Touch-Me-Not

Project By Team – Alter Dime

Project Description

Touch me not is an electronics solution to guide the blind to ensure social distancing for themselves in the urgent scenario of COVID-19. The solution we propose and to an extent have implemented is a wearable device that alerts the user in case any person breaches into the personal space around them for about 3ft radius as mentioned required to maintain social distancing by WHO.

Why we chose this track??

It was just a few months before that the seafood market of Wuhan,China became the epicentre to the to one of the most contagious malady causing novel virus-the corona. It spread so fast around the globe that today we face lockdown in Kerala.

The widely endorsed solution for this pandemic is to practise social distancing. But sadly this was realised late in a hugely polluted country like the People’s Republic of China. Our solution in a way is to promote the 2 hugely recommended practice to keep away from corona i.e,

1. DO NOT Touch your Face when Outside Home.

2. Maintain 1 - 3ft distance from People.

Hence the Track we have chosen is the Medical Track to particularly deal this scenario most importantly personal hygiene and isolation.

**How We Intend To Implement This Solution??**

🡺The Uniqueness and Practicality

We us the approach to be able to calculate the distance of any person approaching the user via a smart camera module called Pixy Cam and interface it to an Arduino Board.

Calculation of the distance of camera from an object is done using the concept of Triangulation as shown below:

**Triangulation Method**

The triangle similarity goes something like this: Let’s say we have a marker or object with a known width *W*. We then place this marker some distance *D* from our camera. We take a picture of our object using our camera and then measure the apparent width in pixels *P*. This allows us to derive the perceived focal length *F* of our camera:

*F = (P x  D) / W*

For example, let’s say I place a standard piece of *8.5 x 11in* piece of paper (horizontally; *W = 11*) *D = 24 inches* in front of my camera and take a photo. When I measure the width of the piece of paper in the image, I notice that the perceived width of the paper is *P = 248 pixels*.

My focal length *F* is then:

*F = (248px x 24in) / 11in = 543.45*

As I continue to move my camera both closer and farther away from the object/marker, I can apply the triangle similarity to determine the distance of the object to the camera:

*D’ = (W x F) / P*

Again, to make this more concrete, let’s say I move my camera 3 ft (or 36 inches) away from my marker and take a photo of the same piece of paper. Through automatic image processing I am able to determine that the perceived width of the piece of paper is now *170 pixels*. Plugging this into the equation we now get:

*D’ = (11in x 543.45) / 170 = 35in*

Or roughly 36 inches, which is 3 feet.

* Codes to implement Triangulation is Available on the Teams Assignment Submission
* We have also attached the pictures and videos explaining the same.

In Order to enable multi-person tracking we believe to make use of already available application for the PixyCam called PixyMon

Upon Receiving the input information ,it shall be used to generate different tones to help the blind recognise w=in which direction a person is approaching. For this to be effective we extract the concept of “Dial-Tones”, they help the blind in differentiating the diffenent numbers dialled on a number pad. Similarly we can train them to be able to map which sector of the 360 degree around them is there a person approaching.

This shall be implemented as part of the device with the help of tone() function of Arduino by interfacing a piezoelectric buzzer to it.

(Images and code are available as part of assignment repository)

The tone() function works with two arguments, but can take up to three arguments. Let’s address the two required items first:

tone( pin number, frequency in hertz);

1. The pin number that you will use on the Arduino.
2. The frequency specified in hertz. Hertz are cycles per second.

The frequency is an unsigned integer and can take a value up to 65,535 – but if you are trying to make tones for the human ear, then values between 2,000 and 5,000 are where our ears are most tuned.

We hope to give a headband like structure for this device.

As of Now, there are various available headband solution with cameras, but are not smart and just perform the ordinary tasks expected of a Camera .

So we believe to make use of this design to implement the wearable device concept.

Future Scope and Dealing With Competitors

As per research, we find that as of now such a solution is not available out in market.

There are navigation assistants available, to help the blind take the correct turns on the road. But social distancing is a new concept with much more scope, as it can be particularly used further to improve the safety and security of the blind.

Such a device can be further modified to protect the blind form of mis-happenings that may occur in the streets even when not particularly in the scenario of an pandemic like COVID-19.

Our Business model will be possibly to tie-up with the Government to make possible the manufacturing of the solution at a subsidized rate and then make it available to the people who are blind and may not be able to afford the solution at lower rates and make it available to the customers capable of purchasing them at a higher price in the markets.