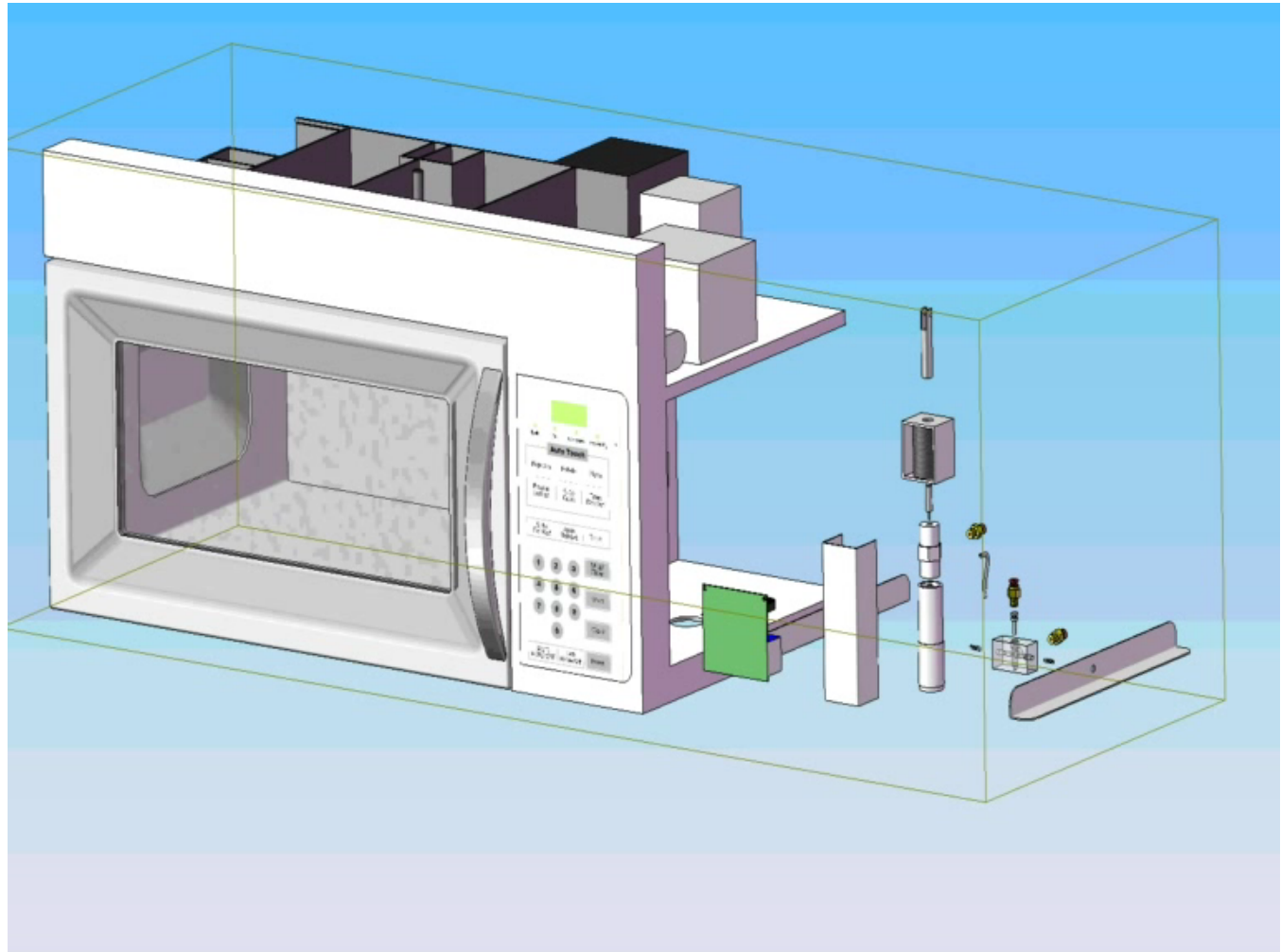# Fire Safe Microwave

Red Team Final Presentation

December 8, 2008

Fire Safe Microwave

Overview

- Background
- Microwave Features
- Technical Components
- Business Model
- Summary

Unsafe Microwaves

Fatal fire sparked by foil in microwave

by The Associated Press

Friday October 10, 2008, 7:09 AM

PHILADELPHIA -- Fire officials said an elderly blind woman killed in a West Philadelphia apartment fire started the blaze by putting aluminum foil in a microwave oven.

Officials said Nicole Swaayze, 8[...] unit in the Katie B. Jackson Ap[...]

Golden Gate Estates microwave fire leaves $50,000 in damage

By RYAN MILLS (Contact)
6:28 p.m., Tuesday, September 23, 2008

NAPLES — A microwave fire caused about $50,000 in damage this afternoon in Golden [...]

[...]ll of fire at 170 16th St. S.E. at 3:55 p.m., [...]. They arrived about five minutes later and

Holiday jet downed by mid-air microwave fire

28/08/2008

A plane packed with British holidaymakers made an emergency landing after a microwave caught fire.

Passengers on Thomso[...]

Prairie school evacuated due to microwave fire

By Jodi Heckel   ✉ E-mail Story   🖶 Printer-friendly
Thursday, April 17, 2008 11:39 AM CDT

URBANA – Prairie Elementary School was evacuated for a short time this morning after a microwave caught fire in the teachers' lounge there.

