Team Name: cARe

Team Members:
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Problem Statement:
Efficient patient-physician interactions are essential in providing quality healthcare. Most healthcare systems today operate through conventional in-person doctor visits. The problem with this approach is that it becomes more difficult to provide timely care as the ratio of patients to doctors increases, or if the patient is in a remote location. Remote patient care via video conferencing aids this process, by allowing the doctor to interface with patients at any time of day and from any location. This becomes especially important when a specialist is required. Specialists are able to observe a patient's situation and give advice for how to give better care to them.

Currently, InTouch offers physicians the ability to remotely provide healthcare to patients through the use of robots that can be controlled by the doctors. However, the experience for both the physician and the patient could be greatly improved with the addition of augmented reality. Through an augmented reality interface, the robot can provide more organized visuals to the physician, as well act upon context-sensitive actions. The physician can have access to this important information more quickly. For instance, it may recognize medical equipment and present relevant information to the operator. Building upon this context-sensitive information, we can allow the doctor to have more useful interactions with patients and colleagues. Image detection and deep learning principles will be essential pieces to achieve this functionality.

Process:
We would start by creating a prioritized list of objects to identify. This could include staff such as specialized doctors, or medical equipment such as syringes and stethoscopes. (We are working with our mentors to get a list of what types of objects or information would be important to doctors).
We will then use Tensorflow to train on images from hospitals that include these objects. This will allow us to actually detect the objects given an image from the robot's video feed. Using the detected objects, we would create context sensitive actions, and have a U.I. overlay to be sent back to the operator. The operator can then choose to act on this overlaid information.

Outcome:
The robot automatically identifies hospital locations, medical equipment, and, as a stretch goal, important people. Upon recognizing something, it provides contextual options for doctors to select from. These context-sensitive options could be pulling up patient information, zooming in

on monitors, following nurses, etc. The result will make it easier for the doctor to get important information and interact with his/her surroundings.

Milestones:
We will have four 2-week sprints over the first quarter.
Sprint 1: Oct 10-Oct 21
Sprint 2: Oct 24-Nov 4
Sprint 3: Nov 7-Nov 18
Sprint 4: Nov 21-Dec 9

During sprint 1, we will focus on getting familiarized with the technologies and frameworks required for the project. We will also document the specifications, such as use-cases, requirements, and interactions. This is where we would think about the skills each team member brings and how we can combine these skills to satisfy the various requirements. We want to specify the goals/non-goals, which would answer what we are building and what we are NOT building.

Sprint 2 will involve designing our software and determining how we want to break up all of the parts we need to make. This process would accommodate the requirements as specified during sprint 1, and group these into software components. We would think about the interactions between the components and start working on a prototype for the software system.

Sprint 3 will be focused on implementing our prototypes and accommodating any changes or evolutions on the design. We would make sure to have regular testing of the components.

Sprint 4 is where we wrap up the prototype implementation and do more rigorous testing for basic functionality. By the end of sprint 4, we would have a fully-functional prototype, which means all common interactions are in working order. We will not be overly concerned with handling edge-cases. We want to ensure that the basic functionality is there before handling edge cases.

Technologies and Process:
To work with the robot's middleware, we will use provided API's from InTouch Health. This will be used to control the robot's movements and is primarily in C++/ Java.

For the object detection and segmentation, we will use Tensor Flow, a machine learning platform developed by Google.

We will be working with our InTouch mentors to learn about the Middleware APIs and get acquainted with any technologies and resources that they plan to provide.