Robotic Arm

Advisor: Ian Harris

Background

An industrial robot, also referred as a robotic arm, is a mechanical device that is often programmed to autonomously perform tasks. Some of these tasks include welding, painting, performing surgical tasks, or manufacturing. Robotic arms have become a proactive development because they reduce the cost of labor, provide more efficient laborious results, and, most importantly, perform tasks in environments not suitable for humans.

Goal and Objective

The goal of the robotic arm project is to create a fully autonomous mechanical arm capable of sorting and organizing arbitrary objects based on their characteristics. In order to perform these complex tasks, it will have proper mechanical structures and the necessary degrees of motion needed. A robotic arm with such capabilities has yet to be developed. We hope that our finalized prototype will encourage further research and development that will enable robotic arms to travel in hazardous environments for human beings, such as deep sea projects or trips to mars.

Current Spenditures			
Bought			
Part/Material	Cost	Quantity	Total
Plywood + Polycarbonate Sheet	$20.00	1	$20.00
Servos (med)	$6.21	8	$49.66
Arduino Mega	$52.35	1	$52.35
Nuts & Bolts	$4.94	1	$4.94
Add. Screws, Nuts	$10.00	1	$10.00
Robotic Claw (1)	$11.97	1	$11.97
Robotic Claw (2)	$29.15	1	$29.15
Pixy Cam (2)	$69.00	2	$138.00
Jack to alligator clips	$1.95	5	$9.75
DC power adaptor	$5.69	5	$28.45
Voltage Regulator	$9.95	2	$19.90
mosfet	$2.14	4	$8.55
		total	$382.72

Projected Costs			
Thermal Sensors	$56.96	2	$113.92
Arduino Mega	$52.35	1	$52.35
Arduino	$27.08	3	$81.25
Nuts & Bolts	$15.00	1	$15.00
Camera	$69.00	1	$69.00
Double Sided Tape	$10	1	$10
Reed switch	$3.95	10	$40
breadboard + wires	$6.95	1	$7
Plywood + Polycarbonate Sheet	$20.00	1	$20.00
		total	$407.97
		Final Budget	$790.69

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Current Status

We have finalized the design of our arm and have completed assembling it. The arm is now able to move. We have also began to develop a program that will enable our Arduino, PixyCams, and robotic arm to work together to locate objects. Currently, our cameras have been taught to distinguish objects of seven different colors.

Next steps

Our aim for next quarter is apply inverse kinematics to make the arm accurately move itself and grab objects. We also plan to incorporate thermal sensors in order to allow the robotic arm to detect objects that are radiating heat.

Our team:

Bobby Moralez: Mechanical aspects of the arm such as modeling, building, and adjustments. Also responsible for the controls and electrical.

Lisete Gonzalez: Responsible for mechanical adjustments, electrical components , and testing of the controls

Mari Vidauri: Testing of the cameras /sensors by analyzing the range of the arm and the necessary code for the specific task

Terry Wang: Assembly of platform for the range of the arm. Contribute to mechanical adjustments as needed

October
- Begin initial research of robotic arms. We must decide on a specific task we want the arm to accomplish to have a better understanding of a design and materials needed.

November
- Begin the process of cutting, printing, and buying the necessary parts needed.
- Have a semi complete functional robotic arm that is fully mechanical to asses any errors that may have occured during manufacturing.

December
- Finalize the mechanical part of the robot and have it ready to be wired up electronically.
- Investigate potential codes that will be useful for our robot and begin applying them for a trial and error process.

January
- Continue working on the code and start assembling the electrical components to verify how they work with the mechanical aspect of the arm
- Obtain final materials that will work the best for testing the arm and

February
- Assemble a platform with a radius within the arms reach in which the objects will surround the arm.
- Begin testing cameras and code necessary for our project

March
- Fix anything that could potentially break or cause obstructions when the arm is controlled electronically
- Have a semi complete code that can control the arm how we desire with minimal errors.

April
- Continue working on code to optimize the arm's ability and do what we need it to do without any errors, electronically and mechanically.
- Integrate heat sensors if everything else has worked to a minimum extent

May
- Work on any last minute details that may have been overlooked and prepare robotic arm for presentation.
- Plan for UCI's undergraduate research symposium, where we will be presenting all the work that was accomplished throughout the year.