Microwave Features

Detects spark and/or fire

1. Alerts user of danger
2. Shuts down microwave
3. Extinguishes flame with CO_2
4. Notifies user when unsafe to open door
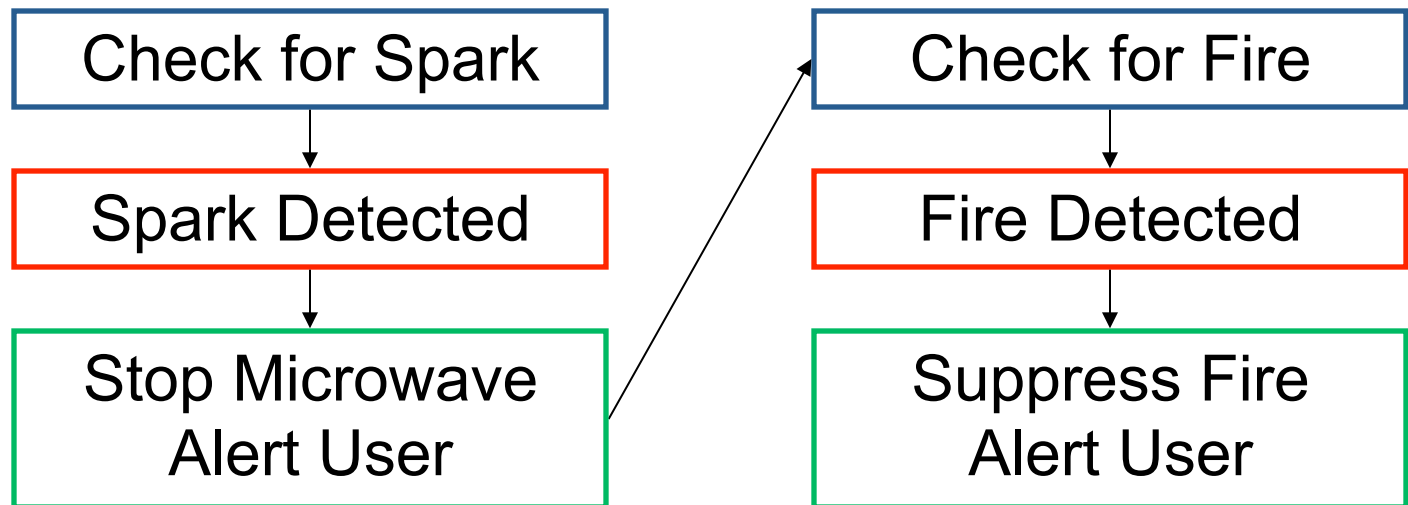5. Indicates when CO_2 cartridge needs to be replaced
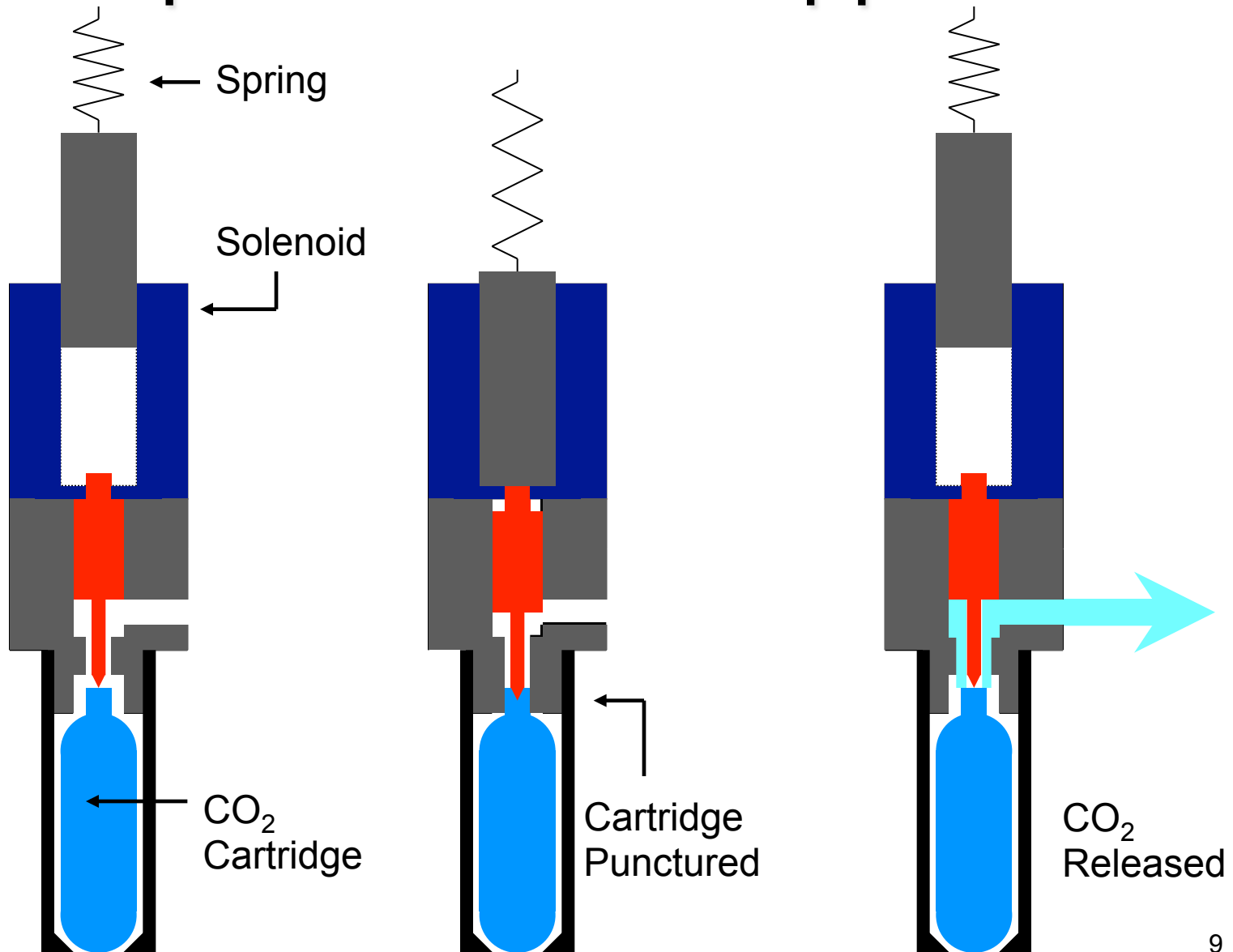
Product Demonstration

