



Preliminary Proposal

Team 16

Abstract

- Today's factories are limited by the specialization of the machines in them.
- To fix this a software is needed to allow a more generalization of factories.
- This is a complicated problem that can be tackled by breaking the issue down into manageable steps.
- Once the solution is found, multiple different robots will be able to cooperatively complete a task.





Problem

- Factories are built for products
- General Purpose Factory requires tasks to be assigned to different robots
- Robots need to be able to communicate effectively
- 3rd party robots all have individual native languages

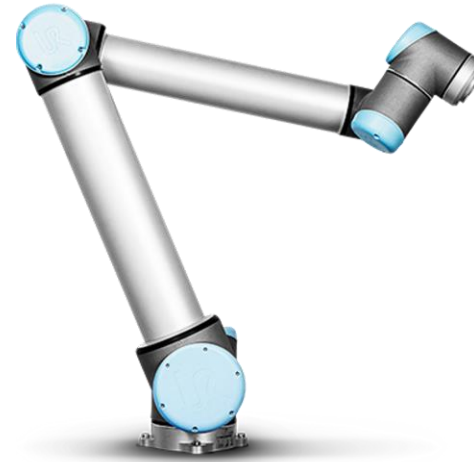
Objective



- Cooperative 3D Printing with Industrial Robotic Arms with ROS
- Developing a universal printing interface
- Design/Implement a communication protocol for 3rd Party robotic arms

Key Concepts

- Swarm Manufacturing
- UR10
- Kinova Gen3 6DOF
- ROS
- MoveIt
- Gazebo
- DOF
- Linux (Ubuntu)



