

Project Title: **SHaZam the Magic Lamp**
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EECS 149/249A Project Charter, Fall, 2014
Project Repo: <https://github.com/EECS149-SHaZam>

Project Goal

The goal of this project is to design a lamp that will redirect its light to follow a user's gaze.

Project Approach

The magic lamp will consist of a standard adjustable desk lamp with a microcontroller embedded in its base and servo motors connected to its light source. Additionally, the lamp will utilize a WiiMote to track IR LEDs affixed to the user's face or hat. The WiiMote will communicate relative positioning data to the microcontroller via Bluetooth, which will in turn direct the motors to aim the light source. The controller will behave according to a state-machine that models states such as user-gaze-in-motion or user-gaze-fixed. Potential growth paths for this project include changing the tracking algorithm to be facial-recognition-based and adding additional degrees of freedom to the lamp's motion.

Resources

- Raspberry Pi (\$40) + Alomode shield (\$35) – OR – mbed (\$13) + Bluetooth Module (~\$10)
- 5V power supplies (2x \$10)
- WiiMote (Free)
- Bluetooth USB dongle (Free)
- IR LED bar (\$5)
- 2-axis gimbal for light (\$46 – \$65)
- LED flashlight (~\$10)
- Mounting Hardware (~\$10)
- Desk lamp stand (~\$10 / Free)
- Cabling (~Free)

Total cost: ~\$124 – \$195

Schedule

October 21st: Turn in project charter and create repo

October 28th: Choice of platform finalized after discussion with GSIs

October 31st: Order necessary parts / get from TAs

November 7th: Familiarize ourselves with parts and create relevant state models. **Dev access to Pi** (Ethernet)

November 14th: Hello world **sensor comm** and **servo control**

November 18th: *Mini project update* - demonstrate **sensor comm** (BT) / **servo** (PWM)

November 21st: Begin assembling parts and write code for models. **Interface Pi with alamode**
(Serial)

December 2nd: **Tracking code** on Raspberry pi (Python?)

December 12th: Complete project

December 16th: Complete demo video, ppt, and prep for presentation

December 17th: Final Presentation

December 18th: Final Project report adjustments (if necessary)

December 19th: Turn in Final Project report

Risk and Feasibility

There are several risk factors involved, mainly because of the different parts we plan to interface with each other. First, we have to interface the Pi with the Alamode Shield. At the same time, we have to get the Pi to interface with the Wiimote via Bluetooth. After that's complete, we have to make sure that the Alamode shield can understand serial commands. Of course, we also have to use the Alamode shield to control the Gimbal itself. These processes are nontrivial and we anticipate a significant amount of the time will be spent on calibration and debugging.