

Tool Check-Out Vending Machine

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System Design

Functional Requirements

- Maintain user and tool database
- Machine behavior dictated in part by databases
- Give admin access to view and modify databases through web GUI
- Vend products to user upon request
- Communicate machine info on LED display
- Maintain safe operations

Non-Functional Requirements

- LED lighting in machine
- Machine connects to building wireless internet

Detailed Design

Specifications

Input/Output

- Magnetic card reader
- Matrix keypad
- LED display
- Admin website

Hardware

- Raspberry Pi
- Powered USB Hub
- Wireless Network Adapter
- Magnetic Card Reader
- Matrix keypad
- LED display
- Power harness
- Vend motors/coils

Software

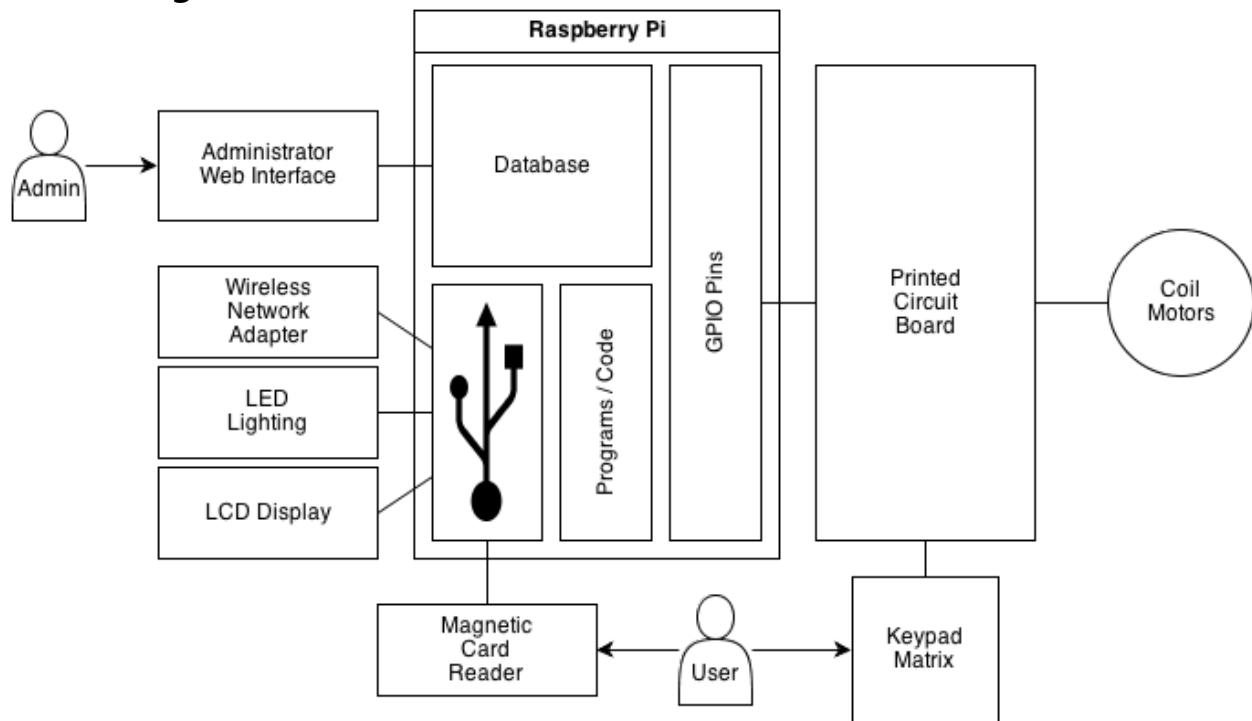
- Python scripting
- Admin website
- MySQL database