UR10

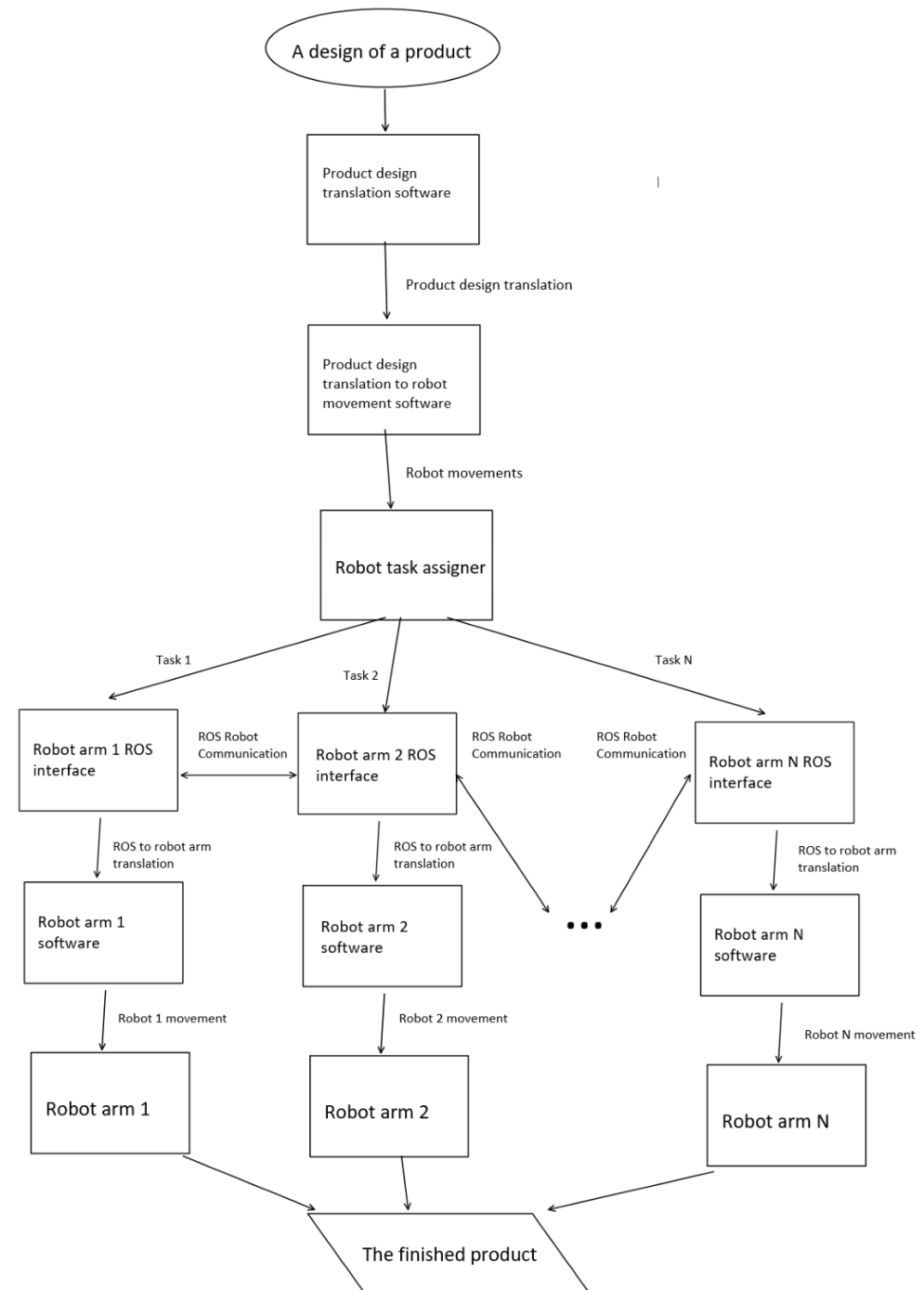
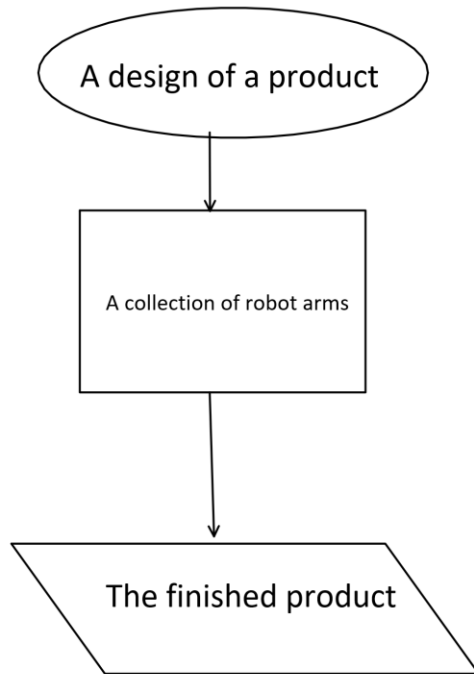