Product Demonstration

Component- Circuitry

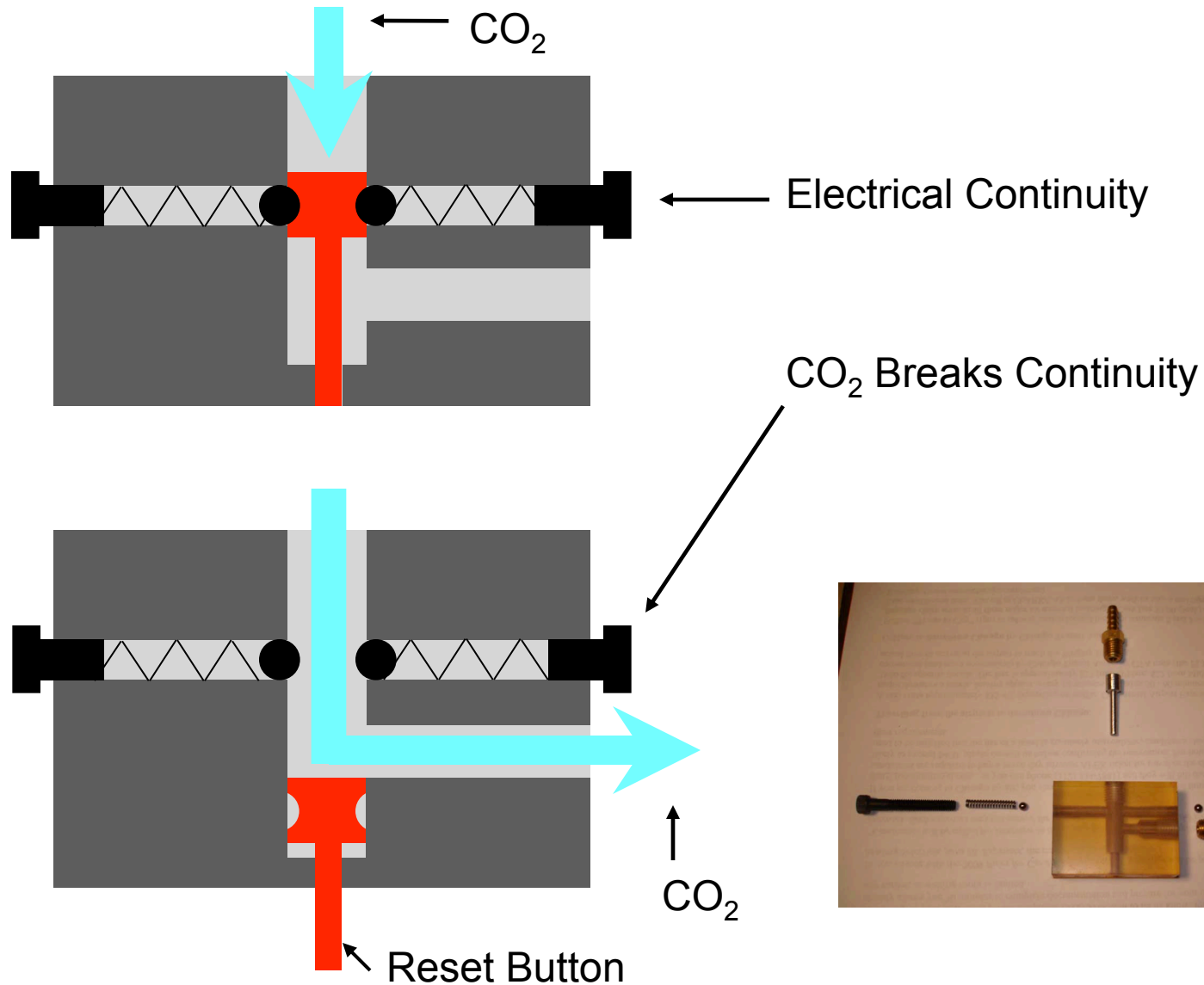## Digital control system with photodiode sensing

Check for Spark		Check for Fire
↓		↓
Spark Detected		Fire Detected
↓		↓
Stop Microwave Alert User		Suppress Fire Alert User

