ECS Design Project #3

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Engineering Design Process

1. Identify the problem
2. Define or “refine” the problem
3. Gather information
4. Develop alternate solutions
5. Select and refine the best solution
6. Express the design solution
7. Build a model or prototype
8. Evaluate, revise, and refine
9. Communicate the solution
10. Build & Test

1. Identify the problem

- Build a computer-controlled Nerf gun that shoots anyone that doesn't have an approved RFID tag.

2. Define or "refine" the problem

- Short-range ID Scanner will verify approved ID cards
- If verified, given 10 second period to pass
- Otherwise, if someone passes, they get shot.

3. Gather information

- Microcontrollers
  - Arduino
  - TI Launchpad (MSP430)
- Missile Launcher
  - ThinkGeek USB Missile Launcher
  - Modify electronic Nerf gun
- RFID Reader/Tags
  - Order from online hobby stores (expensive)
  - Order from chinese Ebay seller (cheaper, long shipping)
- Motion Sensor
  - PIR Motion Sensor

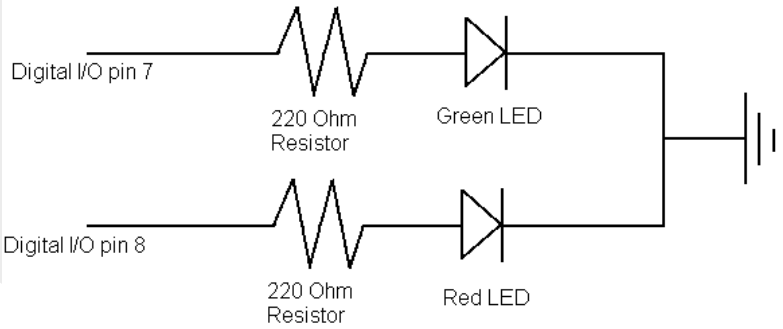
4. Develop alternate solutions

1. Arduino + USB Rocket Launcher
2. TI Launchpad (MSP430) + Nerf
3. Arduino + NFC technology + Nerf

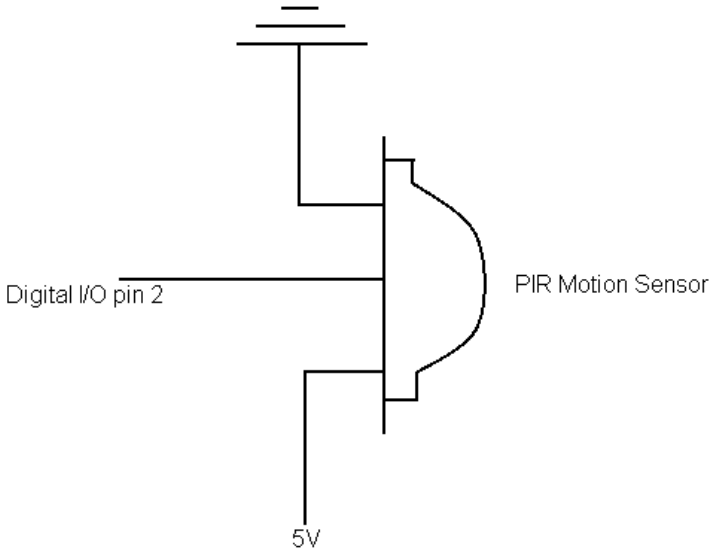
5. Select and refine the best solution

- Selected design #1
  - Simplest to implement
  - Abundance of community support from Arduino
  - USB Rocket Launcher Arduino library already existed