Kinova

Requirements

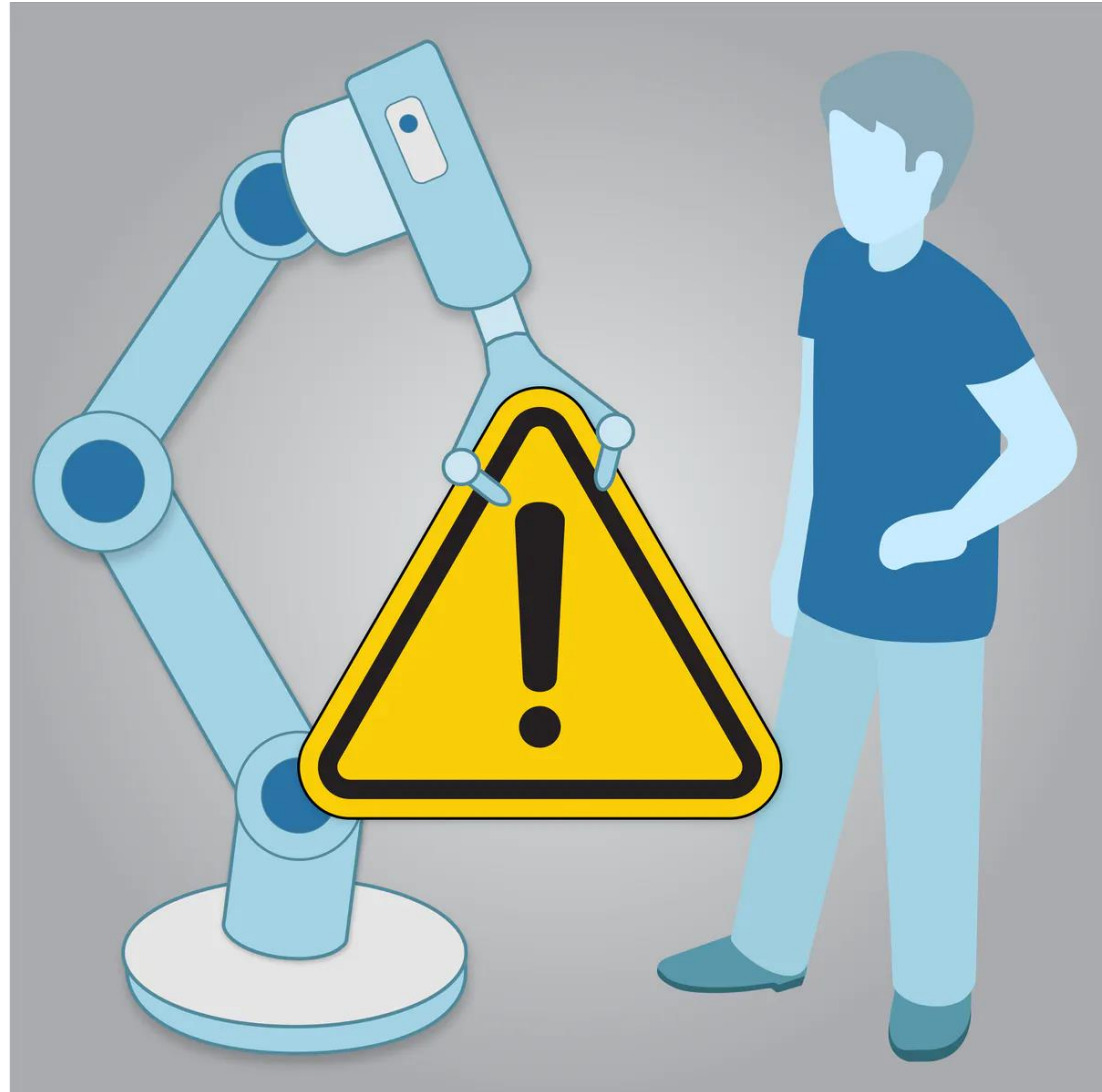
- Ability to input a G-Code file to the machine and have two different robots 3D-Print the object that is represented by the G-Code file
- Code should be generalized and be able to work on multiple different brands of robotic arm
- Potentially add a slicer so that an object from CAD software can be directly inputted without the prior translation to G-Code (this is a "stretch goal")

High Level Architecture



Risks

- Network Security
 - Isolated Network
 - Network isn't connected to the internet
 - Encryption/Firewall
- Physical Safety
 - General lab safety
 - Kill switch



Tasks

- Research various robotic arms and their software
- Simulate basic movement of robotic arm choices in gazebo
- Create program to translate from G-Code file to robotic arms' native language
- Simulate G-Code movement of robotic arm choices in gazebo
- Use ROS to communicate between two arms
- Simulate simultaneous printing with robotic arm choices in gazebo

Deliverables

- Research – collection of all throughout implementation process
- Documentation - how the code works, and why choices were made
- Software Package – code written to reach goal of simultaneous robotic arm 3D printing
- Tutorial – setup of programs used as well as software package produced
- Final Zip File – Includes final report along with code written

Thank You