Ideation Phase
Define the Problem Statements

Date	19 September 2022
Team ID	PNT2022TMID20320
Project Name	Project - A Gesture-based Tool for Sterile Browsing of Radiology Images
Maximum Marks	2 Marks

Customer Problem Statement Template:

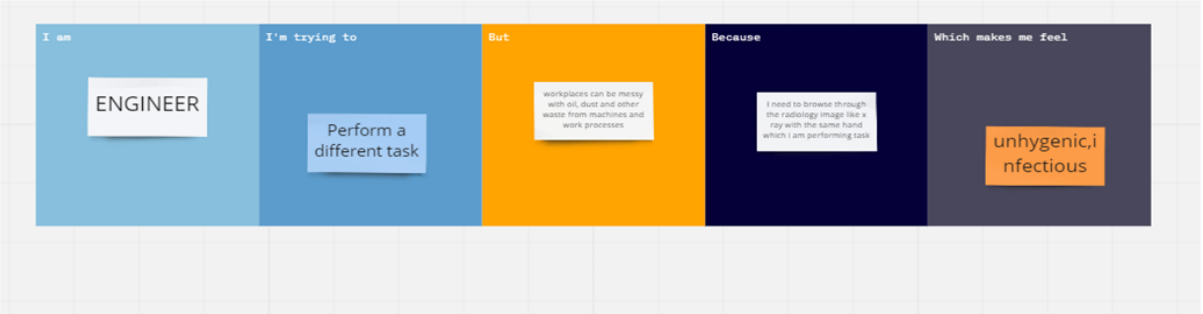
Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

I am	Describe customer with 3-4 key characteristics - *who are they?*	Describe the customer and their attributes here
I'm trying to	*List their outcome or "job" the care about - what are they trying to achieve?*	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way – *what bothers them most?*	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists – *what needs to be solved?*	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view – *how does it impact them emotionally?*	Describe the emotions the result from experiencing the problems or barriers

Reference: https://miro.com/templates/customer-problem-statement/

Example:



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Doctor	perform a surgery	There is infection and lot of time being consumed especially when patient life at stack	i need to browse through the radiology image like x-ray with the same hands by which i'm performing surgery	unhygienic,infectious, untidy and frustrated
PS-2	Engineer	perform a task	workplaces can be messy with oil, dust and other waste from machines and work processes	workplace were trips and falls are made all the more dangerous with the risk of falling into machinery or sharp edges	Risk,Dangerous

LITERATURE SURVEY OF A GESTURE-BASED TOOL FOR STERILE BROWSING OF RADIOLOGY IMAGES

Gesture recognition :

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. It is a subdiscipline of computer vision. Gestures can originate from any bodily motion or state, but commonly originate from the face or hand. Current focuses in the field include emotion recognition from face and hand gesture recognition. Users can use simple gestures to control or interact with devices without physically touching them. Many approaches have been made using cameras and computer vision algorithms to interpret sign language. However, the identification and recognition of posture, gait, proxemics, and human behaviors is also the subject of gesture recognition techniques. Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a better bridge between machines and humans than older text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse and interact naturally without any mechanical devices.

Working :

A gesture recognition system starts with a camera pointed at a specific three-dimensional zone, capturing frame-by-frame images of hand positions and motions. This camera is typically mounted in the vantage point that is unlikely to be obstructed. The system illuminates the area with infrared LEDs or lasers for a clear image even when there is not much natural light.

Those images are analyzed in real time by computer vision and machine learning technologies, which translate the hand motions into commands, based on a predetermined library of signs.

Commands generated by the gesture recognition software become just another type of input, similar to turning a dial, pressing a button or touching a screen. Additionally, as the quantity and quality of cabin cameras improves, other passengers in the vehicle could eventually get in on the act.

History :

The history of hand gesture recognition for computer control started with the invention of glove-based control interfaces. Researchers realized that gestures inspired by sign language can be used to offer simple commands for a computer interface. This gradually evolved with the development of much accurate accelerometers, infrared cameras and even fibreoptic bend-sensors (optical goniometers). Some of those developments in glove based systems eventually offered the ability to realize computer vision based recognition without any sensors attached to the glove. These are the coloured gloves or gloves that offer unique colours for finger tracking ability that would be discussed here on computer vision based gesture recognition. Over past 25 years, this evolution has resulted in many successful products that offer total wireless connection with least resistance to the wearer

Gesture detection on camera :

A standard 2D camera can be used for gesture recognition where the resources/environment would not be convenient for other forms of image-based recognition. Earlier it was thought that a single camera may not be as effective as stereo or depth-aware cameras, but some companies are challenging this theory. Software-based gesture recognition technology using a standard 2D camera that can detect robust hand gestures.

Algorithms :

Depending on the type of input data, the approach for interpreting a gesture could be done in different ways,

1. 3D model-based algorithms :

   The 3D model approach can use volumetric or skeletal models or even a combination of the two. Volumetric approaches have been heavily used in the computer animation industry and for computer vision purposes. The models are generally created from complicated 3D surfaces, like NURBS or polygon meshes.

2. Skeletal-based algorithms :

   Instead of using intensive processing of the 3D models and dealing with a lot of parameters, one can just use a simplified version of joint angle

parameters along with segment lengths. This is known as a skeletal representation of the body, where a virtual skeleton of the person is computed and parts of the body are mapped to certain segments.

3. Appearance-based models :

   These models don't use a spatial representation of the body anymore, because they derive the parameters directly from the images or videos using a template database. Some are based on the deformable 2D templates of the human parts of the body, particularly hands. Deformable templates are sets of points on the outline of an object, used as interpolation nodes for the object's outline approximation. One of the simplest interpolation functions is linear, which performs an average shape from point sets, point variability parameters, and external deformation. These template-based models are mostly used for hand-tracking, but could also be of used for simple gesture classification.

Existing systems :

In recent decades, due to computer software and hardware technologies of continuous innovation and breakthrough, the social life and information technology have a very close relationship in the twenty-first century. In the future, especially the interfaces of consumer electronics products (e.g. smart phones, games and infota1inment systems) will have more and more functions and be complex. How to develop a convenient human-machineInterface (HumanMachine Interaction/Interface, HMI) for each consumer electronics product has become an important issue. The traditional electronic input devices, such as mouse, keyboard, and joystick are still the most common interaction way. However, it does not mean that these devices are the most convenient and natural input devices for most users. Since ancient times, gestures are a major way for communication and interaction between people. People can easily express the idea by gestures before the invention of language. Nowadays, gestures still are naturally used by many people and especially are the most major and nature interaction way for deaf people [1]. In recent years, the gesture control technique has become a new developmental trend for many human- based electronics products, such as computers, televisions, and games. This technique let people can control these products more naturally,

intuitively and Incase of existing system . The objective ofthis paper is to develop a real time hand gesture recognition system based on adaptive color HSV model and motion history image (MHI). By adaptive skin color model, the effects from lighting, environment, and camera can be greatly reduced, and the robustness of hand gesture recognition could be greatly improved.