# Evaluating Human-Robot Interaction

## Background
Several tasks that are currently performed by humans can be offloaded to robots for reducing human effort.

**Human-Robot Interaction (HRI)**

**Goal:** Developing algorithms to improve HRI in two specific ways
- 1. Team Efficiency
- 2. User Experience

## Problem
- Currently HRI algorithms are tested with few environments and few users
- Unknown limits to where an algorithm can fail in different environments

**Solution:** Test algorithms in multiple simulation environments followed by real user study in key environments.

## User Interface
### Why do we need a User Interface (UI)?
UI is needed for humans and robots to communicate with each other

**What did I do?**
- Learned basics of python and PyQt5
- Changed buttons from parts to actions
- Added timer to uncheck the buttons

## ROS Subscriber
### What did I do?
- Learned basics of ROS [1] (Robot Operating System)
- Wrote a ROS subscriber node in Python by referring to a C++ code

## URDF/Task Environments
### Why do we need a URDF?
**A Unified Robot Description Format** (URDF) is a format used to define a body put in simulation with certain dimensions and color.

**What did I do?**
- Created multiple URDFs for the packages and represented the environment in RViz simulation

### Impacts
- Identify when an HRI algorithm will **fail** to ensure usage of the algorithm to its maximum potential.
- **Safety** of users will be much better
- Evaluate effectiveness of HRI algorithms will help other researchers identify problems for future research

## Parcels Task
**Why do we need to Calibrate a Camera?**
It was needed so that the camera could **accurately detect** april tags. April tags were used to identify packages.

**With the checkerboard [2], the camera was allowed to detect points in different positions when moving boxes with april tags.**

## Camera Calibration
### Bibliographies


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