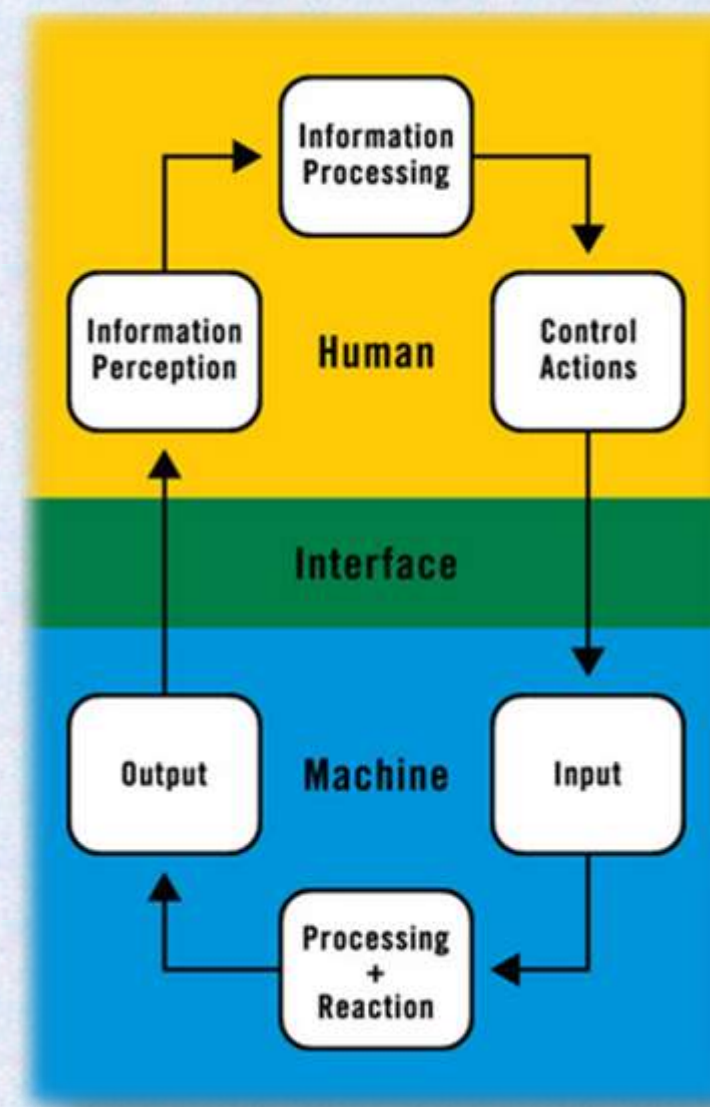


## CONTEXT



- ❖ 20 million Americans report difficulty moving/operating devices
- ❖ Current control interfaces do not account for paralyzed individuals
- ❖ The demand for in-home care is increasing
- ❖ Number of in-home care assistants is decreasing

