**Project Design Phase-I**

**Problem – Solution Fit Template**

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| Date | 19 October 2022 |
| Team ID | PNT2022TMID43796 |
| Project Name | Real-Time Communication System Powered by AI for specially Abled |
| Maximum Marks | 2 Marks |

**Problem – Solution Fit Template:**

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer’s problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why.

**Purpose:**

* Solve complex problems in a way that fits the state of your customers.
* Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
* Sharpen your communication and marketing strategy with the right triggers and messaging.
* Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.
* **Understand the existing situation in order to improve it for your target group.**

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| **1.CUSTOMER SEGMENT(S)**  Communication creates bonding and relations among the people, whether persona, social, or political views. Most people communicate efficiently without any issues, but many cannot due to disability. They cannot hear or speak, which makes Earth a problematic place to live for them. Even simple basic tasks become difficult for them. This system provides detailed hand gestures that show the interpretation at the bottom so that everyone can understand them. This research allows the readers to learn the system and what it can do to people who are struggling with what they are not capable of and will provide the technical terms on how the system works. | **5.AVAILABLE SOLUTIONS**  The process of this application can be daunting, but the value is priceless. Being able to create something to serve people in need is uncountable. The focus of this research is to answer questions related to sign recognition. Artificial intelligence to make the right decisions. These trees will be based on images in the database to define our system in a more efficient and effective method to reach the optimal decision. Several questions considered as research questions, which are:  What will happen when the application recognizes the  image?  How the image recognized by the application? | **7.BEHAVIOUR**  The training phase was based on storing the images in the database. The database contained images of hands, both men and women. The training was based on identifying all possible signs that can be made using one hand. For this purpose, 30 different images with different levels of lights and duration were captured and stored in the database. These images were used as training images that will help in making the right decision for the tasks. The database contained over 1000 images of unique hands and signs. |
| **2.JOBS-TO-DONE/PROBLEMS**  They cannot hear or speak, which makes Earth a problematic place to live for them. Even simple basic tasks become difficult for them. Disability is an emotive human condition. It limits the individual to a certain level of performance. Being deaf and dumb pushes the subject to oblivion, highly introverted. In a world of inequality, this society needs empowerment. Harnessing technology to improve their welfare is necessary. In a tech era, no one should be limited due to his or her inability. The application of technology should create a platform or a world of equality despite the natural state of humans. | **6.CUSTOMER CONSTRIANT**  This section provides a theoretical background for D-talk to have a better understanding of the process to be used in the application [13,30, 32]. This application can provide a helpful tool for communication between the deaf and the external world. The studies are focused on various input sensors, gesture segmentation, feature extraction, and classification methods. This paper is aimed at evaluating and comparing the methods used in the sign recognition systems, classification methods used and  identifies the most promising approach for this project. This paper focuses on the classification methods used in the prior recognition scheme for sign Recognition. Based on our research, HMM-based methods, including its modifications, have been thoroughly discussed in prior studies. | **9.PROBLEM ROOT CAUSE**  In a nutshell, the development of technology is essential, and its deployment in sign language is highly critical. It will serve to bring efficiency in communication, not only to the deaf and dumb but those with the ability to hear and speak as well. In addition to creating opportunities for their career growth, it will enhance their social life through effective communication. Making an impact and changing the lives of the deaf and dump through technology will be an innovation of the year worth the time and resources. At the beginning of the D-Talk idea, the developers think to have more than one task for this application, but in the end, they narrow the task to have only one. They thought to have an open calendar, lunch Microsoft office word, and browse the website. |
| **3.TRIGGERS**  This application can provide a  helpful tool for communication between the deaf and the external world. The sign language recognition program, which is required to understand sign languages, has been studied extensively for years [25,27]. The studies are focused on various input sensors, gesture segmentation, feature extraction, and classification methods. This paper is aimed at evaluating and comparing the methods used in the sign recognition systems, classification methods used and  identifies the most promising approach for this project. Despite recent advances in classification methods, many of the recent works proposed to apply primarily to classification methods, such as deep learning [23, 34, 40, 42]. This paper focuses on the classification methods used in the prior recognition scheme for sign Recognition. Based our research, HMM-based methods, including its modifications, have been thoroughly discussed in prior studies.  **4.EMOTIONS**  Most people communicate efficiently without any issues, but  many cannot due to disability. They cannot hear or speak, which makes Earth a problematic place to live for them. Even simple basic tasks become difficult for them. Disability is an emotive human condition. It limits the individual to a certain level of performance. Being deaf and dumb pushes the subject to oblivion, highly introverted. A detection algorithm is used to detect the hand of the user, and a contour-based hand tracker is developed, which combines condensation and partitioned sampling. The proposed approach can attain automated online identification of hand movements and can effectively reject atypical movements. The hand gesture recognition system consists of three major parts: palm detection, hand tracking, and trajectory recognition. | **8.CHANNELS BEHAVIOUR**  We explored one way to identify simple hand gestures and implement two basic gesture controls: movement of the cursor and mouse click. The figure 6 describes the basic process of hand gesture recognition.  By using vision-based recognition, the computer captures the sign to find the gesture acquisition. Hand tracking can be done by using clustering algorithms that able to treat each finger as a cluster and delete the empty spaces between them or multi-scale color feature hierarchies that provide users' hand and the different background shades of colors to identify and remove the background. Hand tracking is the computer's ability to track the user's hand and split it from the background or any other objects Feature extraction depends on the application. On D-talk, finger status, skin color, alignments of the finger, and the palm position are taken into consideration.  After features extracted, they sent to training and testing classification algorithms to reach the output. | **10.YOUR SOLUTION**  In the implementation phase, developers change several tasks that they were planned to do. They notice that they can build the system without preparing any training and testing images as they were plan. The code is depending on skin color and contour to find the right sign. Moreover, developers narrow the tasks to only one task which is browse websites only. Moreover, the result was precise and accurate aligned with the methodology and testing that was used. This signifies that developing modern technology assists disable individuals specifically deaf-dumb on interacting among people. The measurement variables along with the supporting. evidence from the methodology concluded that the measures taken to evaluate this study were supported all throughout. Meanwhile, the efficiency and effectiveness of the system provide the utmost benefit of disabled individuals by offering convenience and being able to make their lives easier and better for there are no required training or specificities for them to use the system. Thus, as a result, D-talk allows everyone to determine the hand gestures that are being projected and be able to come up with interpretations on enabled individuals. Hence, communications between deaf-dumb and enabled individuals are way easier and lacks misunderstandings are being prevented this time. |