Component- Fire Suppression

Spring

Solenoid

CO_2 Cartridge

Cartridge Punctured

CO_2 Released

Component- CO$_2$ Flow Switch

CO$_2$

Electrical Continuity

CO$_2$ Breaks Continuity
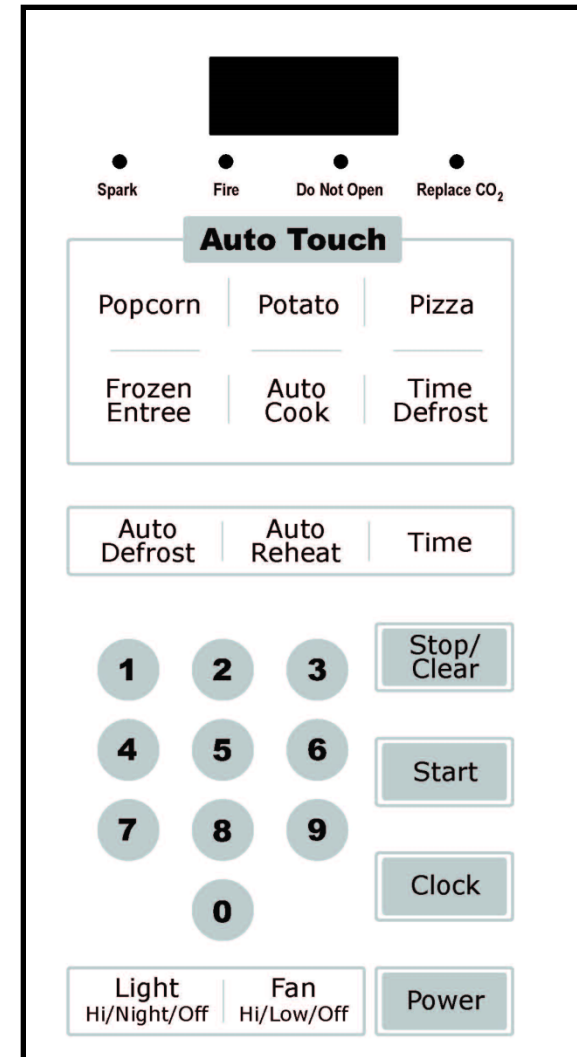
CO$_2$

Reset Button

Testing- Schlieren Flow Visualization for CO_2 Nozzle

Testing- Schlieren Flow Visualization for CO_2 Nozzle
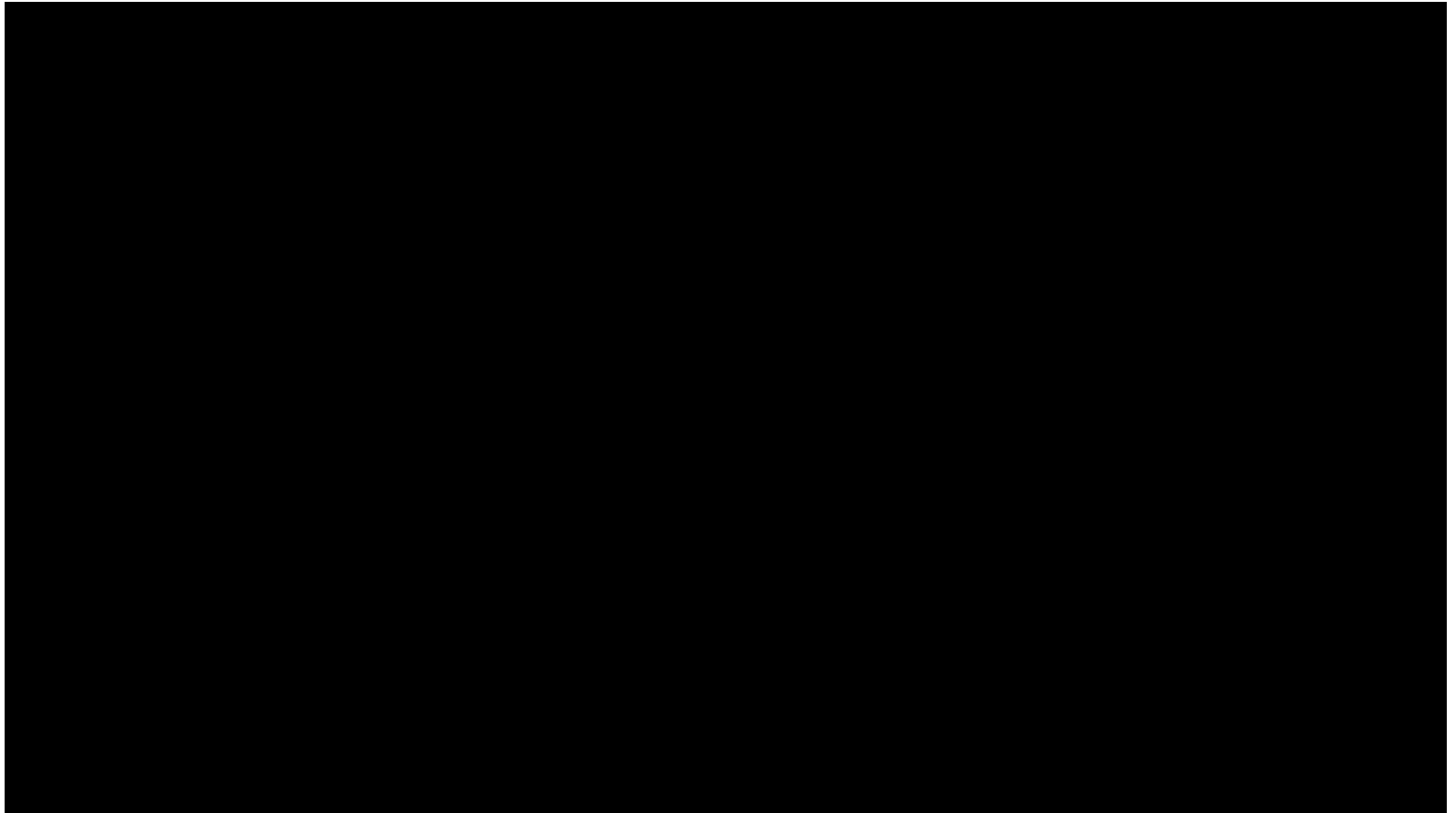
Component- User Interface

