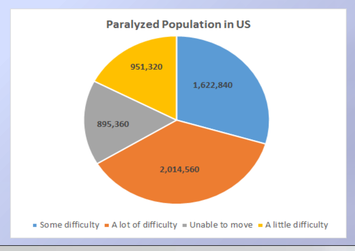
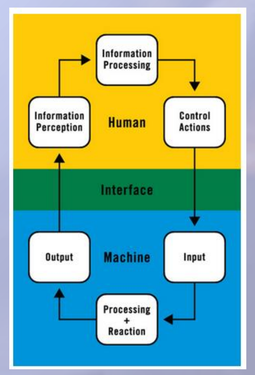
Design of a Hands-Free Control System for Device Manipulation

Kassidy Kenney, Angelo Huan, Kimberly Harrington, Muhammad Sungkar
System Engineering & Operations Research, George Mason University

Context

- Almost every human-machine interaction must occur through a physical interface
- A paralyzed person cannot perform many basic tasks that require physical motion. A robotic aid can perform these tasks, provided a control interface is developed so that the paralyzed person can direct the robot's movement
- Approximately 19.9 million in the US have difficulty lifting and grasping objects





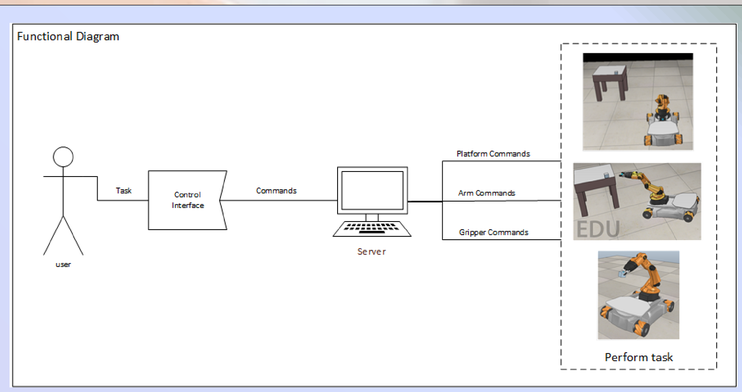
Problem & Need Statement

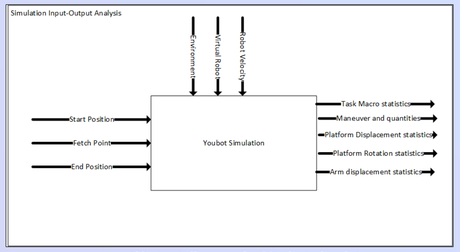
Problem Statement
Paralyzed persons are unable to use robotic aid devices that require physical input from the user

Need Statement
Members of the disabled community are in need of an alternative that will allow them to manipulate a robotic aid device without requiring physical motion

Win-Win Scenario
Develop a hands-free control system that can match the quality and cost of a traditional control system

Method of Analysis

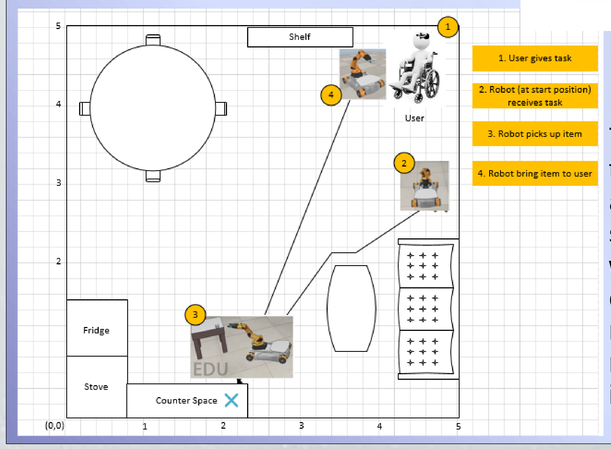




Input/Output diagram for Youbot simulator

Simulation

The YouBot consists of several omnidirectional pivots. The three main components are the platform, arm, and gripper which are used to provide the YouBot 360 degrees of freedom and the ability to grasp objects



The figure to the left depicts a use case scenario where the user commands the robot to retrieve an item for them

Results

Conclusions & Future Work

Describe the implications of these results
Link back to the context and need statement

Show how this solution closes the gap.
Show how it creates a win-win.