# Omnidirectional Unmanned Manipulation Robot with Kinect Control

*Project Proposal*

*October 30, 2018*

**1) Team member names and roles**

| Team Member | Specialization | Group-wide Roles |
|---|---|---|
| Nikhila Vembu | - Solidworks design<br>- Prototyping | - Major Project Decisions<br>- Putting things together<br>- Helping with all tasks<br>- Testing |
| Shu You | - Kinect/Arduino interfacing<br>- Circuitry design | |
| Hardik Singh | - Robot base design/assembly<br>- Body analysis algorithm | |

**2) Problem you are trying to solve and why it is interesting. What will you demonstrate on demo day?**

**Identified Problem**

Buttons are of the past. Controllers can limit how exactly you can control a moving part; buttons are not exactly intuitive for 3 dimensional control. Hence, we want to try controlling a robotic platform using our entire bodies, through a kinect. This could be helpful in search and rescue missions, factory settings to increase safety, and much more. Woooo autonomous control!!

**Our solution**

We are creating a small, moveable, omnidirectional robot that will be controlled virtually using a Kinect. On the demo day, we will demonstrate control of the robot and the ability to accomplish a terrain manipulation task with the robot by using a series of arm/hand gestures to command the robot's movement and use of its 4-bar linkage gripper. Upon of accomplishing the task, the robot will show some Pizazz(a surprise!!).

The task will consist of retrieving an object and returning it into and ending spot based on the way we direct it with our bodies. The robot will ideally have to navigate through a few obstacles and then reach a box which senses that the robot arrived with the object.

**3) Course topics that will be used. What sensors and actuators will you use? What will your code do?**

- Actuators
    - Servo motors (x4)
- Sensors
    - Proximity Sensor
    - Kinect
- Processor
    - Arduino Uno (x2)

Our code will be designed to take input from the kinect in the form of body-part locations and joint angles. From there, our code will be convert body movements into commands for the omnidirectional base. We will also have a separate setup where the proximity sensor will be running an open loop system where as soon as the omnidirectional base moves within range, the setup lights up to mark a completion of the task.

**4) What materials you foresee needing to complete the project? What makerspace resources will you need access to?**

**Materials List**

1. Omnidirectional Robot wheels x4 (1 backup)
2. Bearings x6 (2 backup)
3. Proximity sensor (Upto 3, depending on budget)
4. Light but strong wood (potentially balsa)
5. Acrylic Sheets
6. Servo Motors (x6) (2 backups)
7. Extra Wires / Breadboard / Electronics

**Makerspace resources**

- MakerSpace computers for SolidWorks
- Laser Cutters
- 3D Printers
- Assembly space

**5) Project timeline. What do you anticipate completing by the progress update points?**

**Progress Update 1 (Nov 13th)**

- Software proof of interfacing between kinect and arduino
- Simple minimal circuit - evidence of interfacing (lights turn on from person movement)
- Circuit schematics
- Sketches of robot design and photos of anything we've done so far
- Solidworks model for Omnidirectional Robot
- Body control algorithms
- Reflection of Progress

**Progress Update 2 (Nov 27th)**

- Working/moving Omnidirectional Robot
- Functioning 4-bar linkage gripper on the robot
- Primarily working on figuring out tweaks for controlling the robot and creating the final stand which lights up upon completion.

Note: We're not sure how Thanksgiving Break will affect this - we hope to complete these tasks but may be 2-3 days behind if we can't get what we want done over Thanksgiving Break.