Room Occupancy Final Product

ENG EK 210 Intro to Design

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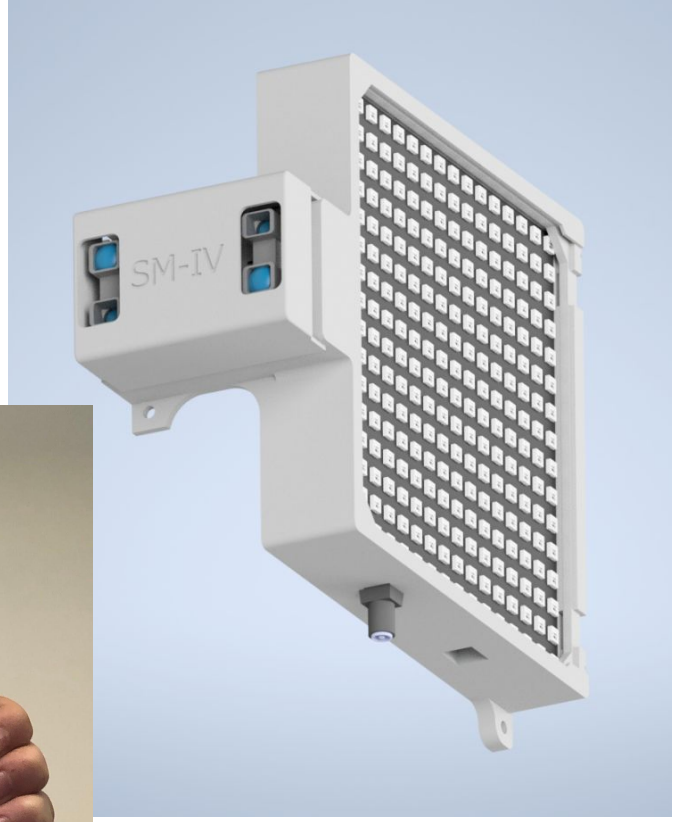
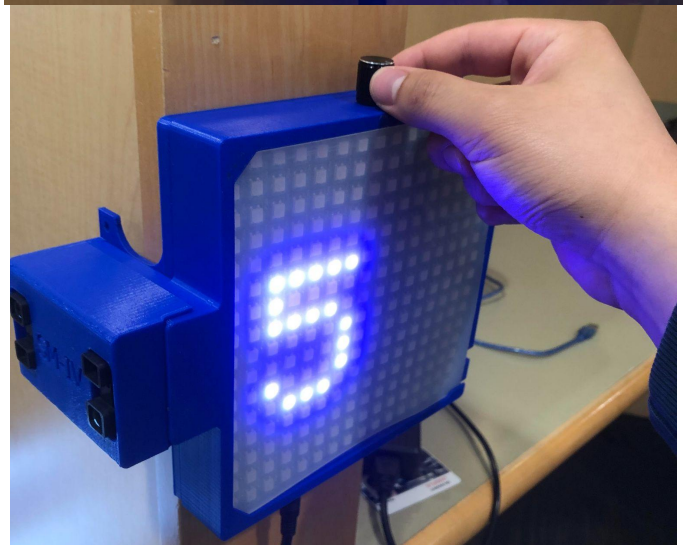
Overview

- Record, store, display room occupancy
- Design:
  - 3D Print Enclosure
  - IR Distance Sensors
  - 16x16 LED Display
  - Encoder
  - Refractive sheet