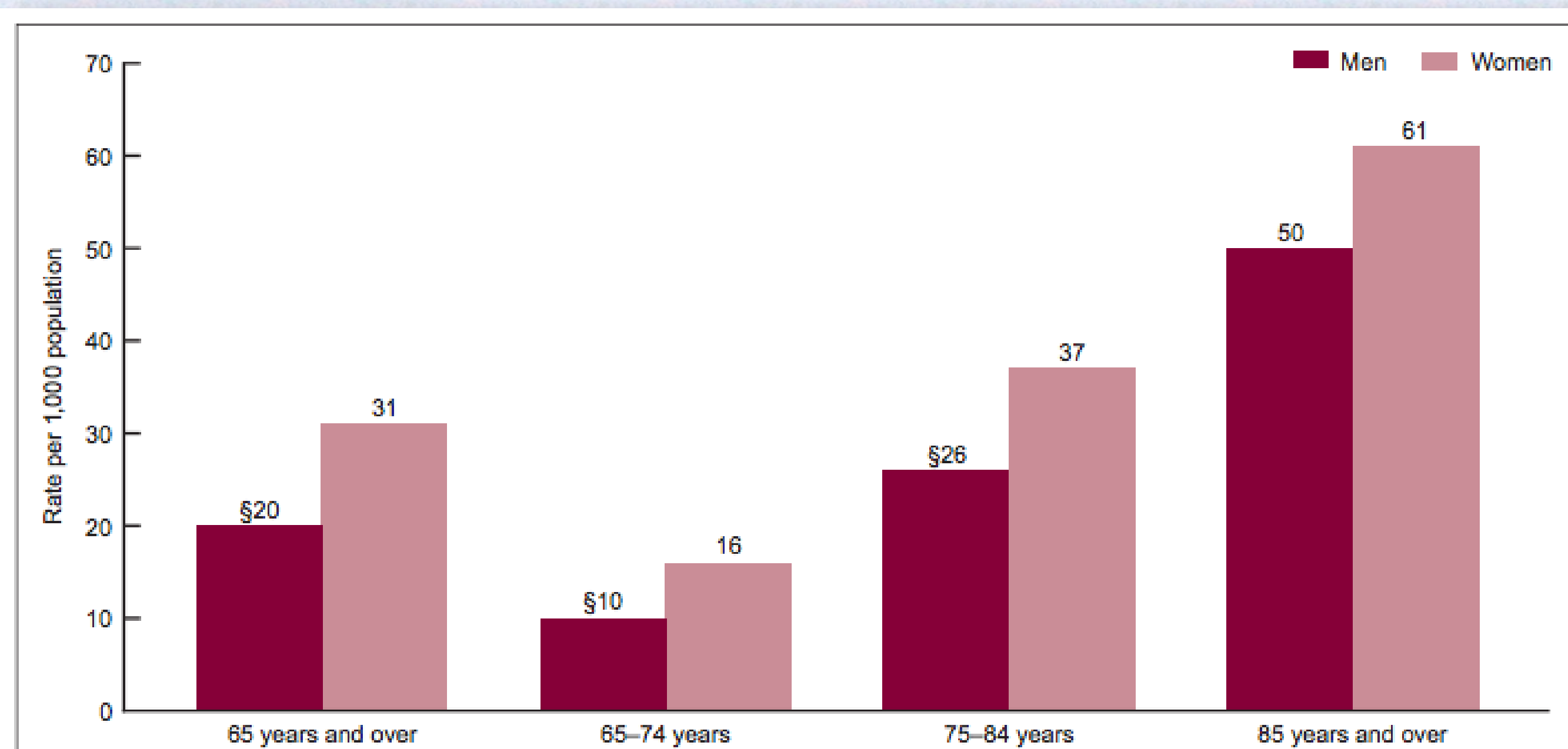


Figure 1. Rate of receipt of home health care per 1,000 civilian noninstitutionalized population aged 65 and over by sex: United States, 2007