- 3 surveys with over 300 responses
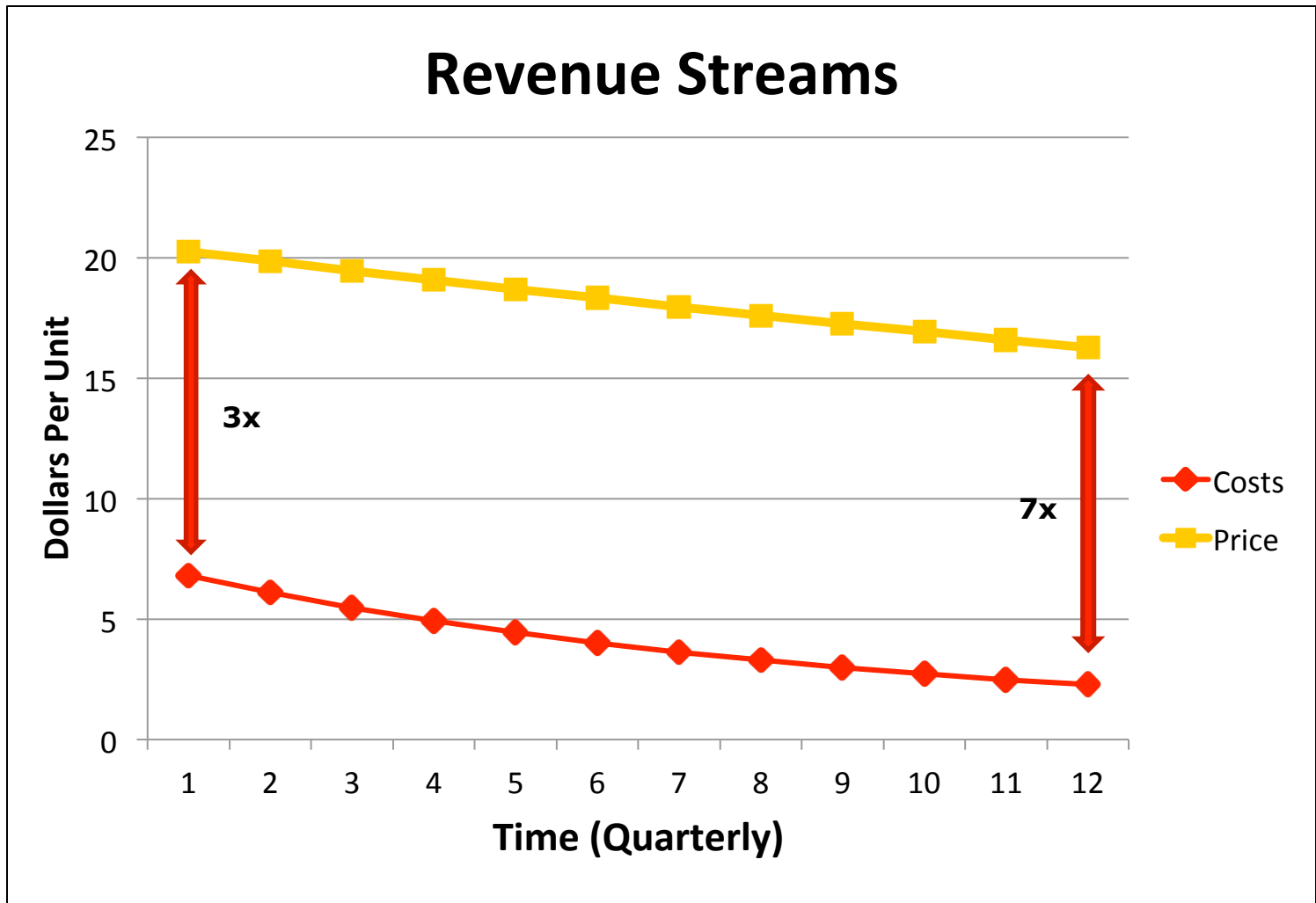
- Final design
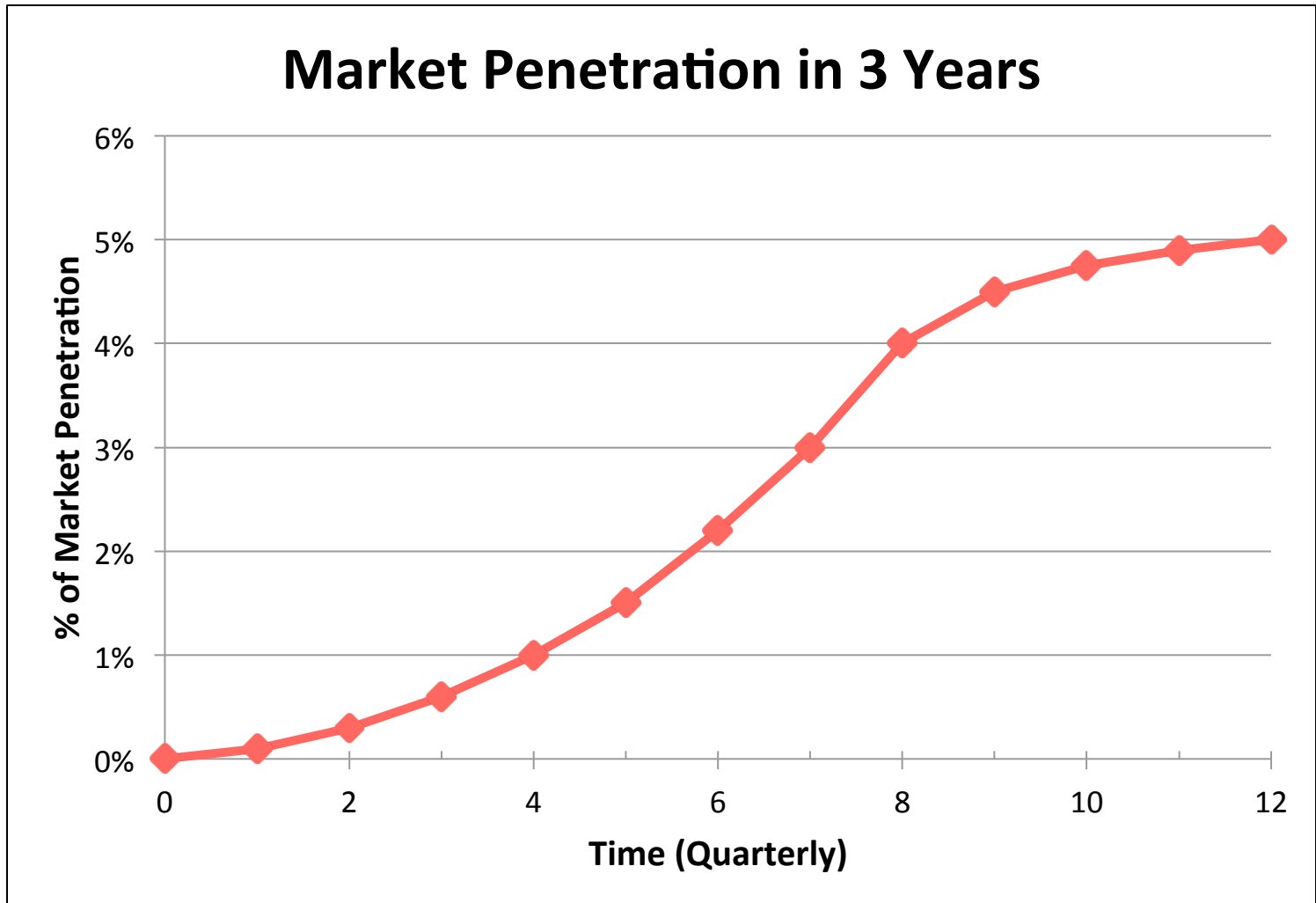 - LED Light System
  - Auditory Alarm

Business Model

Market Fire Safe Technology to OEM through product license

Version	Survey: Price People Will Pay	Manufacturing Cost to Add Feature	Expected Profit
Standard	$17	$2.30	$14.70
Deluxe	$30	$16.20	$13.80

