

Competitive Analysis

Description of Your Planned Project

My project is the control of a mobile robotic arm using hand gestures and voice control, in addition to conventional control with a video game joystick. The arm will learn new poses based on the mode it is in and perform some basic functions like holding in place. The arm will also dynamically move according to the hand gesture presented, using the hand as a frame of reference to assume a different movement. This arm could be used for several purposes, such as assistance for disabled people or simply for convenience.

Evaluating Your Competition

[This EEG-Controlled Arm](#) is quite an impressive project, featuring the use of an EEG to control the opening or closing of the robotic arm.

- Pros:
 - Very high “cool” factor
 - Uses hardware
- Cons:
 - Little self-developed material (most were pre-existing packages and hardware developed by the marketers of the EEG or by other robotic arm hobbyists)
 - Very little functionality besides opening and closing

All in all, it's a very nice science fair project, but it seems to prioritize “coolness” over practicality.

[Pick N' Place](#) robots use an end effector to grab items. They are often preprogrammed with specific items and guided either by an autonomous computer vision system or manually to manipulate objects.

- Pros:
 - Practical and flexible; can program to do many tasks
 - Fun to make and drive around
- Cons
 - Nigh impossible to make accurate unless at an industrial level; putting something precisely is HARD
 - Many functions must be manually inputted beforehand; no “on the fly” adaptation
 - Unless more complex autonomous SLAM/path-planning is implemented, one must manually drive it.

Over all, a pick n' place is a fun project to make but difficult to do well. Nearly all of the good ones are exclusively used in industry, due to cost.

[Dean Kamen's Prosthetic Arm](#) is an amazing feat of engineering, using advanced forms of EEG combined with electrodes mounted on the wound area to manipulate an arm with incredible resolution.

- Pros
 - Amazing item to revitalize the lives of those who've lost limbs
- Cons
 - Requires you to not have an arm to use
 - Cost more than my four-year tuition to develop

It's simply incredible what this can do. However, it is extremely pricey and niche; thus, it cannot be used in many situations and is definitely not something anyone cause use.

Identify Comparison Dimensions

My dimensions are:

1. Practicality
2. Cost
3. User Friendliness
4. Flexibility
5. Cool Factor

Practicality is a very important concept in robotics; in fact, there would be no point in making robots if they weren't practical in some way or form. Cost is also key; if an arm costs thousands of dollars to use, most people who could benefit from it will not use it. User friendliness is a good way for users to enjoy their product, which can be difficult given the confusion that comes with robotics software. Flexibility blends into practicality; it allows the user to gain more usage from the item and be more satisfied with it. Lastly, the cool factor must play a role because robots. They may be a pain to deal with, and a crazy time-sink to debug, but robots are cool and that must be recognized.

Comparison Table

Fill out the table shown below with the features you identified in the section above. Out of a possible max 5,

	Practicality	Cost	User Friendliness	Flexibility	Cool Factor
EEG	2	2	2	3	4
Pick N' Place	4	3	3	4	3
DeKa Arm	5	1	4	5	5

Summary

Using the results from your comparison, provide a summary of your findings. You should concentrate on

- Features that your project will need to be competitive
- Identified gaps that your project can take advantage of

The features I can best capitalize on are cost, practicality and flexibility. There is (no surprise) a tradeoff between the two, as the more money you sink into something the better it tends to be, but it seems reasonable that a good balance can be achieved

with the proper application of things. User friendliness is also something that could be more ergonomic; with simple hand gestures, controls can be simplified to make things easier. In short, the main goal appears to be: make things easier, simpler, and you'll probably have a better product.