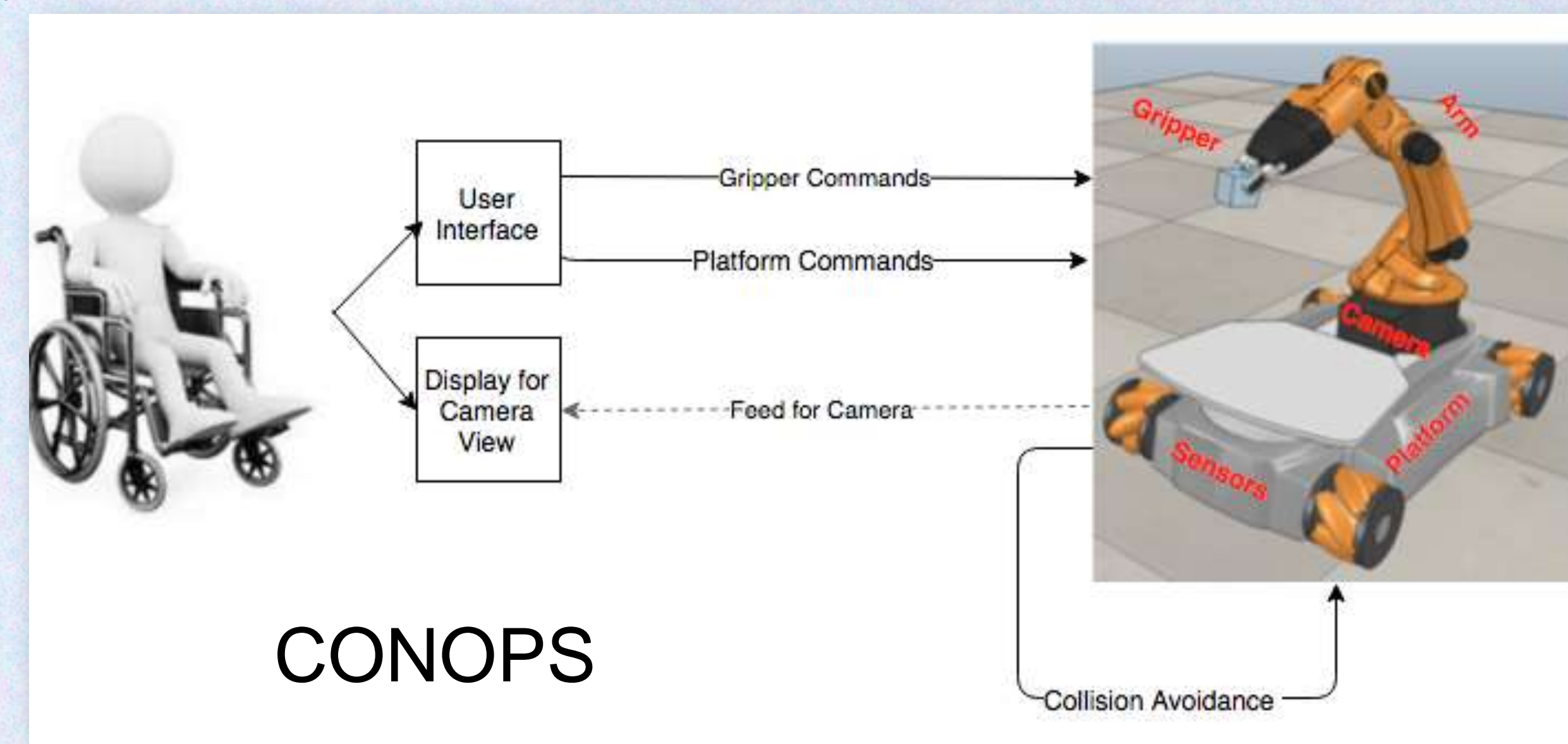
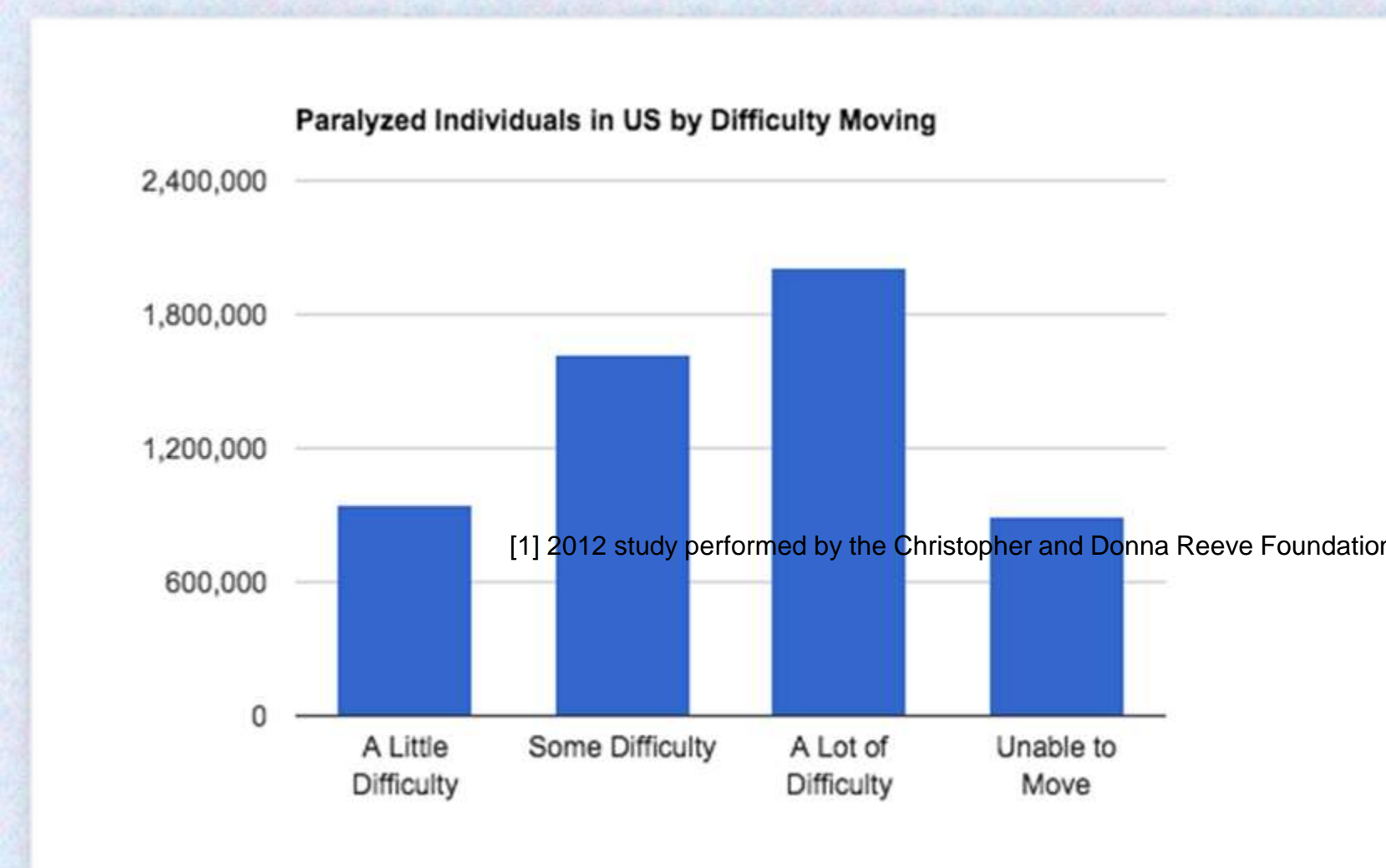
## PROBLEM & NEED

