Gesture Control for Computer via Webcam

Mehdi Lakhoua, Rijul Arora, Ye Myat Kyaw, Yuki Hayashi
Prof. Xiaohui Xie
Department of Electrical Engineering and Computer Science

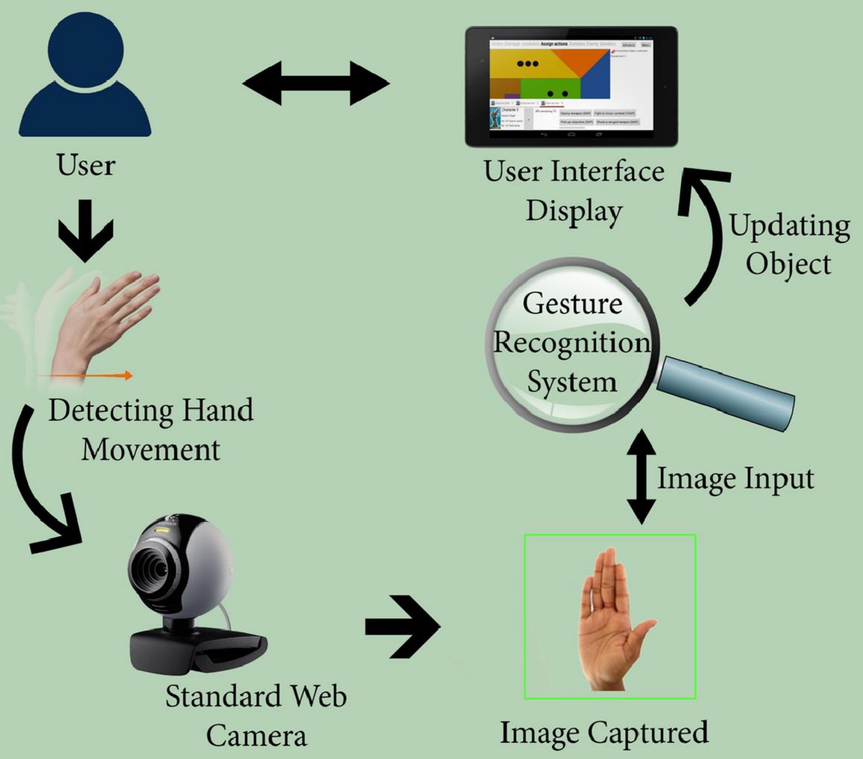
BACKGROUND

As advances occur in machine vision technology, there is a greater demand for a more natural and intuitive interface between humans and computers. Major innovations in the gaming, home automation, food service, and medical industries could arise from the development of robust touchless user interfaces. There are many scenarios where hand gesture control could be useful: a surgeon could scroll through scans without wasting time, or a user sitting at home could turn on their lights without having to press a switch, and so forth.

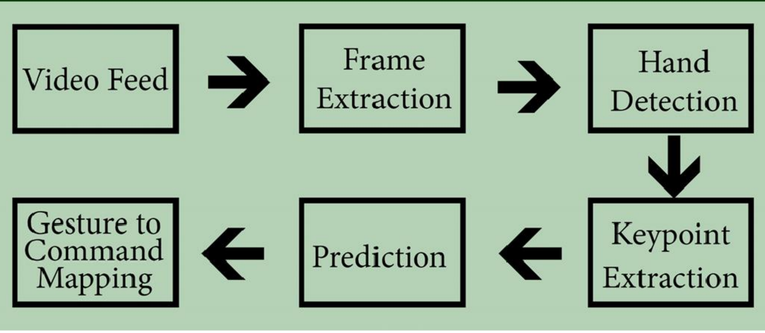
PROJECT GOAL

Our project is a software that allows a user to interact with the computer using hand gestures. The software detects the user's hand, interprets the gesture, and maps the gesture as a command to the computer. Our goal is to create a gesture recognition system that works accurately and in real-time for any person through the webcam on a laptop, then demonstrate its potential uses on portable edge devices in the fields of gaming or home automation industries.

PROGRAM WORKFLOW



GESTURE RECOGNITION WORKFLOW



MILESTONES & PROGRESS

Fall 2019

-Researched the state of the art technology related to our project
- Implemented hand detection
- Collected training data for gesture classifier
- Train gesture classifier

Future Work

-Test for real time performance on various devices
-Create demonstration projects (Gesture controlled media player, game, etc.)

MATERIALS NEEDED

- Hardware components: RGB camera, Laptop, Raspberry Pi or Jetson Nano.
- Software components: Python, OpenCV, PyTorch, hand detector and gesture classifier

REFERENCES

- V. Dibia, "How to Build a Real-time Hand-Detector using Neural Networks (SSD) on Tensorflow," Medium, 19-Jan-2019.
- V. D. Nguyen, M. T. Chew, and S, Demidenko, "Vietnamese sign language reader using Intel Creative Senz3D," 2015 6th International Conference on Automation, Robotics and Application (ICARA), 2015
- J.-H. Sun, T.-T. Ji , S.-B. Zhang, J.-K Yang and G.-R. Ji, "Research on the Hand Gesture Recognition Based on Deep Learning, " 2018 12th International Symposium on Antennas, Propagation and EM Theory (ISAPE), 2018
- Simon, Tomas, Joo, Matthews, Iain, and Yaser, "Hand Keypoint Detection in Single Images using Multiview Bootstrapping," arXiv.org, 25-Apr-2017.

UCIrvine | The Henry Samueli School of Engineering