An Electronic Approach to Ensure Social Distancing alongside its BMC

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Abstract - *The coronavirus pandemic has reshaped our lives and made us adjust to a 'new normal'. We have started wearing masks and hand gloves, which would seem abnormal a year ago. We have also started physically distancing ourselves from others to reduce the chances of infection. This phenomenon, called social distancing is a great tool to slow the spread of COVID-19. We have made great progress in reopening the country after the lockdown. People are getting back to work and the economy is recovering. However, this has to be followed by proper precautions which includes social distancing. In this article, we provide a simple solution to follow social distancing by the use of a small electronic device, called The Sodistancer.*

***Key Words*: COVID-19, Social Distancing, Consumer Electronics, Wearable Technology, Survey, Business Model Canvas**

1. INTRODUCTION

It all started in the November of 2019, when the very first COVID-19 cases were recorded. This is the time period in the human history, which the world will never forget and is carved in stone. Since then, the coronavirus has spread to almost all countries, affecting millions of people worldwide. A common trend among all affected countries was to implement lockdown and quarantine the red zones. As a result, people have lost their jobs, and the global economy is in turmoil. The world lost nearly 400 million jobs in the second financial quarter [1], according to International Labour Association. South Asia accounted for 110 million of the total 235 million full-time jobs lost this quarter. Stock indices all over the globe have shred over 35% from February to March. Many businesses have been shut down and startups have been wrapped up. Almost all established companies recorded loses amidst the pandemic. However, the world is slowly recovering and aims to bounce back to the pre-pandemic levels as soon as possible.

1.1 Social Distancing

There is no specific cure for COVID-19. Social distancing, also called physical distancing is proven to be the best way to prevent catching the infection and prevent it from spreading. There is no specific cure for it. This has been proven in a study [2] and is known among all masses. The lockdown restrictions are being lifted, but the number of cases is increasing on a daily basis. This is where social distancing plays an important role as it is proven that 80% social distancing could help beat COVID-19 in just 13 weeks [3].

Achieving this number may not be possible, due to limited space and certain work styles. However, one could always follow guidelines where required.

1.2 The Solution

For this purpose, we propose a small electronic device, The Sodistancer. It would help its user follow social distancing guidelines without consciously putting effort into it. It alerts the user whenever a safe distance with someone is breached. It can be put into the pocket or attached to your jeans in a way that is not visible to others.

2. MATERIALS AND METHODS

The product is a simple electronic device that alerts the user when someone enters in the safe radius around.

2.1 Minimum Viable Product

This is the design of the embedded prototype, from which the final product shall be made. The LCD light may be removed on the basis of cost. This device is enabled to process with MSP-8266 Microcontroller/ Arduino UNO development board which uses a 3V output pin to power up the sensing devices. The basic functionality of the gadget comes into play when the minimum required distance between two persons in breached and hence the device alerts them. The components of the table have been listed in the table.

Table -1: Table of components and their description

Components of the Circuit	
Arduino UNO	Developmental Board
Ultrasonic Sensor HC-SR04	Detect humans at distance
LED & Buzzer	Alert System
9V Battery	Energy Source
Rocket Switch SPST	ON-OFF Switch

Here, the Arduino measures the temperature. The temperature is used to calculate the distance with greater accuracy. If the distance is between 1m and 2m, the LCD backlight lights up and the LCD shows 'Please keep away' and how far away the person is. If the distance is 0.5m to 1m the

backlight of the LCD flashes and the LCD shows 'Keep away' along with a single beep from the buzzer If the distance is less than 50cm the backlight turns off and on twice along with two beeps from the buzzer.
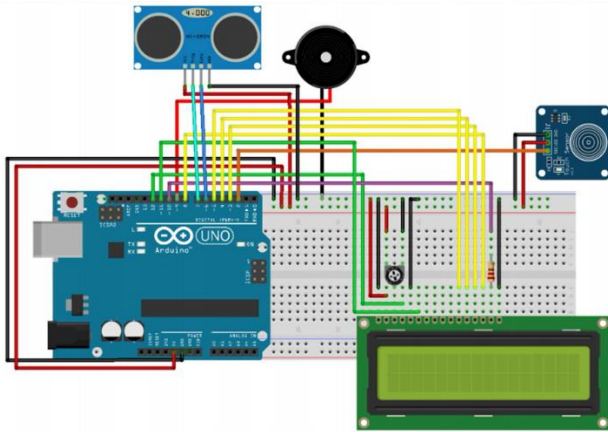

Fig - 1: MVP Design

This concludes the MVP and for the final product, the aim is to develop a relay integrated circuit model to miniaturize the product and make it user friendly.
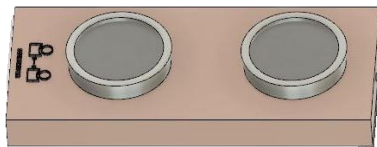

Fig - 2: The Final Design

2.2 SURVEY

A survey was conducted online, through Google Forms. The sample size was 205 people. The age group was from 18 to 72 and people from both genders participated. They were from all walks of life: Business owners, working class, retired citizens, students and housemakers. This diverse group allows accurate opinion as all of them could be the potential customers. There were six option-based questions and the seventh question was open for their suggestions.