### PROBLEM

Paralyzed persons are unable to use devices that require physical input from the user

### NEED

Members of the disabled community need an alternative that will allow them to manipulate a robotic aid device without requiring physical input



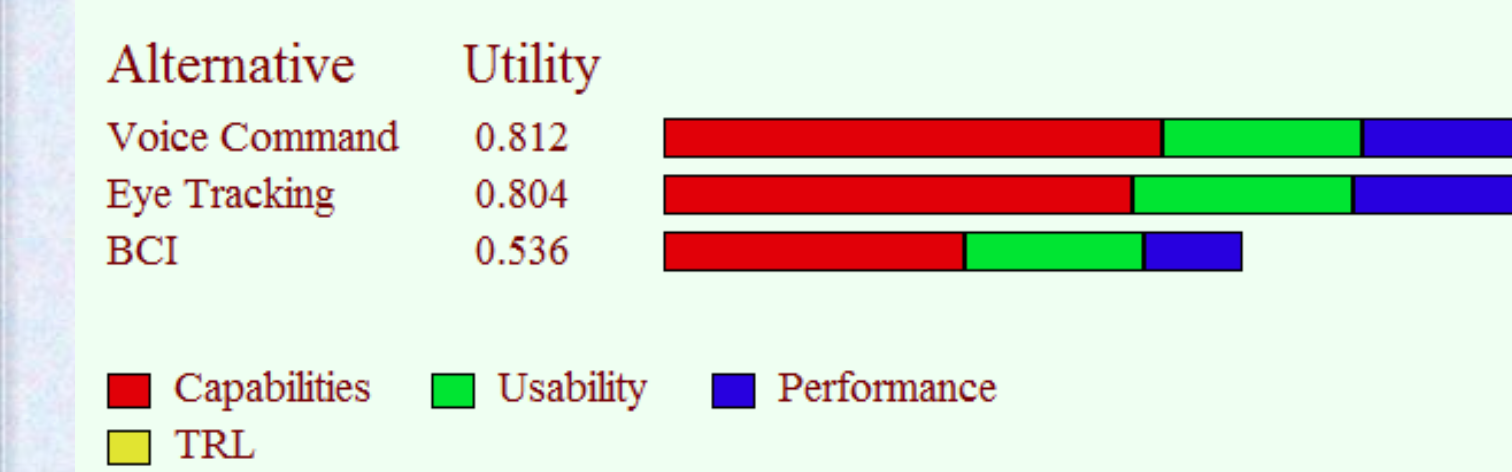
### CONOPS

## DESIGN ALTERNATIVES

- ❖ Eye Tracking Software
- ❖ Voice Command Technology
- ❖ Brain Control Interfaces (BCI)
- ❖ ~~Muscle-Contraction Detection~~
- ❖ ~~Head Gyroscope Technology~~

