

Wheatley Cam Project Proposal

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1 Abstract

Our project would provide a way to open up the robotics lab to new members, and also interact with sponsors. We are proposing a web camera system that will move around a corner of the lab on a rail and also provide camera pan and tilt. The camera would stream to the website and would be controlled by users on the website. We are planning on using a powerful processor that will be very modular and open to later upgrades and modifications. Examples of future projects include enabling conversations with our device using Vocal Recognition, Facial Recognition, and creating a Wheatley (a character from the videogame Portal 2 who moves along a rail) skin using a 3D Printer.

2 Technical Merit and Broader Impact

This project is not necessarily as mechanically challenging as others, but it has a relatively challenging programming aspect. It would require research about networking protocol and the interface between the web server produced by our device and the OSURC website. As a team we would be gaining experience about embedded programming, combined with linux at the same time. The processor we are planning on using is a pcDuino which is essentially a very small PC running Ubuntu, with an Arduino interface built into the device. The pcDuino is a very powerful embedded microcontroller that we chose because it has pre-existing network capabilities and will allow us to become more experienced with network protocols and connecting embedded devices with the internet. Our processor also has the resources to be a platform for expansion and future development.

We plan on using a gimbal system to actuate the camera, which is one of the most mechanically challenging aspects of the project, and this would ideally be designed and manufactured at OSU.

Our project would allow for greater integration of sponsors and prospective students. It would allow them to view the lab from a remote site. We could potentially schedule times with sponsors to allow them to view the lab when we are having a meeting or making a demonstration. Our plans eventually provide for a method of interaction between the viewer and the robotics lab, but the specifics for these plans will be decided at a later time, after the device is constructed and tested. An example of this interaction could be if the group sets up a demonstration time, interested students who otherwise might not be able to go (or want to go), could view the demonstration online and interact with the Robotics Club and ask club members questions.

3 Budget

With a small amount of electronics and hardware, we can reach out to sponsors, introduce potential members to the lab, and create a platform for future development. We have identified the electronic parts and systems that we will use in our design, and have included them in our attached Bill of Materials. We know that all of the systems in our project will work separately, and we have a plan to integrate all of the separate systems together.

Attached is a spreadsheet with our Bill Of Materials and relatively short descriptions of all of the parts we are planning on using. The price we have for our mechanical portion was quoted by Daniel Knott, the Mechanical Engineer on our team.

4 Schedule

Week One:

Order parts

Week Two:

Basic assembly and setup
pcDuino up and running

Week Three:

Begin track/cart/gimbal construction
Begin electronics interfacing

Week Four:

Camera being read
Servos being controlled
EStop tested
Ethernet communication trusted
Build small test track

Week Five:

Local servo control
Cart/gimbal assembled
Server communication

Week Six:

Cart runs on test track
Gimbal controlled by pcDuino

Week Seven:

Camera data sent to server
Cart fully assembled with electronics

Week Eight:

Commands being read from website
Track fully assembled with cart

Part Name / Category	Price	Quantity	Total Price	Seller	Web URL	Notes
Main Components						
16 Channel PWM/Servo Driver	14.95	1	14.95	Adafruit	http://www.adafruit.com/products/815	To control the angle of the camera / move along track
pcDuino	59.95	1	59.95	Sparkfun	https://www.sparkfun.com/products/11712	Main Processing Unit
Web Cam 3-axis Servo Kit	25	1		cuteDigi	http://www.cutedigi.com/development-tools/pcduino/web-cam-3axis-servo-kit-for-real-time-video.html	Camera and servo assembly for movable camera
Power						
5V 2A Switching Power Supply	9.95	1		Adafruit	https://www.adafruit.com/products/276	For convertting from AC to DC
Coaxial Power Cable Extension - 18AWG	9.4	1		rpelectronics	http://www.rpelectronics.com/310-825-18a-2-1-x-5-5mm-plug-2-1-x-5-5mm-inline-jack-25ft-18awg.html	For extending with the Ethernet Cable
Female DC Power adapter to screws	2	1		Adafruit	http://www.adafruit.com/products/368	For splitting off onto PDB
1.5" Protoboard	1.5	1		OSU IEEE Store		For Power Distrubution Board
DC Barrel Plug to 2-Pin Terminal Block Adapter	1.95	1		Pololu Robotics & Electronics	http://www.pololu.com/product/2448	For powering pcDuino
USB A Jack to 5.5/2.1mm jack adapter	2.95	1		Adafruit	http://www.adafruit.com/products/988	For powering pcDuino
USB Cable - 6" A/MicroB	2.95	1		Adafruit	http://www.adafruit.com/products/898	For powering pcDuino
Network Connections						

Part Name / Category	Price	Quantity	Total Price	Seller	Web URL	Notes
Cat5e Network Cable - 50ft	5.55	1		Amazon	http://www.amazon.com/Cat5e-Network-Ethernet-Cable-Blue/dp/B000QZ00	For connecting pcDuino to internet
RJ45 Female to Female Coupler	5.85	1		Amazon	http://www.amazon.com/Intellinet-Female-CAT-6-Keystone-Coupler/dp/B002JP	For coupling ethernet cable to existing ethernet cable
Misc						
Soundcard	9	1		cuteDigi		For Wheatley's sound
IR Control Kit	10	1		Sparkfun	https://www.sparkfun.com/products/1176	For control in-room and also disable
Mechanical Portion	250					For the purchase of all of the materials involved in the mechanical aspect of the project. This includes all track, metal enclosures, hanging mechanisms, etc.
Subtotal	411					
Overhead	51.5					For use in unexpected circumstances that may arise
Shipping	51.5					
Total	514					