Price and Cost

Revenue Streams

Market Penetration

Market Penetration in 3 Years

Expected Revenue
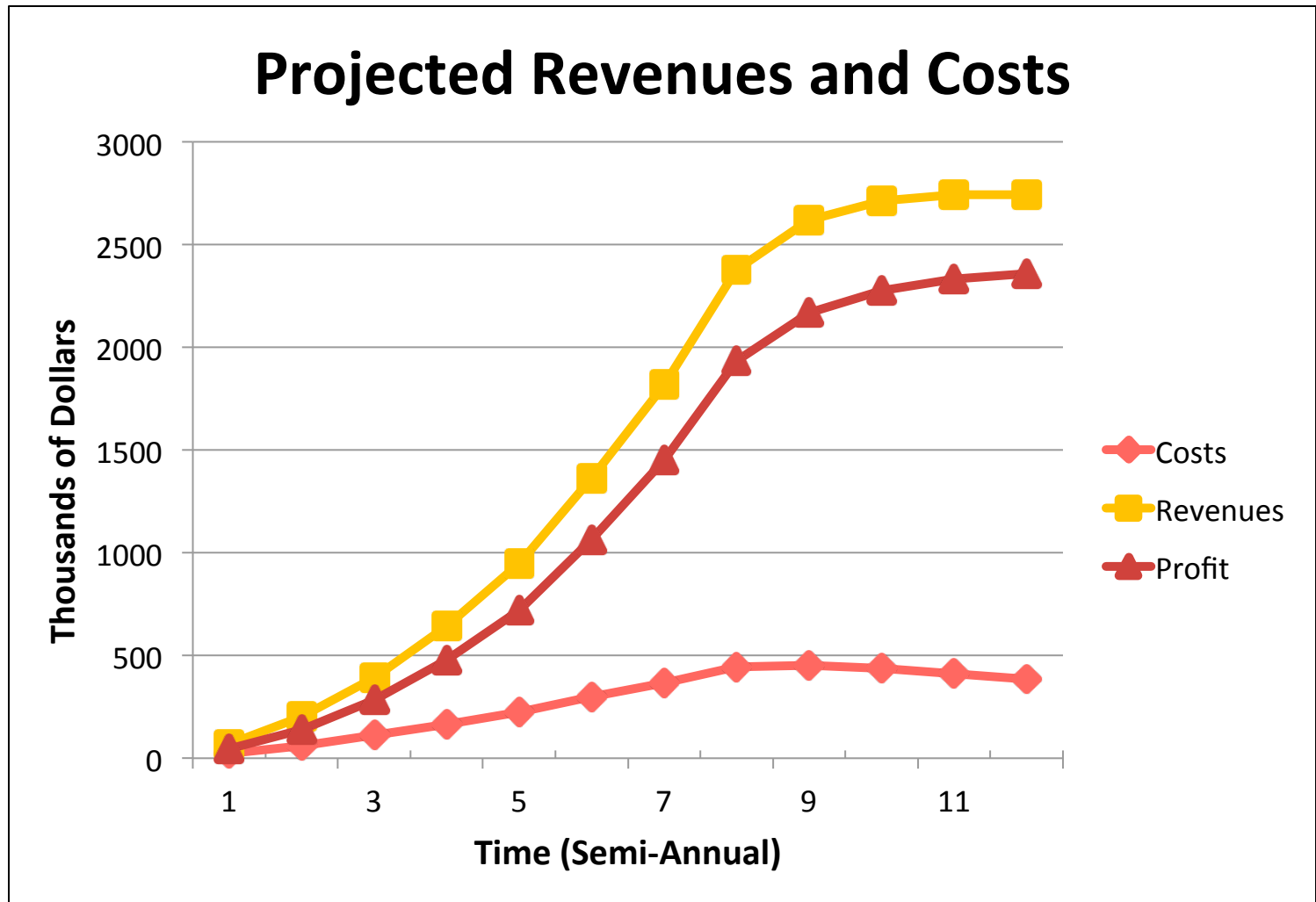

Projected Revenues and Costs
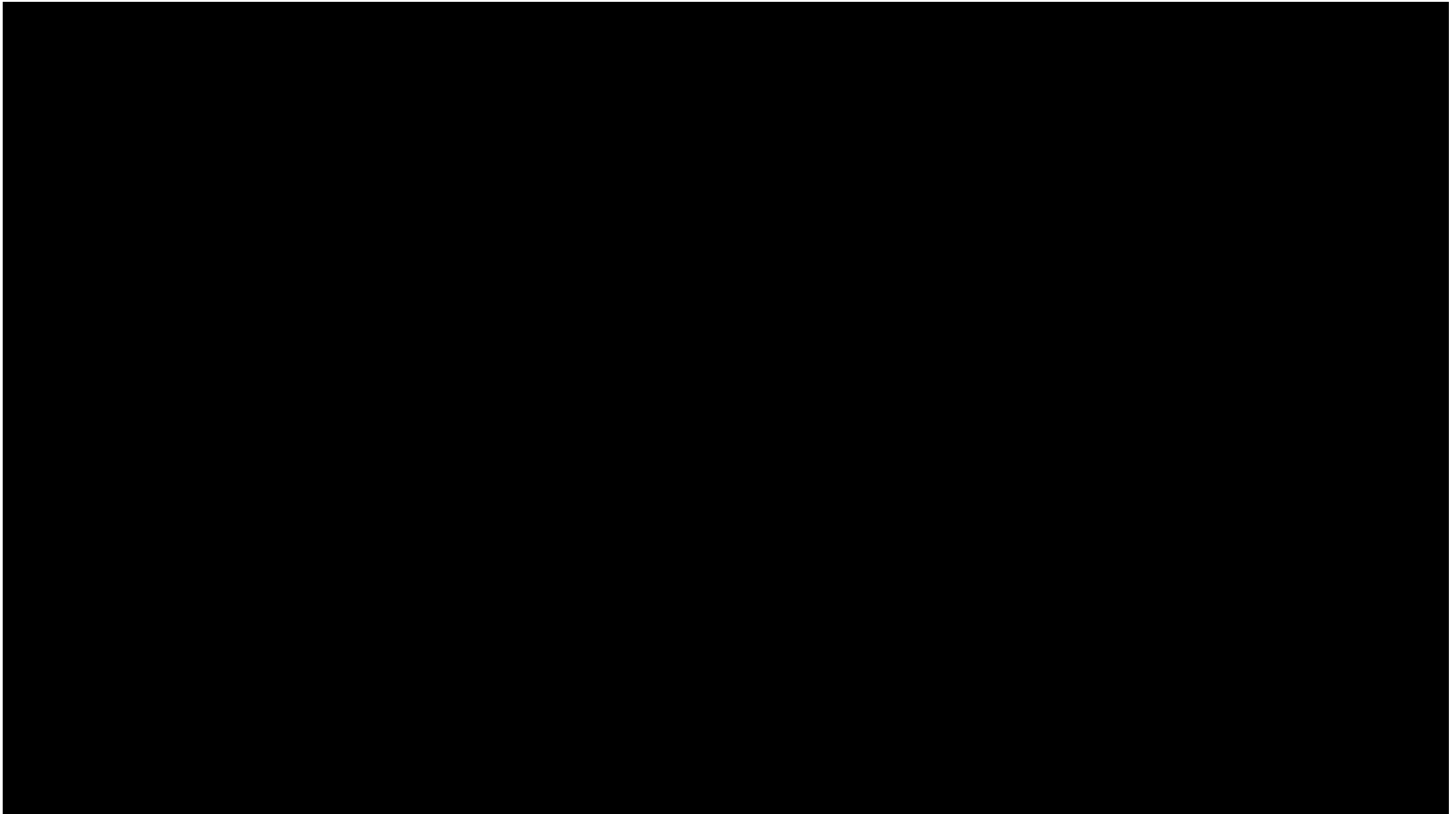
Fire Demonstration

