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Sponsor: ECE Department? Makerspace?

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The Makerspace robotics team aims to design an assistive robotic arm that will operate on a desk or lab space. This sentient robotic arm scans the room periodically to create a map. Then, whenever prompted by a voice command, it will identify, acquire, and provide the item to the user. The team is designing object and facial detection software to give the robot sight along with voice recognition to take commands. The robot will use these senses to develop neural networks to improve the accuracy of recognition. Furthermore, this robot should be able to function autonomously to remap the room and help given user commands.

Visual processing will be handled using OpenCV and TensorFlow. These libraries will allow us to access and process images, while building a neural network to improve recognition. When mapping the room, the robot will recognize if a user has entered the space and promptly begin its facial detection routine.

Given a familiar user, the voice profile for that user will be loaded for improved recognition. If the person is a new user, a new neutral profile will be created to be trained. The robot will rest in standby mode until called upon by the user. When prompted with a command such as, “Give me a pencil”, it will translate the command from voice to text and check for keywords and log the position of the user.

The team has divided the mechanisms of this project into two components, the arm and the gripper. The arm’s 6-axis movement and mechanics will be developed using Robot Operating System (ROS) on Ubuntu. Programming the ability to move autonomously allows the robot decide how to move without external input beyond voice commands. The gripper is a three-finger design with an integrated camera, lidar, and light. Each finger will have a set of tactile sensors to give the robot feedback on the pressure applied to the object it is attempting to grasp. It can therefore respond accordingly and autonomously adjust its grip. When functioning in conjunction with the software components, it will be able calculate and complete the best path to the item and its return path to the user.