Bluetooth beacons applied there can help to secure the wearers from the water by nearby naval or coastal life saving boats. In addition to those, at night when there is no visible aid, we apply some glowing-in-the-dark type materials in order to rescue them no matter what the lighting condition is. This can be really helpful for the life-saving teams as at night it’s very hard to work in the dark. Also, we can further improve this systematic application to a life jacket with a balloon that pops up only when triggered. Below in the appendix section we are adding some of the primal sketches of our life jacket to be implemented – “AquaDoc”.

3.3. Sustainability

- Setting the scope of view on the sustainability of our project, we can see that it clearly aligns with one of the sustainable development goals which are presented by the United Nation. By looking at the solution, it is pretty obvious that our project is clearly related to the third goal named good health and well-being. Since, our solution is related to the fishery community all around the world. Undergoing the topic sustainability, we can clearly divide this into three main subtopics which can be presented as economic sustainability, environmental sustainability, social sustainability.

    1. Economic Sustainability – Talking about the financial viability of our project, it is majorly funded by the government, and we can find some companies in this field, who are the current world top level stakeholders related to this industry. So, this target can be achieved with the proper use of material, implementing efficient operational processes, adopting ethical and responsible business practices, and considering the long-term impacts of the project on stakeholders and the broader ecosystem. Some of these are already achieved since we are using renewable materials for our product and some of these are not yet achieved but highly feasible.

    2. Environmental Sustainability – Since, this aspect is focusing on either minimizing or mitigating the impact of the product on the environment, we have deeply looked onto how this can be done without causing any minority in the desired functionality in our product. Since some of the materials we are applying in our product are non-decomposable, we can recycle them and reuse them without causing any harm to the environment. Also, we can use alternative materials which are not non-decomposable. Therefore, no kind of pollution would be caused by our product.

    3. Social Sustainability – Since our solution possesses a vast scope on the fishery communities all over the world and any kind of social group which is related to any kind of aquatic activity that can be harmful. With the increasing number of these kinds of social groups, we can ensure the well-being and safety of our project's stakeholders. Also, it fosters many kinds of positive social outcomes. Furthermore, it

would generate many inclusive opportunities for many people.

- When our view of point is driven onto the relationship between our product idea and the SPARK mission statement, we can take a sight that this is an innovative idea brought on the fishery community, which is very under rated in present day. Also, as mentioned above, under topic 2.4, it clearly be a farsighted solution for them indeed. Furthermore, it will be a long-lasting product in the coming future which would be yielding a high demand.

4. Social and Environmental Impact Assessment

- Safety and lives saved – Our product maintain the safety of the people who engage in fishing industry and sportsmen who expose to deep sea. As well as this will reduce the effects of the accidents and fatalities by keeping the victim in a safe environment in fatal sea. That prevents the families of the victims being orphaned.

- Economic benefits - Since these fishermen confident to engage in their work without any hesitation. Therefore, that causes to enhance in the economy of the country. As well as this will increase the productivity of the fishing industry and redundant production will be able to export for foreign countries.

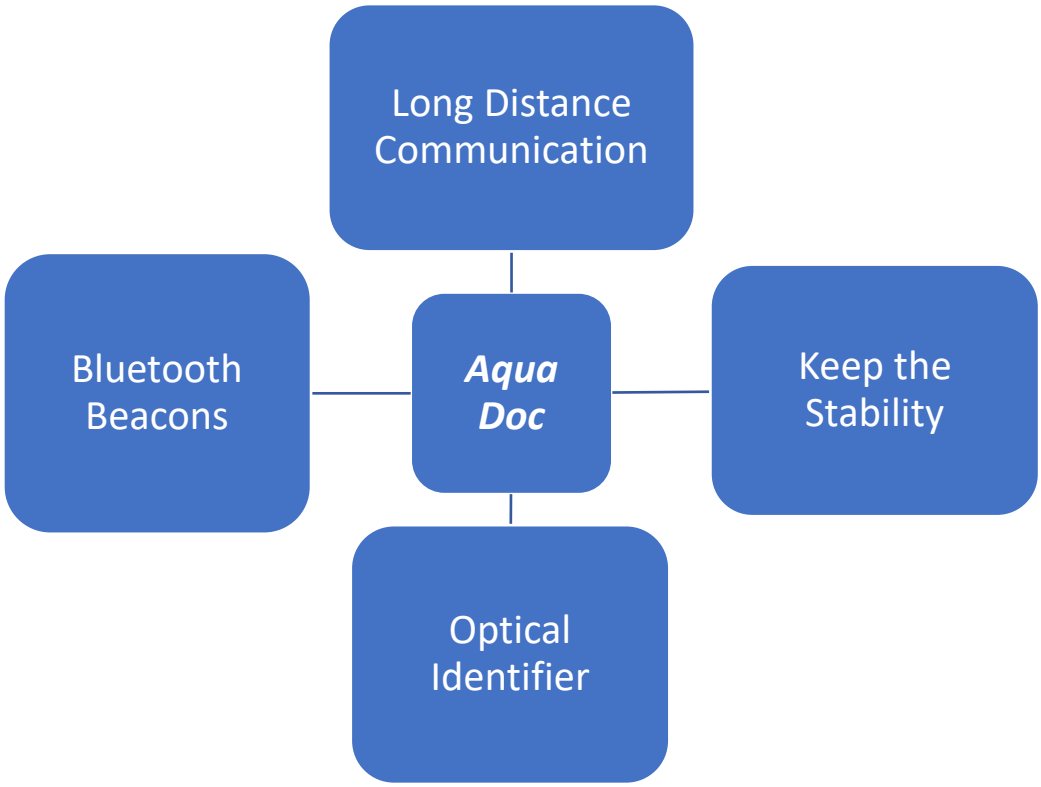
- Environmental impact – providing protection to sailors in deep sea, costal security authorities will be aware about accidents which happen in middle of sea due to communication system implemented inside the lifesaving jacket. So, they will be able to prevent or reduce the probability of sinking a ship or a boat. We know that the sea is an area where rich biodiversity is located. Hence, we can prevent those severe damages that happen to sea animals and other living creatures.