\*Limited alternatives to those that do not heavily rely on physical user input

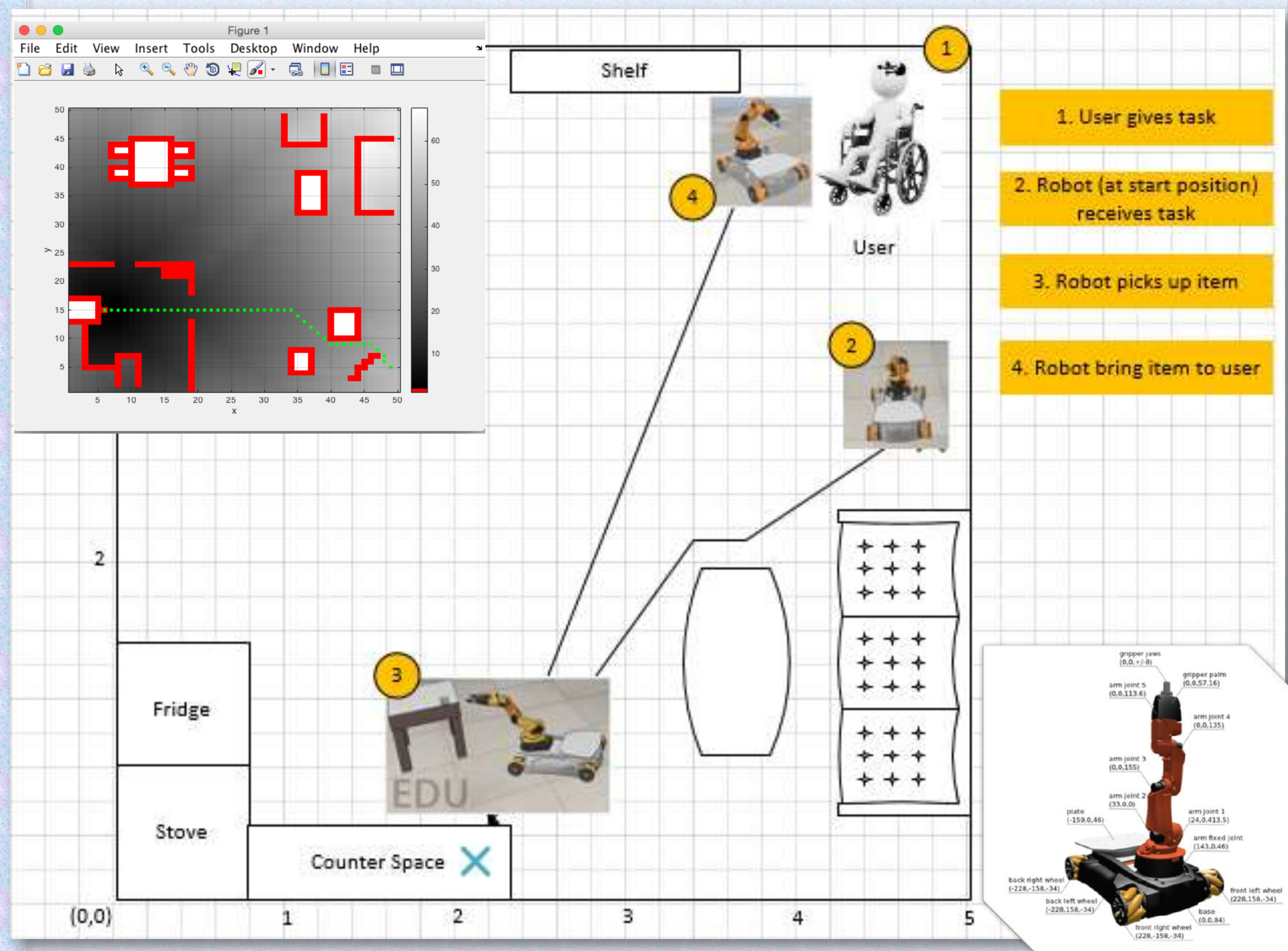
## METHOD OF ANALYSIS



Sensitivity analysis determines voice command technology is optimal according to weights