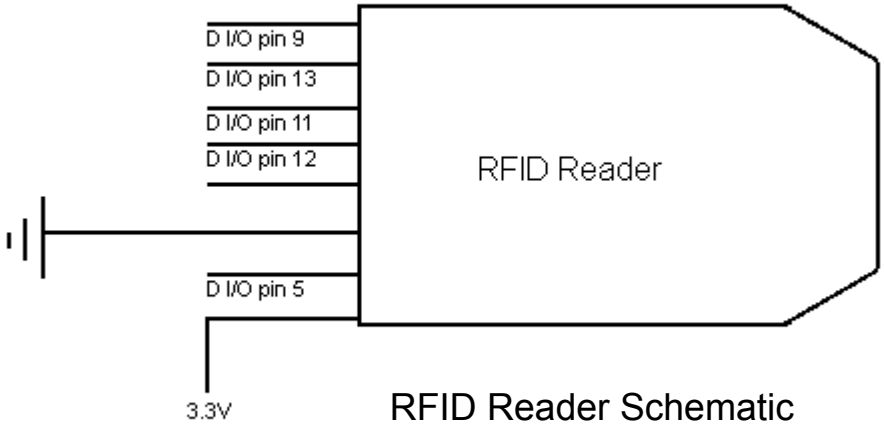
6. Express the design solution



LED Schematic

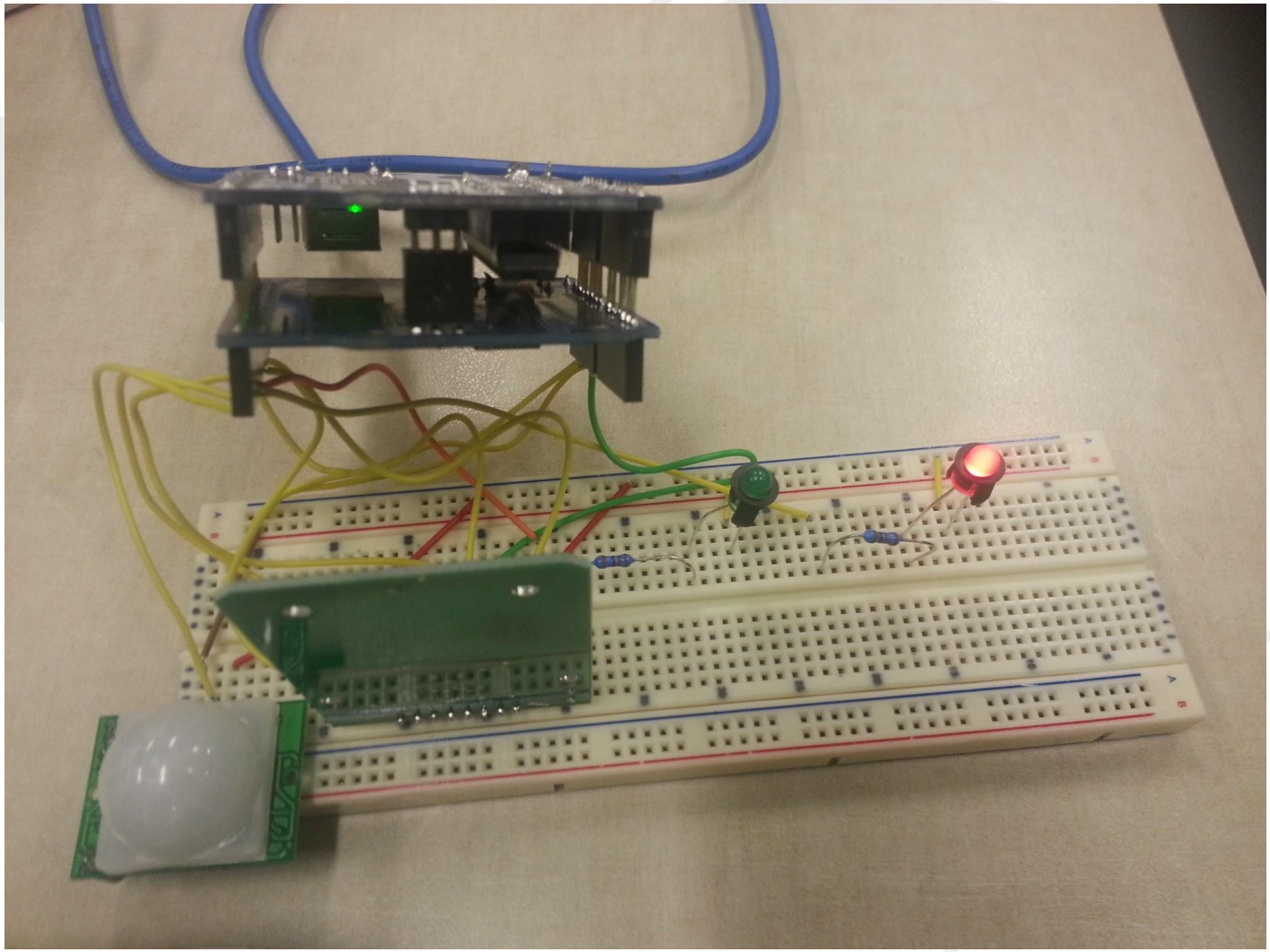


Motion Sensor Schematic



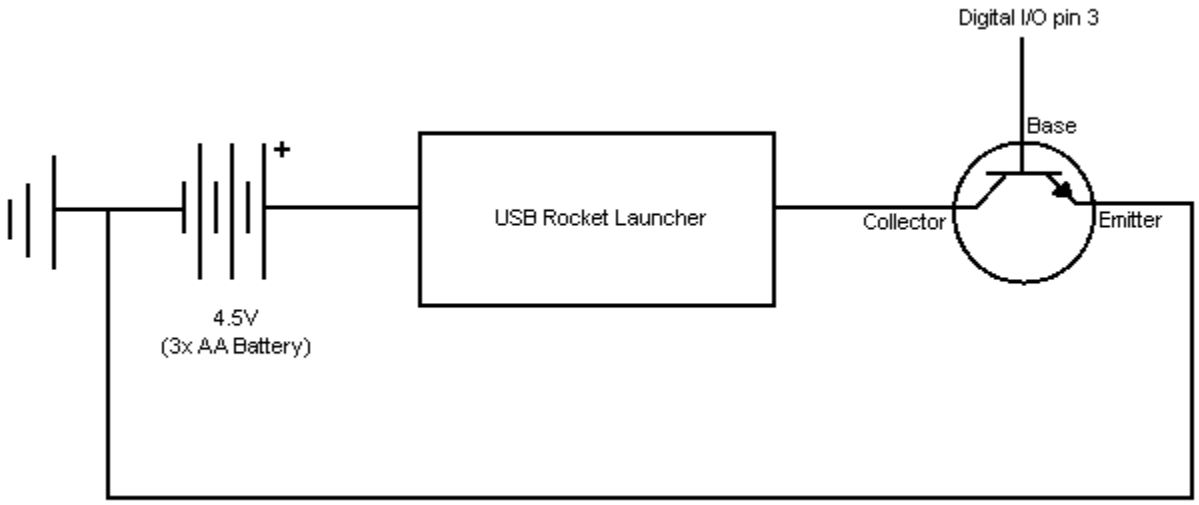
RFID Reader Schematic

7. Build a model or prototype



8. Evaluate, revise, and refine