5. Logistics

5.1. Task Breakdown and Time Frame

Time Frame	Task allocated	Task allocated group member
Spark Stage 1	Team Canvas	All members
Spark Stage 2 (20th – 31st October)	Mind Map (including activities 1, 2 and, 3)	All Members
Spark Stage 3	Activity 1 – Five whys	Pravindu Satharasinghe
		Dojitha Mirihagalla
	Activity 2 – Problem Breakdown	Tishan Sathruwan
		Nipun Pushpakumara
	Lean Canvas	All members
Spark Stage 5	Pugh Matrix	Nipun Pushpakumara
		Pravindu Satharasinghe
	Pugh Matrix Criteria	Dojitha Mirihagalla
		Tishan Sathruwan
Spark Stage 6	Lean Canvas Completing	All members

Appendix



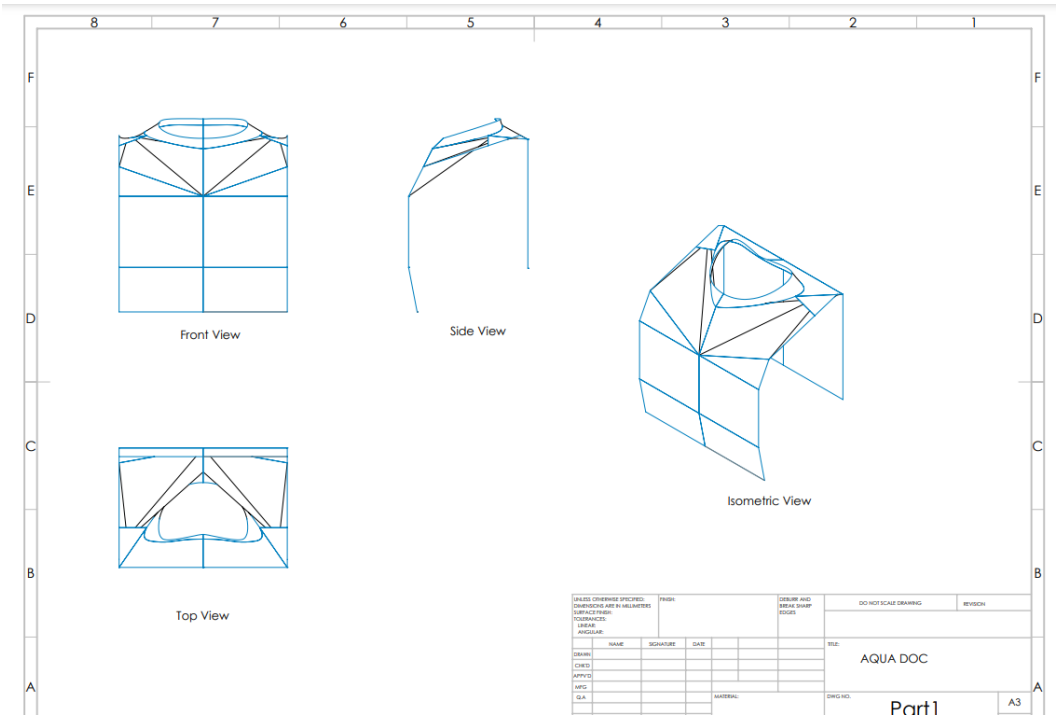


Figure 1: Primal Sketches of "AquaDoc"'

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