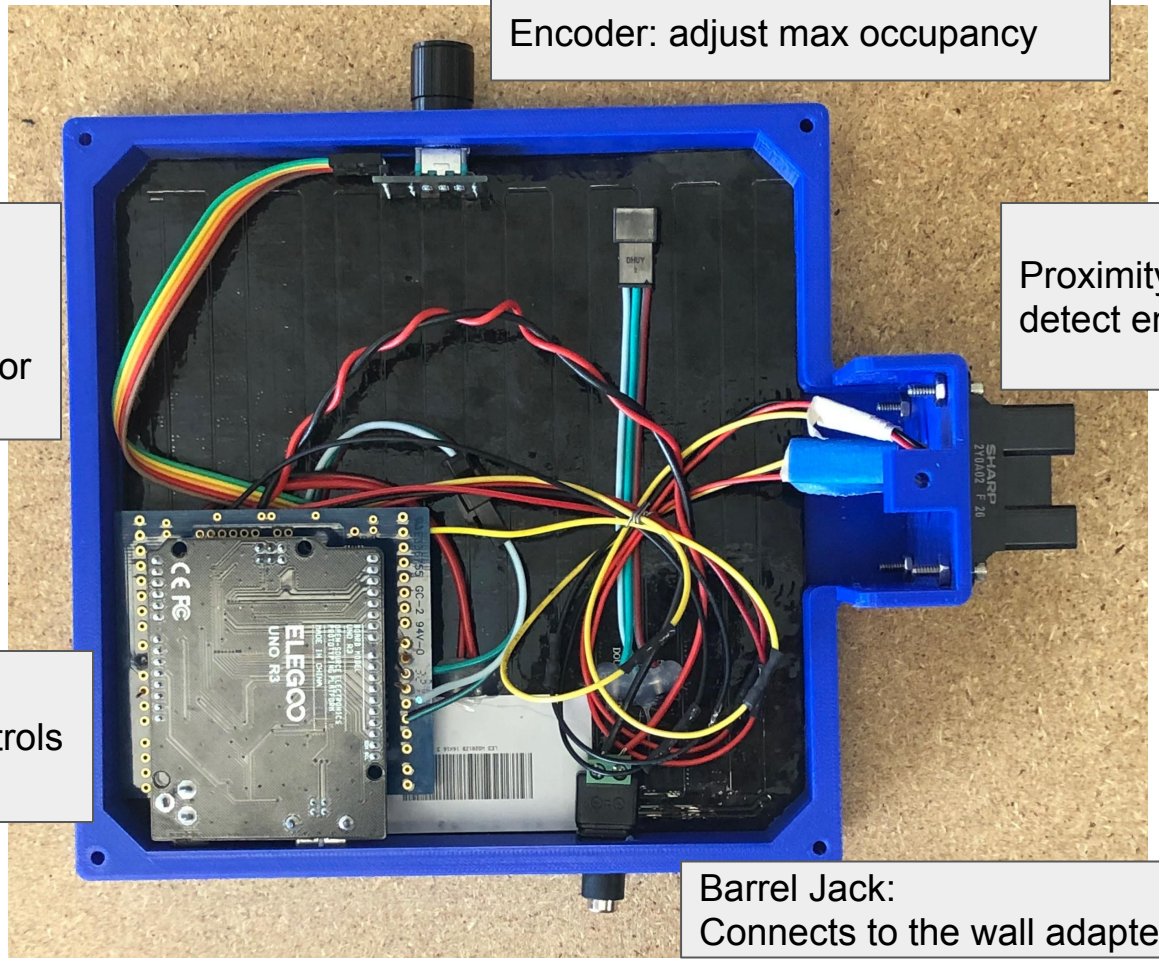


Usability

- Easy setup
  - Auto range-find
  - Simple mounting
  - No technical understanding required
- Intuitive interface
  - Single-point control
  - Intuitive color scheme
- Adaptable
  - Fits most doors; spacers supported
  - 150cm for wide doors
  - Arduino-access port



Key Parts of Product



Encoder: adjust max occupancy

LED Matrix:
display room occupancy/max occupancy with color code

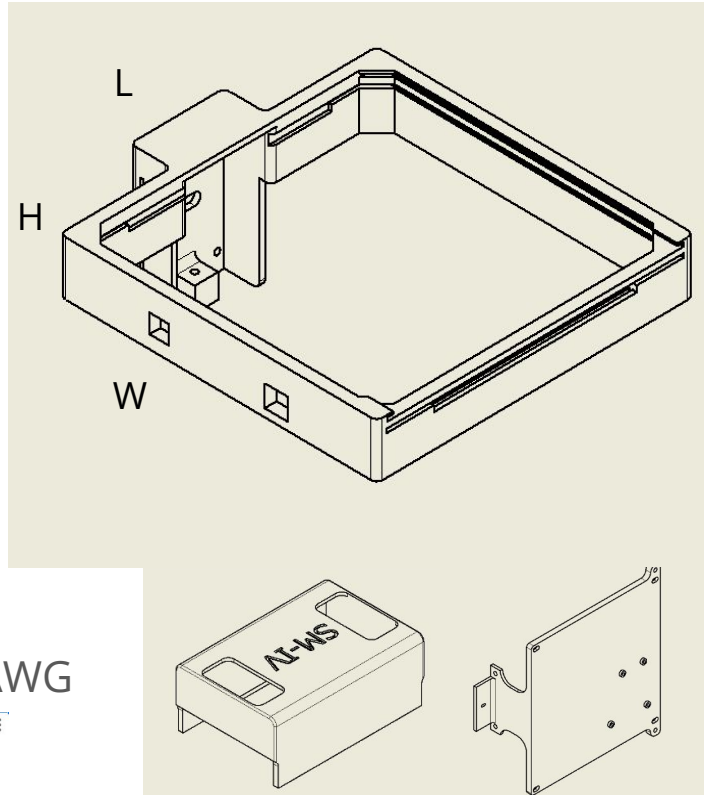
Proximity Sensors:
detect enter/exit

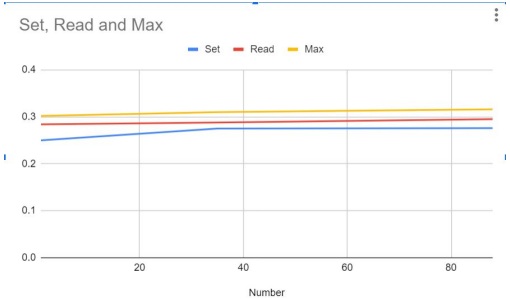
Elegoo Uno R3:
Cheaper arduino, controls the whole system.