Simulation

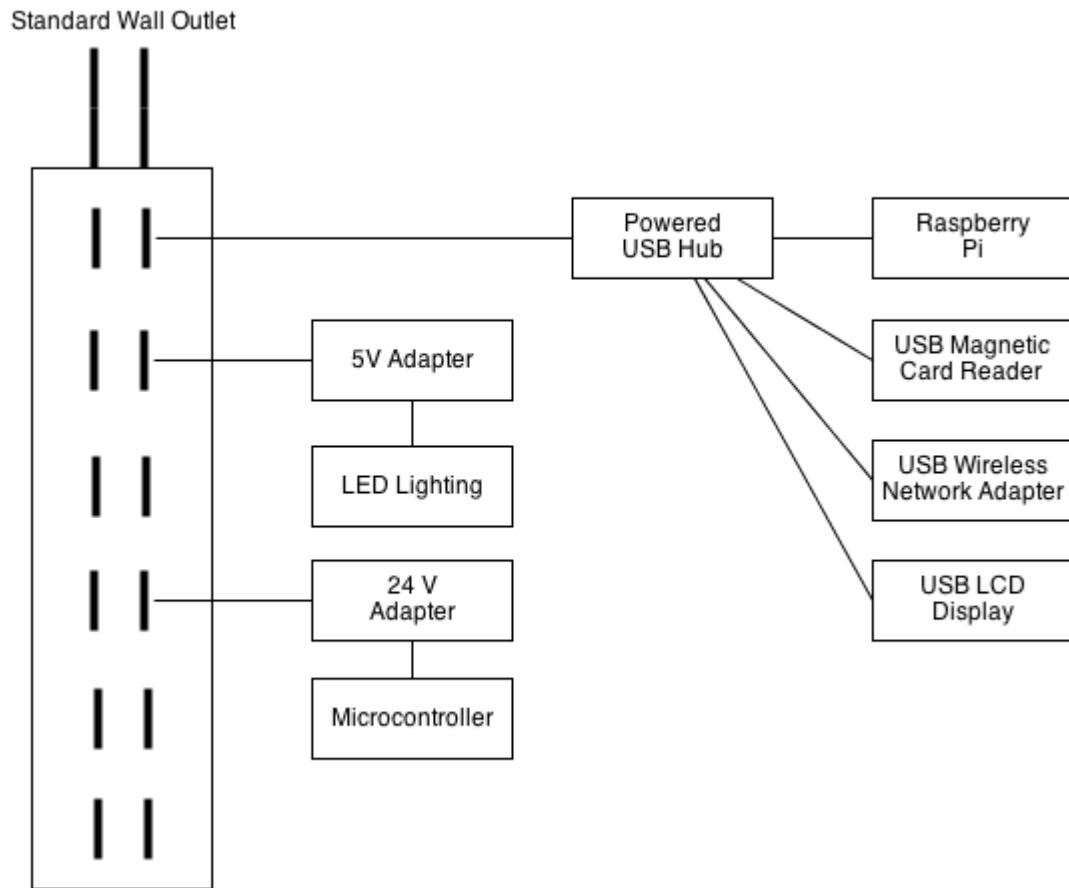
- Testing and design of magnetic card reader, matrix keypad, and LED display drivers using local access to Raspberry Pi
- Verify logic using admin website to track tool count and user accounts
- Voltage supply and multi-meter readings to test mechanical components

Design Documents

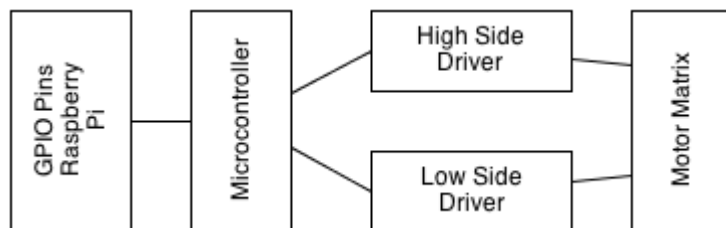
Block Diagram



Power Diagram



PCB Layout



Software

- Admin website – user account

CprE Tool Vending - Database
Machine

Add Student ID:

Remove Student ID:

Search By ID:

User: 533931398		
Tool	Date Taken	2
screws	11/04/2013	<input type="button" value="Check In"/>
breadboard	11/04/2013	<input type="button" value="Check In"/>
		<input type="button" value="Check In"/>
		<input type="button" value="Check In"/>
		<input type="button" value="Check in"/>

- Admin website – machine status

CprE Tool Vending - Machine
Database

Position: Product: Inventory:

Position: Inventory:

Position	Product	Full	Left
A1	screwdriver	5	5
A2	breadboard	5	5
A3	pliers	5	5
A4	wire cutters	5	5
B1	screws	10	10
B2	resistors	10	10
B3	diodes	10	10
B4	capacitors	10	10