

# *Lend A Helping Hand*

**Team: Victor Acuna, Evelyn Miguel, Wendi Aguilar**

**Grade: 11th**

**Advisor: Linda Sciaroni**

**School: Marco Antonio Firebaugh High School**

## **Problem Statement:**

Globally, around 1 million people use sign language to communicate with people on a daily basis. It is a necessary way of communication for those who are deaf and/or hard-of-hearing since they cannot learn English the same way as us. They rely on hand movements and facial expressions to do the talking for them. The problem is, though, that not many people understand sign language. In fact less than 0.00003% of the global population understand sign language! This can make it extremely difficult for the deaf and hard-of-hearing to get help from those around them.

## **User Research:**

We gathered research through an interview with Evelyn's cousin who is hard of hearing. We also interviewed her cousin's parents since they communicate with him on a daily basis. His parents talked about how he was born with down syndrome which was why he was born with hard of hearing. They talked about how they didn't know how they would communicate with him since he couldn't speak, he went to school and learned sign language but only one of his

parents was able to communicate with him and understand him because they did not have that much free time on their hands to learn sign language.

They also told us that they have tried to look for alternatives to sign language so that they can both understand him better, but the solutions out there are either too expensive or require a phone to use a sign language interpreter application, which is something that they do not have due to financial reasons.

### **User Insight:**

We learned through their experience that it is very hard for many families and not just them. We learned through their experience that it is very hard for many families and not just them to communicate with their children who are deaf and or hard of hearing. In lower income families it's harder for people to have access to resources to communicate with their kids. We learned from the struggles they went through from finding out that their kid was hard of hearing and that he will need extra assistance in many things and this glove will make it easier to communicate and is more economic than other things on the market. At the moment they first find out about it they are going through a lot of emotions in which many families go through and don't know how to react. When families are given the news that their kids are deaf and or hard of hearing doctors can present them with our glove to them but they will always have the option of learning sign language.

### **User Needs:**

Based on the user insight, we have created a list of user needs. The user wants to have a way of communication that is low cost so that he can easily afford it. He also wants that solution

to comply with the 6ft social distance orders from the CDC. Apart from that, the user also wants the solution to be easily portable as well as comfortable so that it does not get in the way of daily tasks. Lastly, the solution should not require any outside resources such as a phone, since he doesn't have one.

### **Project Goals:**

One of our goals for this project is to try and make our solution to come to a total of under \$150 to make it affordable. We will also try to make the solution on common clothing such as a glove so that it can be easily portable as well as comfortable. Lastly, to deal with needs related to not using outside resources, we will try to incorporate all necessary components needed onto the glove, which will also include how the sound or text will be outputted so that there is no need of using a phone or tablet.

### **Key Features of the Design:**

Our project will use a tech glove to make the project easily portable. We are using an Arduino Nano and a 400-point breadboard so that the components on the glove are not as crowded compared to if we use an Arduino Uno and an 830-point breadboard. Each finger on the glove will have a flex sensor glued onto it. Depending on the finger that is bent down, a certain sentence will be outputted in the form of speech using a 0.5w speaker, so that there is no need of using a phone or tablet to output the sentences. The thumb outputs “hello” and the pinky outputs “thank you” when bent, while the other 3 fingers output questions that they can have throughout the day. A MicroSD Card Module as well as a 2gb MicroSD Card is used to store the audio files.

The project will be powered using a rechargeable 9V battery so that there will be no need to buy other batteries, which helps with the cost effective portion of the user's needs. The 9V battery is attached to the Arduino Nano with the help of a battery holder that has an on/off switch.

**Impact:**

This design will remove the barriers for the user since the deaf and hard-of-hearing will now be able to easily communicate with us at ease. There will be no need for us to learn sign language since all we need is for the deaf/hard-of-hearing to wear the glove. This will allow for them to be able to get the help that they need throughout the day at ease without any issues getting in their way. All that is needed is for them to input phrases that they believe they will be needing throughout the day to the Arduino Nano and with that, they will now be able to speak with anyone who speaks English.