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Vision Statement

Project Title: NAVSEA
Company: Navy Pt. Mugu
Team Name: Sea++
Team Lead: Lyuda Panina
Team Scribe: Vivian Ross

Project Summary:

Overview:
The Navy supports many systems on deployed ships, ranging from weapons to communications systems. These systems are quite specialized, and some are as many as forty years old. After designing and deploying these systems, it is necessary to maintain them and incrementally update or retrofit them. The goal of our project is to integrate augmented reality in systems maintenance in a way that is feasible in the complex environment of a Navy ship.

Problem Being Solved
Current methods of maintaining systems on Navy ships are inefficient and slow. The goal of our project is to eliminate the need for transportation of specialized, highly trained individuals to Navy ships for system maintenance. This will save resources by allowing these specialists to stay on land and work remotely, and this will allow specialists easier access to multiple systems for repair and maintenance. This poses several challenges, including the navigation of the complex environment of a Navy ship, the limited bandwidth available on a ship, and the necessity for secure communications.

Why is this Important?
It is important to maintain the systems on Navy ships because these systems are designed to remain in place for decades. Within that time frame, it is necessary to incrementally repair, maintain, and upgrade these systems. Although there is currently a framework in place to send experts and specialists to ships to maintain systems, it is very inefficient and resource intensive to do so. Augmented reality is the focus for communication between experts working remotely and untrained personnel who are readily available on ships, but current methods of utilizing augmented reality outside of a lab setting are very limited. It is important to improve this technology by reducing the required bandwidth, improving the object recognition capabilities of the HoloLens, or securely transmitting the information from the HoloLens in order to make this technology feasible for use by the Navy.

How the Problem is Solved Today
The Navy currently sends trained specialists to the ships that need maintenance. This is demanding of time and resources as the specialists have to be physically present in order to solve the issue. Our solution will cut down on these costs by making the operation remote.

Project Outcome/Goal:
The goal of our project is to create a virtual tool that will help the Navy in remote maintenance of naval ships via AR assisted video communication. The ideal outcome would be a HoloLens application that is sophisticated enough to handle the complex environment on a Navy ship, secure when transmitting sensitive information, and able to deliver high quality information in a low-bandwidth environment.

Solution Implementation Details (Technologies you will need):
The main technology we will need will be an augmented reality headset, like the HoloLens 2. This will require the use of Windows machines in development and in installing our application bundle onto the HoloLens. Development will be done through the Unity game engine, which is well suited for dealing with 3D environments. Unity scripts are written in C#, so we will develop using this language. We will use the agile development model in creating our app.

Milestones and How to Achieve Them:
- Learn how to use Unity and HoloLens: deploy a demonstration/tutorial app
  - Follow tutorials provided by Microsoft and Unity Learn
- Create an application that streams video data from the HoloLens to a PC
- Add an interface for the PC user to interact with the video stream of the HoloLens
  - The PC user should be able to add arrows, boxes, or highlighting to the HoloLens user's video stream and text instructions
- Create virtual platform for video communication
  - Reduce bandwidth usage if possible
- Develop feature tracking software for the HoloLens
  - User of the HoloLens will send images from their end
  - Maintenance operator will see a 3D reconstruction on their end
- Check in with mentor to consider specific requirements of project
- Visit Point Mugu to see available technologies and existing systems

Github Repo Link: https://github.com/kylekam/CS189
Trello Link: https://trello.com/sea577
Google Docs Link:
https://drive.google.com/drive/folders/1R1WoUe5PQggEW9OHU8ebwtbXaFBZYKYB?usp=sharing