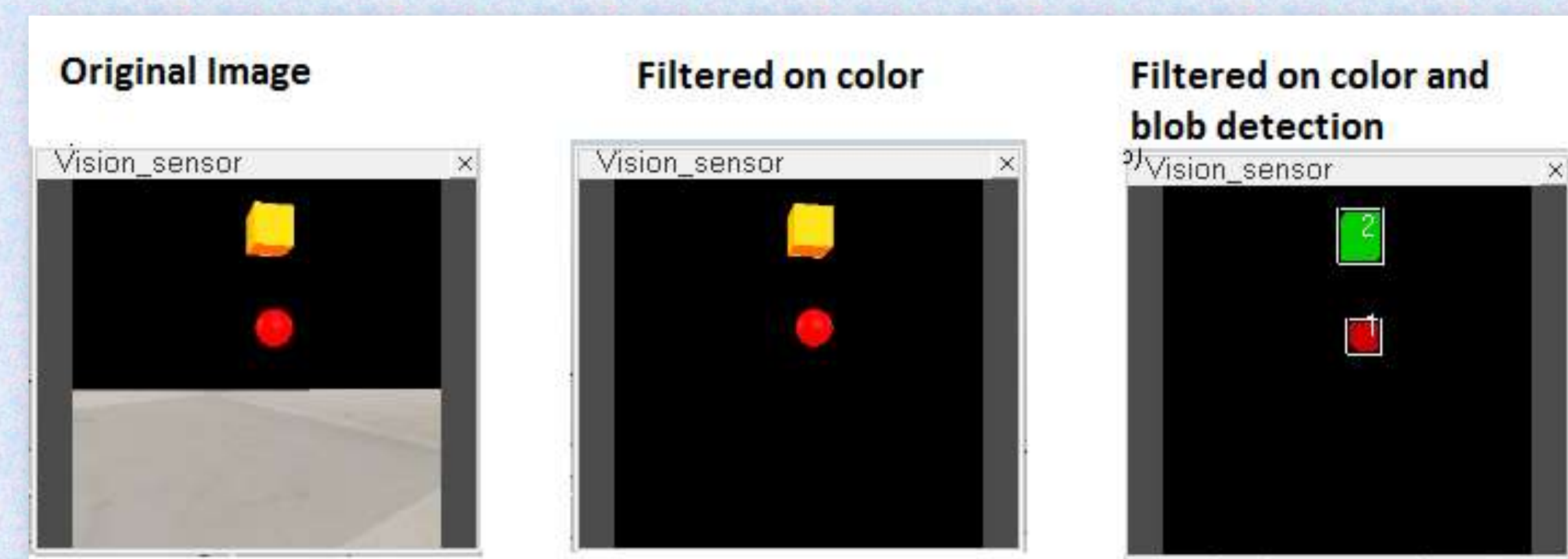
Goal	Category Weight	Measures	Measure Weight	Total Weight
Capabilities	0.5	Number of Commands	0.7	0.35
		Time Sensitivity	0.3	0.15
TRL	0.1	TRL	1	0.1
Usability	0.2	User Population	0.75	0.15
		New User Time	0.25	0.05
Performance	0.2	Accuracy	0.4	0.08
		Maintainability	0.2	0.04
		Reliability	0.4	0.08

## SIMULATION



## RESULTS & RECOMMENDATION

- ❖ Voice control is a low-cost, ready to use technology
- ❖ In combination with advanced robotics, voice command technology can alleviate the shortage for in-home care
- ❖ Six functional commands are recommended: turn right or left 18 degrees, turn right or left 2 degrees, start, and stop
- ❖ Employ the use of a vision sensor
- ❖ Utilize collision avoidance and return-to-user functions.



VREP Vision sensor returns a depth value, color and intensity values for every point and differentiates objects

