

Augmented Reality in the Maintenance of Ship Systems

Winter Demo Presentation



OUR TEAM: Sea++



Lyuda Panina
(Leader)



Vivian Ross
(Scribe)



Kyle Kam



Emily O'Mahony



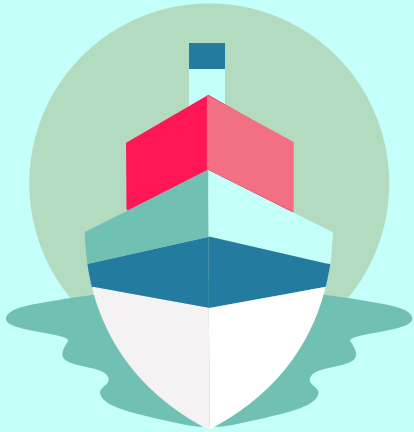
Thao Phan

Sponsor: NAVSEA

NAVSEA Mentors: Alan Jaeger and Christopher Leslie

NPS Mentor: Clay Greunke

Problem



- Navy ships contain many systems that are in need of repair and maintenance
- Sometimes required maintenance is beyond the crew's training
- **Solution:** Use augmented reality with a HoloLens 2 to guide untrained users through maintenance and verify its completion

Our Approaches

Original Idea

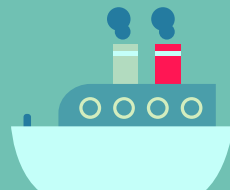
- App streams video feed to a remote expert
- Expert annotates scene using AR to help guide user through maintenance

Problem

- Limited bandwidth on navy ship

Current Implementation

- App displays a virtual model of machinery
- Instructions walk user through maintenance steps
- App tracks and verifies user's actions



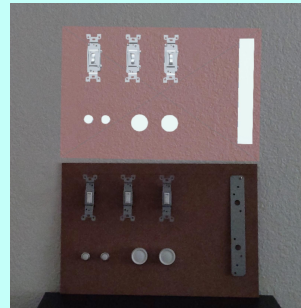
Our App

User aligns virtual board with physical board

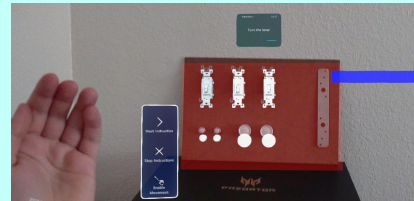
User follows preprogrammed tutorial instructions

The application monitors hand movements, hand gestures, and eye gaze to ensure actions are being performed correctly

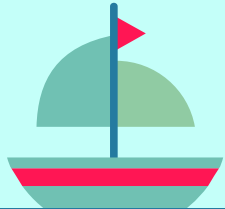
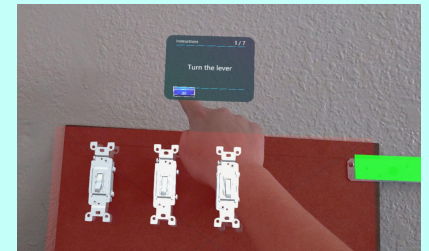
01



02



03

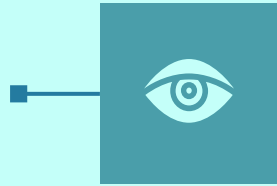


Verification Methods

Main Goal: Verify the user has completed the correct step

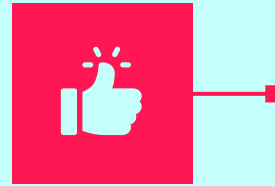
Eye tracking

A user must look at the indicated component before proceeding to the next instruction



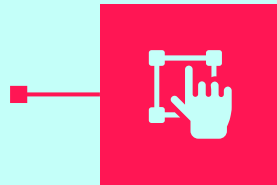
Gesture Tracking

A user's wrist must rotate counterclockwise when rotating a knob in order to proceed to the next instruction



Hand tracking

A user must touch the correct component before proceeding to the next instruction



Logging

A log is generated indicating the components gazed at and touched for future reference



Future Applications

01

Tool Training

Can train users to perform industrial procedures

02

Generalizability

Assisted machine interaction in any context

03

Design Pipeline

Verification methods and logging outline a feedback loop for design



Demo



THANKS!

Questions?