Project: Housedroid

A Learning Based Project to Develop Humanoid Robotics

Note: This project is split into several phases.

Purpose of the Project

Project Housedroid is a step by step robotic development process. After these 5 weeks, we will create the basics of the system, in which we will implement some algorithms, data structures, systems programming and circuitry which you have learned in all your past lives. This document is not meant to go into details of the project, rather just to give a general overview.

The first phase of the project involves building a basic robot that focuses on moving from place to place and detecting objects.

Phase 1: A Practical, Simple Robotic System

Part 1) Create a robot that can drive around the hallway, at first using a gamepad like a first person shooter. *Status: Completed*

- Build a simple robotic structure
- Create a system of electrical components to communicate to each other
- Write software that will allow the robot to move

Estimated time: 2 weeks (1 week for ordering parts, 1 week for implementation)

Part 2) Change it up. Now make it move from point A to point B. You will implement:

- Graph search
- Speech to text
- Wireless Control

Estimated time: 2 weeks

Part 3) Pick up an object autonomously. You will implement:

- Object detection
- Function management
- Preprocessed control

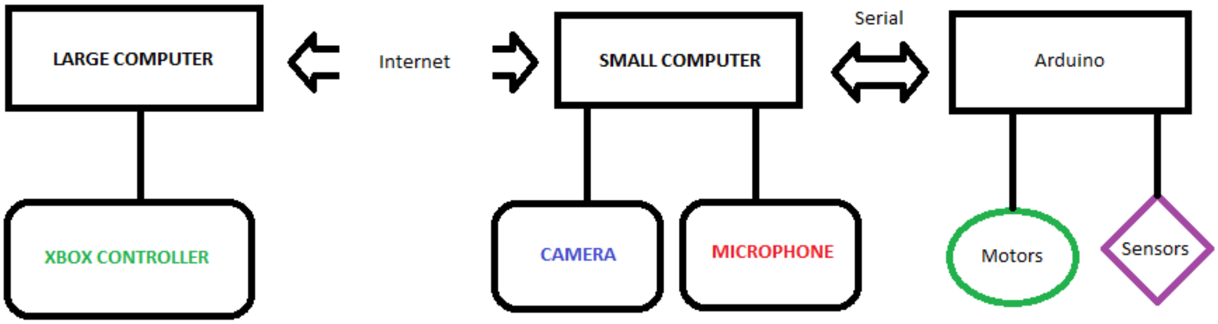
Estimated time: 1 week

Phase 2: A Walking Robot *(coming soon)*

Phase 3: A Useful Robot *(coming not so soon)*

Design (yay pictures):

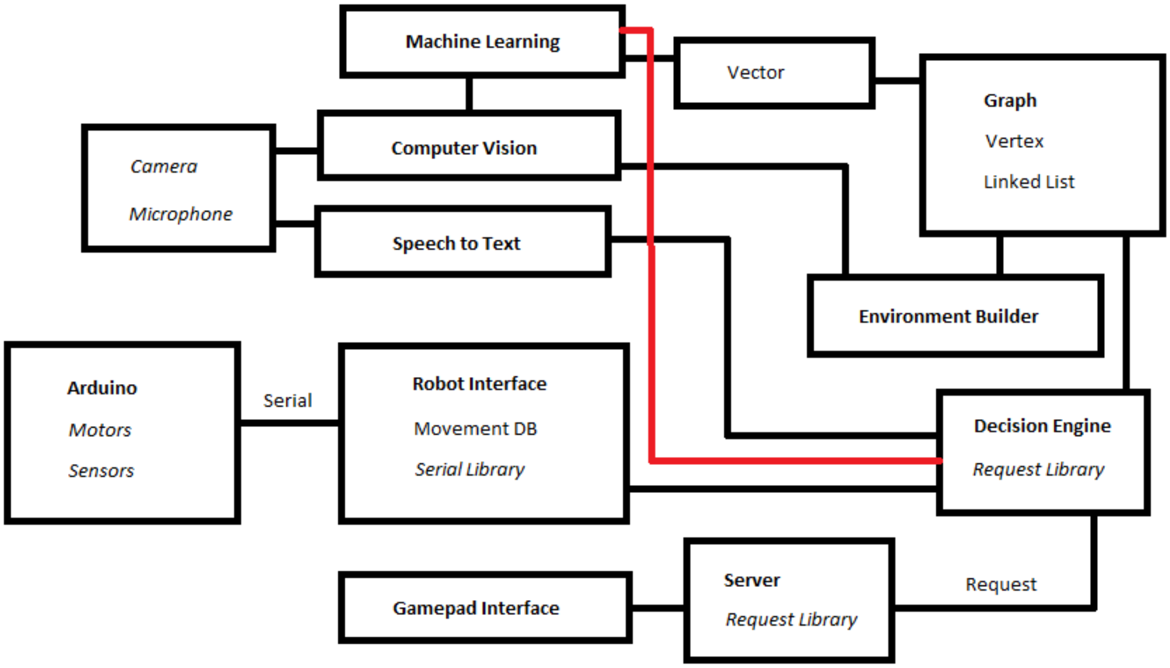
Robot



How to program the robot

The rectangle boxes are the devices that will have the programs stored on them. The large computer is just a regular computer, so you can program directly on that one. The small computer (raspberry pi) has its programs stored on the sd card. You can either ftp/scp program files over, or take out the sd card and copy the files from your computer to the device. The arduino's programs can be uploaded via serial.

System



Communications (during runtime)

The large computer is the server, so you are able to send commands from that computer to the small computer over an internet connection. For example, in the scenario the robot goes berserk and wants to take control of the world whilst enslaving humanity in the process, we can just switch to manual control and control the robot with the XBOX Controller.

** NOTE: The rest of this page is filler **

Dependencies (some of the libraries and hardware we will be using):

Operating System: Linux (whatever distros support the following libs):

1) OpenCV (python wrapper)
2) Either GSAPI or Sphinx
3) Arduino
    - SoftPWM
    - Pololu Gyro/Accel API
4) Flask
5) Python libs:
    - requests
    - serial
    - pygame
    - numpy
    - scipy
6) gstreamer (python wrapper)
7) libfreenect (python wrapper)

Kinect (camera + mic)
Pololu (gyro + compass + accel)
Ultrasonic sensor (possibly)

Project Personnel:

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