2.2.1 Question 1 and 2
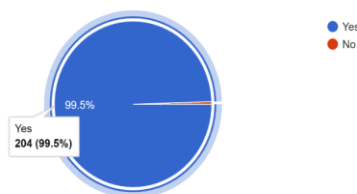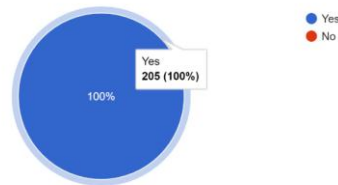

Chart - 1: Q1 results

Chart - 2: Q2 results

The fact that 99.5% people knew about the concept of social distancing shows the fascinating work of the government and social media. They have ensured that each and everyone knows about the concept of social distancing and its positive effects. This is a good sign for the product as the public is aware of the problem being solved. It is an added advantage to the product as the customers trust the process on which the product is built. This is shown by the fact that all of them have answered yes in the second question. This allows them to use the product without any haste.
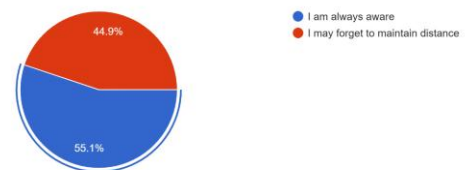
2.2.2 Question 3

Chart - 3: Q3 Result

We can observe that people may unintentionally forget social distancing while they are involved in work that requires constant concentration. This can lead to chances of infection without them even knowing of such interaction.

2.2.3 Question 4 and 5
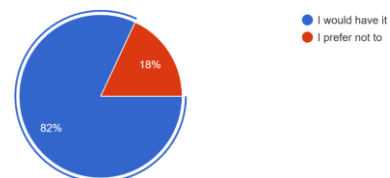
Chart - 4: Q4 results

Chart - 5: Q5 results

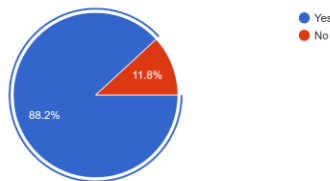We received positive feedback here where the majority percentage of people (82%) would like to have a small device to ensure the following of social distancing, compared to 55.1% people that claim to always follow distancing guidelines. The second chart is for business owners or professionals that would like their employees or fellow colleagues to use this solution. The number is even higher than the previous chart, showing that the later focus group emphasizes more on following social distancing guidelines. Thus, more resources should go towards optimizing the product for their needs.
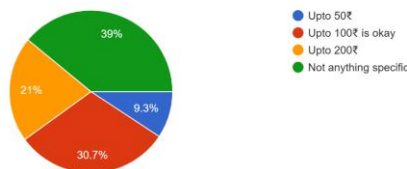
2.2.4 Question 6

Chart - 6: Q6 Results

This question has mixed results. However, it is evident that majority (almost 70%) of the target customers fall in the category where the price does not matter or would be willing to pay 200 rupees for the product. Hence a price up to 200 rupees would be ideal. However, the final price would be decided by the supply compared to the demand. Products like this are highly beneficial during these times for general safety. This creates urgency, which pushes the price upwards.

2.2.5 Question 7

Finally, the suggestions were taken from the participants and some common answers were received which included: low cost (76.6%), miniature (65.4%) and durable (10.1%). Others included rechargeable, long battery life, user friendly, comfortable and not bulky. A customer centric product development model can ensure maximum chances of success. Thus, taking into consideration the results of the survey, the product and the business model will be built.

Low cost, miniature and durability of the product would surely be incorporated, along with suitable cost structure.

2.3 Business Model Canvas

The business model canvas was developed which best suited the customer needs from the survey and maximized the income.

2.3.1 Value Proposition

The product helps its users to maintain specific distance from others by alerting them whenever someone enters in the radius of that specified distance. The unique selling proposition provided is that the device can be fit in the pocket and is easy to carry around. Moreover, it is low cost and will be available in the packs of 5, 10 and 50 which reduces the cost even more. Finally, we provide a product which allows a smart way to ensure the customer and family safety.