Fire Demonstration

Acknowledgments

- Professor David Wallace
- Instructors: Kim Vandiver, Matt Duplessie
- Mentors: Anna Shih, Jon Evans, Pamela Siska
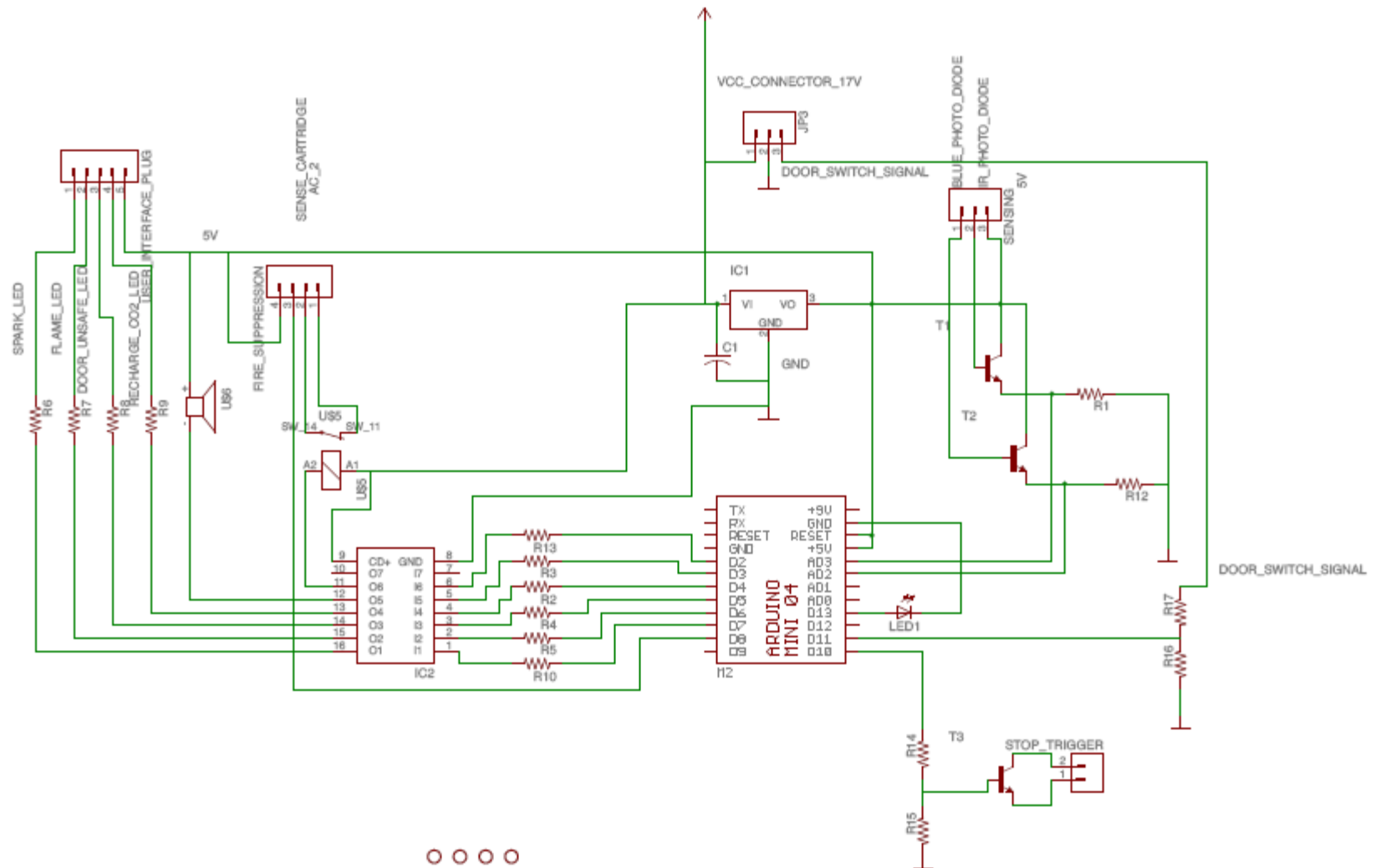- Papallardo Staff
- 2.009 Instructors, TAs, Mentors, Staff, Maureen Lynch
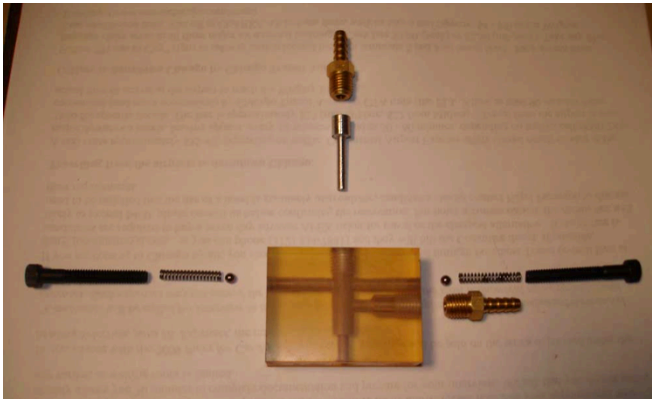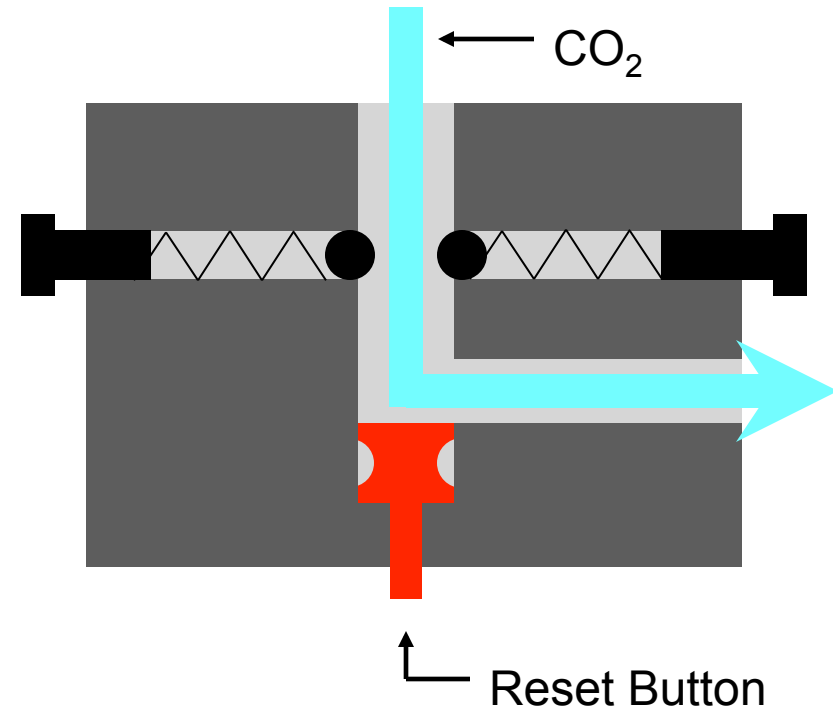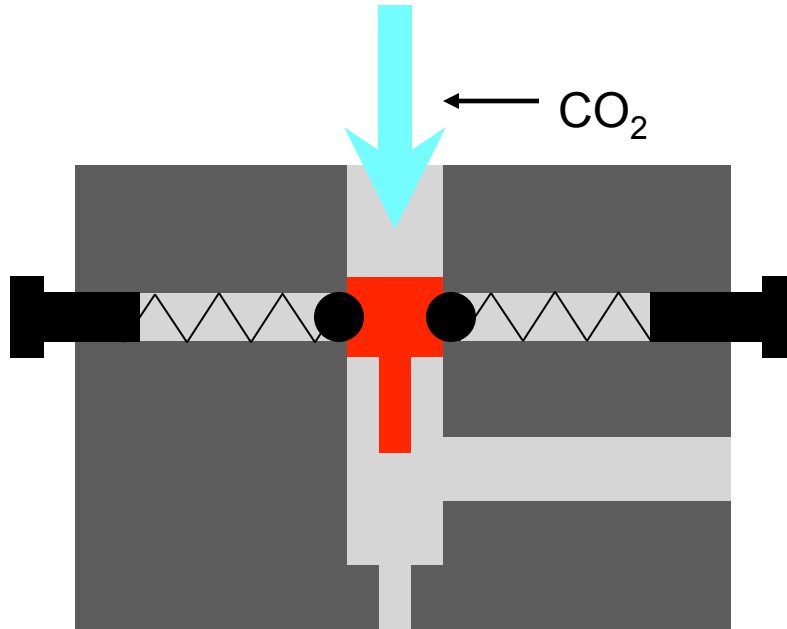
Questions or Comments?