Barrel Jack:
Connects to the wall adapter

Basic Product Specifications

- Dimensions
  - LxWxH 6.75 in x 7.625 in x 3.25 in
  - Protrusion into door frame: 1.725 - 1.844 in
  - Maximum range: 59 in.
- Power
  - 5V 1A min.
  - 1.4W operating power
  - Stock current 316 mA
  - Maximum current draw 6A (Theoretical; 22 AWG can handle 7A)
- Weight
  - 263g (0.58lbs)





Detailed Product Specifications

- Repeatability
  - Reasonable assembly time
  - Cheaper parts available
- Durability
  - Bolted
  - Lightweight box
  - 1.5m drop test x3 passed
- Lifespan
  - Sensors are resilient and long lasting
  - Device works as long as it is plugged in

Reliability

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%
LTPD : 20 or 30

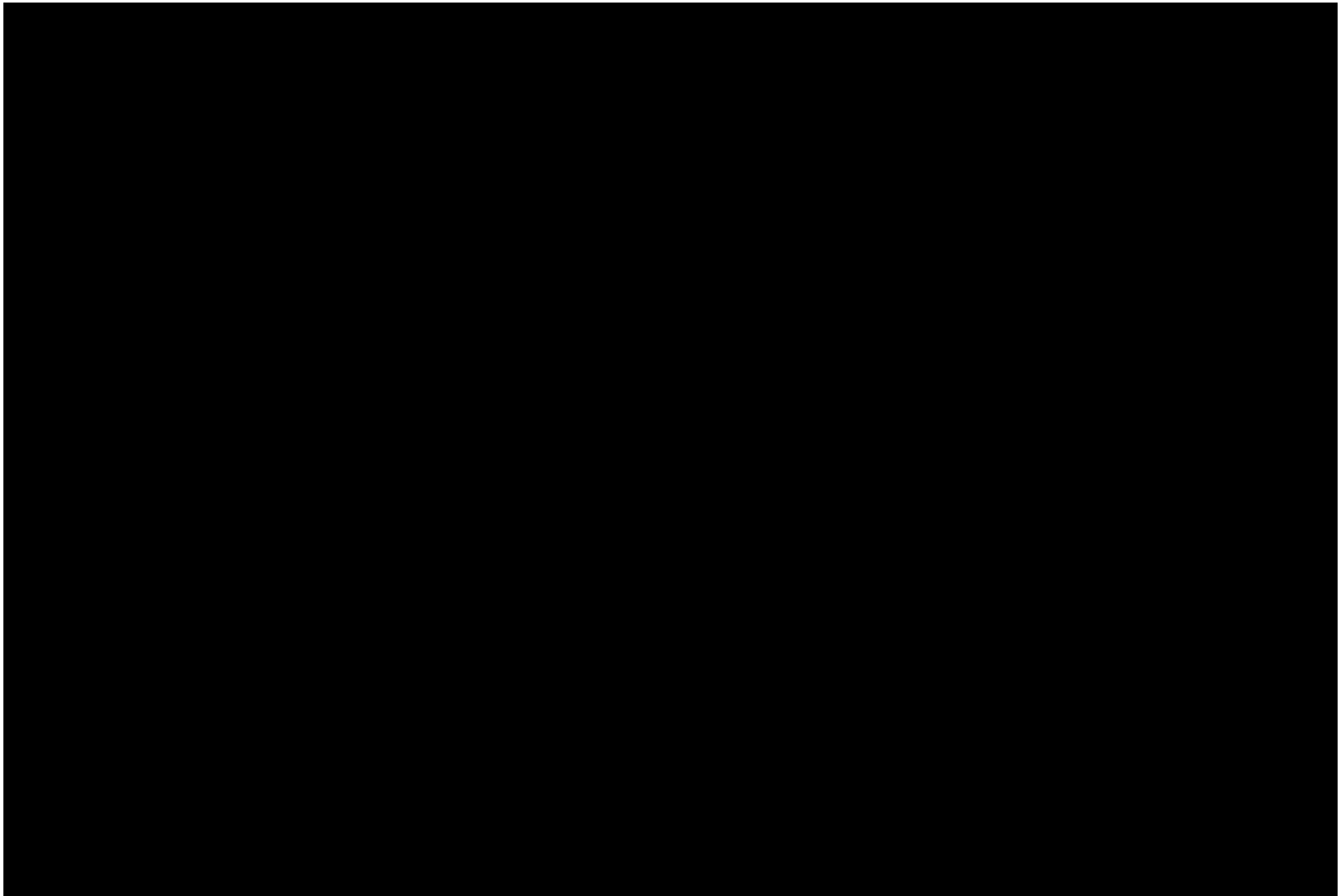
No.	Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) / Defective (c)
1	Temperature cycling	1 cycle -40℃ to +70℃ (30min.) (30min.) 25 cycle test	Initial × 0.8 > Vo Vo > Initial × 1.2	n=11, c=0
2	High temp. and high humidity storage	+40℃, 90%RH, 500h		n=11, c=0
3	High temp. storage	+70℃, 500h		n=11, c=0
4	Low temp. storage	-40℃, 500h		n=11, c=0
5	Operation life (High temp.)	+60℃, Vcc=5V, 500h		n=11, c=0
6	Mechanical shock	1000m/s^2, 6.0ms 3times/±X, ±Y, ±Z direction	(Note 1)	n=8, c=0
7	Variable frequency vibration	10 to 55 to 10Hz/1min. 2h/X, Y, Z direction overall amplitude : 1.5mm		n=8, c=0