2.3.2 Customer Segment

A huge advantage of this product is a large market. Potentially anyone in COVID-19 affected areas can use this to safeguard themselves. As the industries, offices, schools, malls and other public places open up, we can target specific customers. The product would be sold online and by local retailers, making the latter a significant customer base. People working in factories and corporate offices will add to the major part of the customers. Teachers and students could possibly use the product if the government allows the reopening of schools and colleges.

2.3.3 Customer Relationships

Feedback is always welcome from the users. This shall be taken via the website dedicated to the product. We also plan on providing a 6-month warranty, in case of technical failure. The instructions to use the device shall also be available on the website, along with an email address and forum for queries

2.3.4 Channels

Reaching out to the potential customers and stressing on the value of social distancing can ensure immense sales. The typical age for working class is 24+ and they are active on social media platforms like Facebook, Instagram and Twitter. These platforms can provide significant reach and marketing opportunities. Reading newspapers and listening to radio is common in the older age groups and can be used as a platform for advertising the product.

2.3.5 Key Partners

Retailers would our major partners along with the forms that specialize in the development and manufacturing of electronics. It would be practically impossible for us to

manufacture these devices on large-scale, thus contract manufacturers shall be required.

2.3.6 Key Activities

Development and selling of the Sodistancer will be the main revenue stream. The required regulatory approvals shall be taken and manufacturing will be started. The technical team shall develop the product and the website. Marketing and sales team would ensure the selling part of the process. We would also have devoted customer care through the website.

2.3.7 Key Resources

All the components required to make the final electronics circuits like microprocessor, ultrasonic sensor, battery, LCD and buzzer.

All the experts like engineers and web developers that would contribute towards the product would be the main key resources. The manufacturing facility would also be a resource.

2.3.8 Revenue Stream

The source of revenue would be the selling of the Sodistancer. The product would be sold online and also by retailers. It can be bought as a single piece or in the packs of 5, 10, and 50 which are suitable for family members, small organizations and large offices respectively.

2.3.9 Cost Structure

Cost would be incurred in purchasing electronics components. Then developing a functional relay circuit and manufacturing it on large scale. Contract manufacturers would be hired for the latter purpose. Website domain and hosting would also be considered under costing. Advertising and marketing would also add here.

3. CONCLUSIONS

The vision statement of this product is to fight COVID-19 in a smart manner and rebuild the economy in the least time possible. The product can be used by anyone and is simple in its working. However, there are some drawbacks in the adoption of the product and the main one being that is more suitable for organized places like offices, factories and schools. In a scenario like a vegetable market or any retail store, there would be much lesser space and some degree of proximity would be incurred there. But a counter argument can be made by the fact that something is better than nothing. It provides the best solution for industries, corporate offices and educational institutes. There are many labs which work on highly pathogenic organisms and the scientists need to maintain distance from each other, in the scenario that one may have contracted some disease. The future applications of the product can be immense. This can

Business Model Canvas : Sodistancer   Aaryan Mehta,19BBT0098

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
• Electronics Engineers • Web Developers • Large Scale Manufacturers • Industrial Associations • Marketing Groups • Dealers in COVID-19 related products • Retail store owners	• Developing functional electronic circuits • Regulatory approval • Manufacturing • Marketing • Customer Care	• Social distancing reduces spread by 80% • A device which alerts the person on the breach of specified distance • 82% would like a device to maintain safe distance	• Get-Keep-Grow strategy • Constant touch, inquiring performance of device • Assist customers, manually and online website • Warranty option, 6 months	• Retailers • Industrial workers • Office workers • Local vendors • Domestic workers • Housewives • Students • Teachers
	Key Resources • Microcontrollers & Sensors • Electronics Designers • Web Developers • Manufacturing Facility • Marketing Team	• Features •Accurate •Durable •Wearable embedded •Low-cost (200 max) •Miniature	**Channels** • Social platforms like Whatsapp, Facebook • Contacts in Industry • Retail stores • Online advertising like GoogleAds	
Cost Structure • Microcontrollers, sensors, buzzers and batteries • Manufacturing and labor • 18% GST on manufacturing • R&D and Marketing • Transport and logistics			**Revenue Streams** • Contract Manufacturing • Retailing • Direct Sales • Licensing	

be highlighted by the fact that as the world keeps getting more populated and connected. The chances of pandemics increase. Thus, whenever the next pandemic strikes, we can be ready beforehand. Patenting the product can have more benefits as the ability to license this device is opened. Thus, we see how this product is the need of the hour and has significant applications in the nearby future.

ACKNOWLEDGEMENT

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