Back Up Slides

Circuit Diagram

Component- CO$_2$ Flow Switch

CO$_2$

CO$_2$

Reset Button

Materials Costs Breakdown, Standard

Legend:
- Blue PD
- IR PD
- Other Materials
- Microprocessor
- Various Electronics

26%, 13%, 52%, 5%, 4%
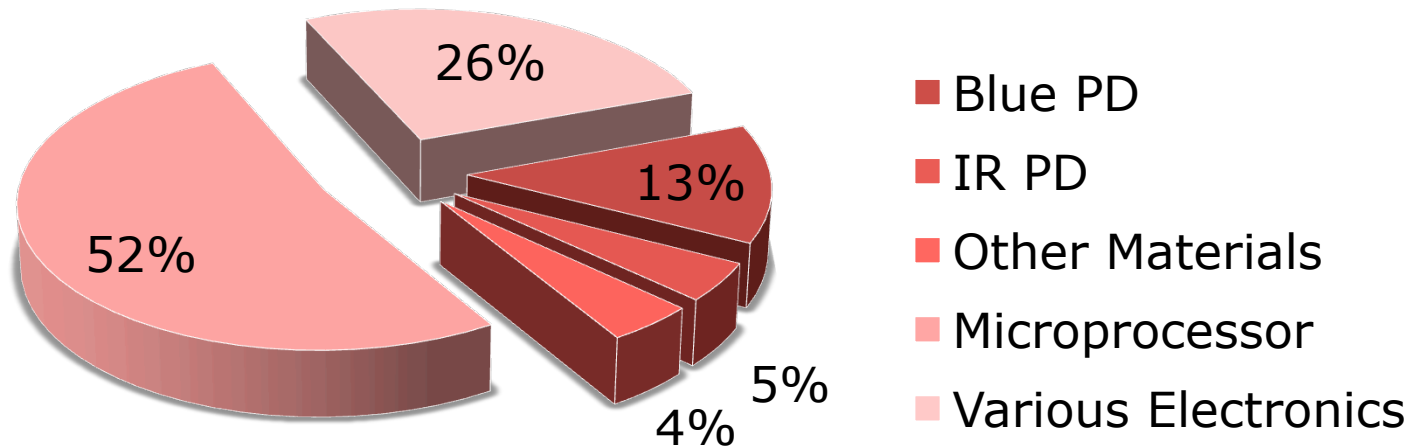
Materials Costs Breakdown, Deluxe

Legend:
- Blue Photodiode
- IR Photodiode
- Other Materials
- Microprocessor
- Various Electronics: Resistors etc
- Cartridge Holder
- Cartridge Assembly
- Tubing
- Solenoid
- CO2 Canister
- CO2 Switch
- nozzle
- Puncture Pin
- Bracket