(Note 1) Test conditions are according to 3-3 Electro-optical characteristics.

(Note 2) After test, measurement shall be carried out after leaving under the normal temperature and the normal humidity for two hours. But no dew point.

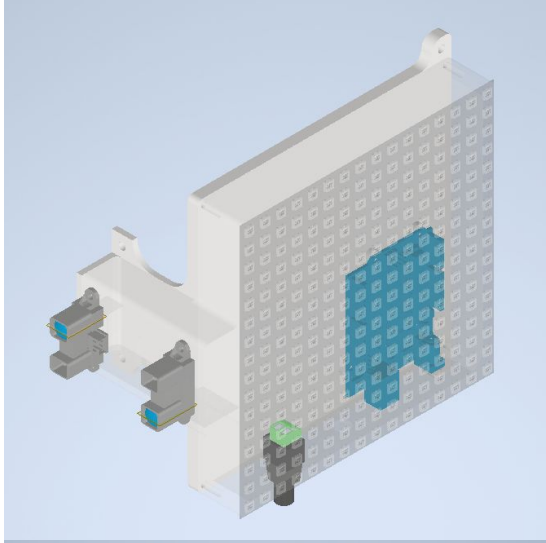
Video

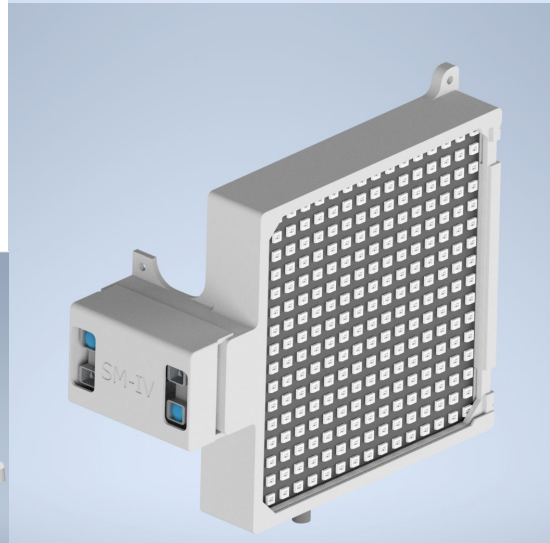
Link

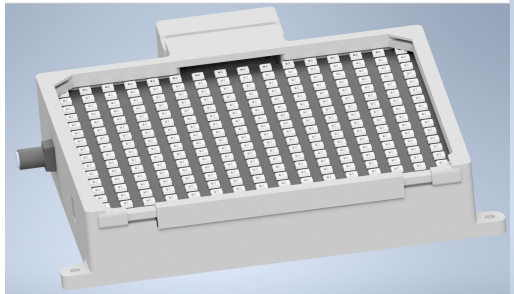


Hardware Improvements Over SM-III

- Thicker walls
- Improved assembly time
- Slots for LED screen+protector
- Sensor cover







Software/Interface Improvements Over SM-III

- User Interface
  - Encoder
  - Over-occupancy counter
- Software
  - Auto-range-find
  - Encoder-adjusted occupancy
  - Increased loop efficiency

Thank You