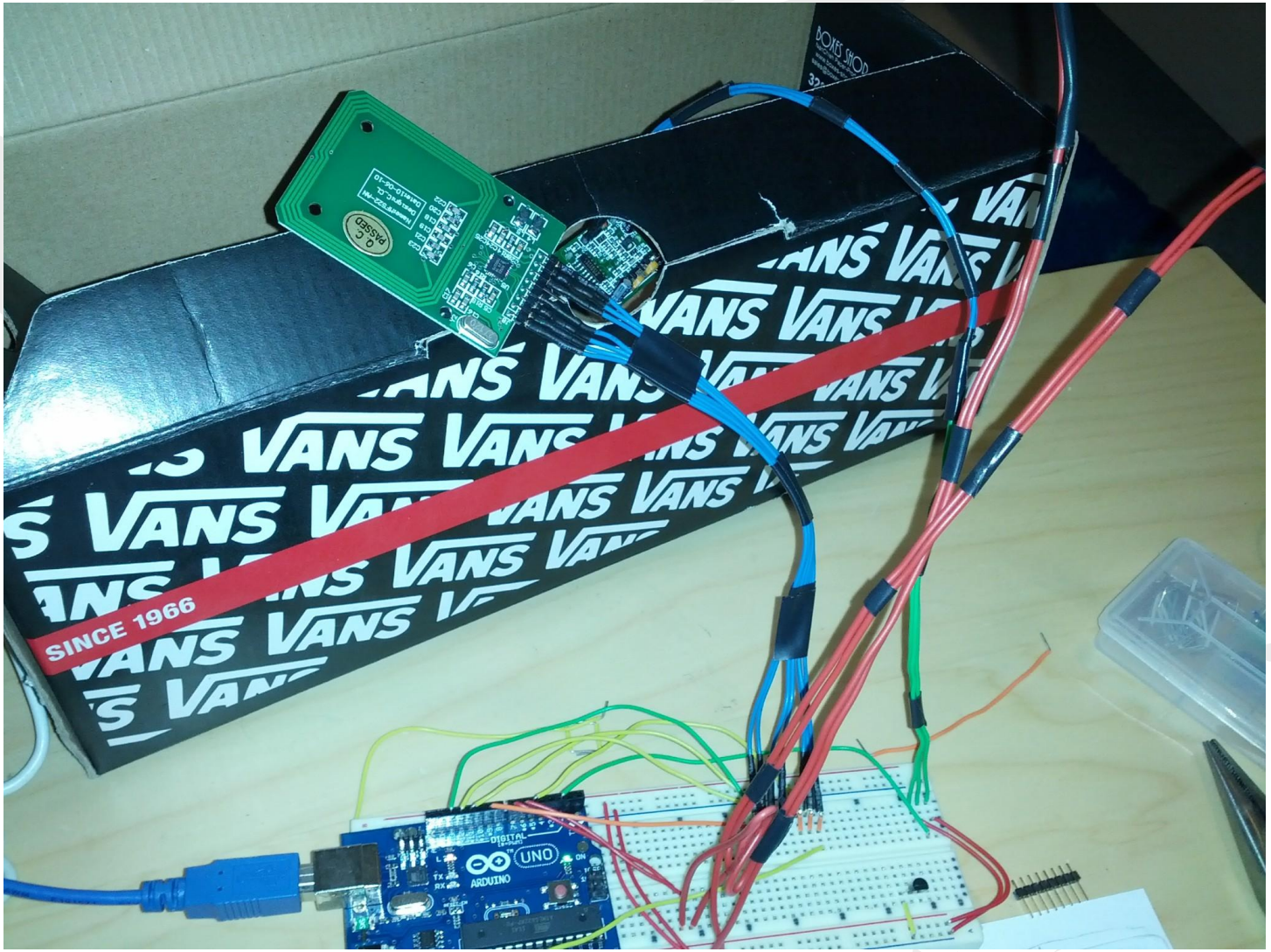
- Unable to get Arduino library for USB Rocket Launcher working
- Decided to physically hook up to motors inside the launcher



9. Communicate the solution

- Wrote extensive documentation
- Created presentation

10. Build & Test



10. Build & Test