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15-112 Term Project Proposal

Problem Statement:

There is an increasing focus on being able to control technology without physically interacting with it. To this end, my project will be program which enables the user to interact with his or her computer using gestures drawn in the air. To make this technology as accessible as possible, I will rely solely on the user's webcam, instead of expensive additional hardware.

Steps to solution:

1. Obtain a camera feed.
2. In controlled lighting, find a contour of the user's hand.
3. Detect the position of the center of the hand (palm).
4. Find the positions of the user's fingers.
5. Initiate basic actions by having the user hold his or her hand in specified parts of the sceen.
6. Track these hand positions over multiple frames.
7. Determine which of a few basic gestures the user's hand is making, if any.
8. Initiate basic actions with recognized gestures.
9. Allow user to train new gestures.
10. Optimize and improve recognition with more complicated algorithms.
11. Provide a hookable API.
12. Interface program with an open source game to demonstrate capabilities.

Modules:

I intend to use OpenCV 2 and its Python wrapper. OpenCV provides both computer vision and machine learning capabilities. Depending on the complexity necessary, I may alternatively implement my own basic machine learning, or use another machine learning library.