

Kinect Controlled Robotic Arm

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Motivation

- Controlling a robotic arm with a traditional controller can be very difficult
- Non-intuitive and increases the complexity of operation

What we need is a Natural User Interface (NUI)

- With NUI the human arm can directly control the robotic arm which tries to imitate its movements
- Thus controlling the arm becomes very intuitive
- User should be able to deploy the arm in remote or hostile places
- Opens a plethora of applications

Kinect



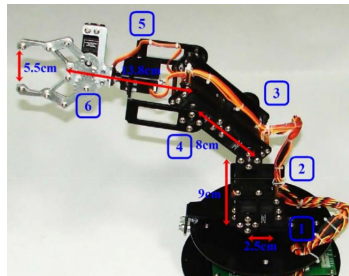
Figure: Microsoft Kinect

Project Idea

Provide a NUI for remotely controlling a robotic arm

- live video feed from a camera placed on the robotic arm is transmitted by wireless to computer
- user responds by moving his arms and making gestures
- movements and gestures of human arm are captured using kinect
- converted into controls for robotic arm which are transmitted to the arm
- robotic arm imitates the human arm

Axis	Function
1	Base Rotation
2	Shoulder Rotation
3	Elbow Rotation
4	Wrist Pitch
5	Wrist Roll
6	Grip, Ungrip



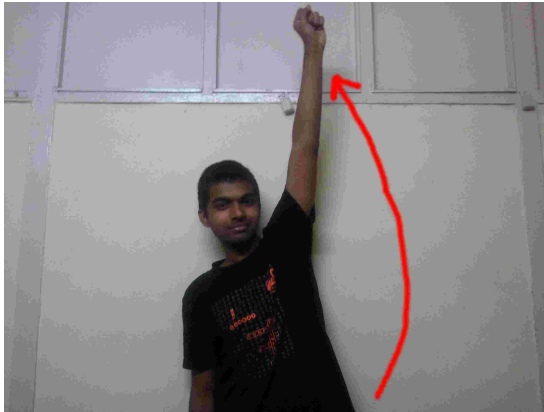
Challenges

- Design an intuitive and robust NUI for arm control. Problems:
 - kinect cannot capture finger movements and wrist roll
 - human shoulder has two axis of rotation
 - kinect skeletal data may not be very accurate
- Establish wireless communication with robotic arm
- Transmit live video feed from robotic arm

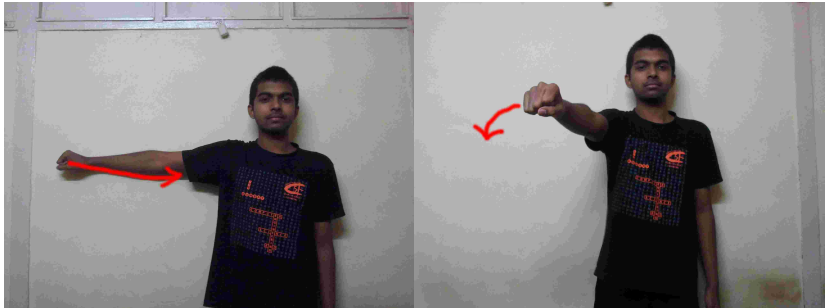
Zero Position



Hold



1.Base Rotation



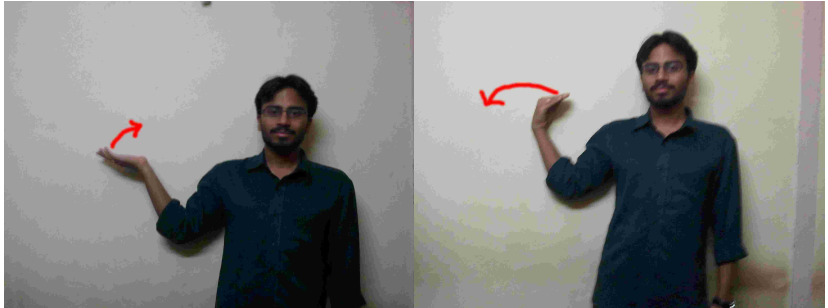
2.Shoulder Rotation



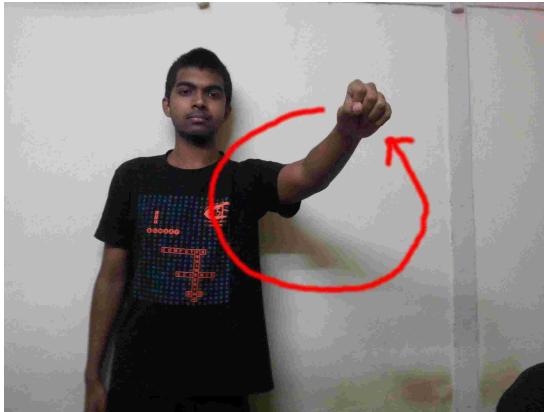
3.Elbow Rotation



4. Wrist Pitch



5.Wrist Roll



6. Grip and Ungrip



Attach a Zigbee module to the robotic arm

- The livefeed from camera on the robotic arm is sent via Zigbee to the computer
- Instructions from the computer is sent to the robotic arm through the Zigbee module

Hardware Required

- Kinect for Xbox v1
- Dexter ER2 Robotic Arm
- Camera
- Zigbee Module

Where can we fail

- might be difficult to get live feed. Reasons:
 - Zigbee too slow to transmit good quality video
 - Connecting camera and robotic arm may give trouble
- kinect may not accurately capture wrist movements.
 - use the other hand to control wrist movements