Knight Light

Senior Design 2022, Team 12

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Problem

Background:

The recent COVID-19 pandemic has spurred conversation about ways to protect public health. This project aims to develop a way to prevent the spread of common diseases through commonly touched surfaces and to facilitate Christlike community through increased health and wellness of individuals.

Goal:

We, as engineers, sought to improve the health and safety of the public by minimizing pathogenic transmission via high-contact surfaces. Our team selected doorhandles as the main focus of sanitization, seeing as they are highly contacted.

SolidWorks Rendering of the Knight Light

Solution

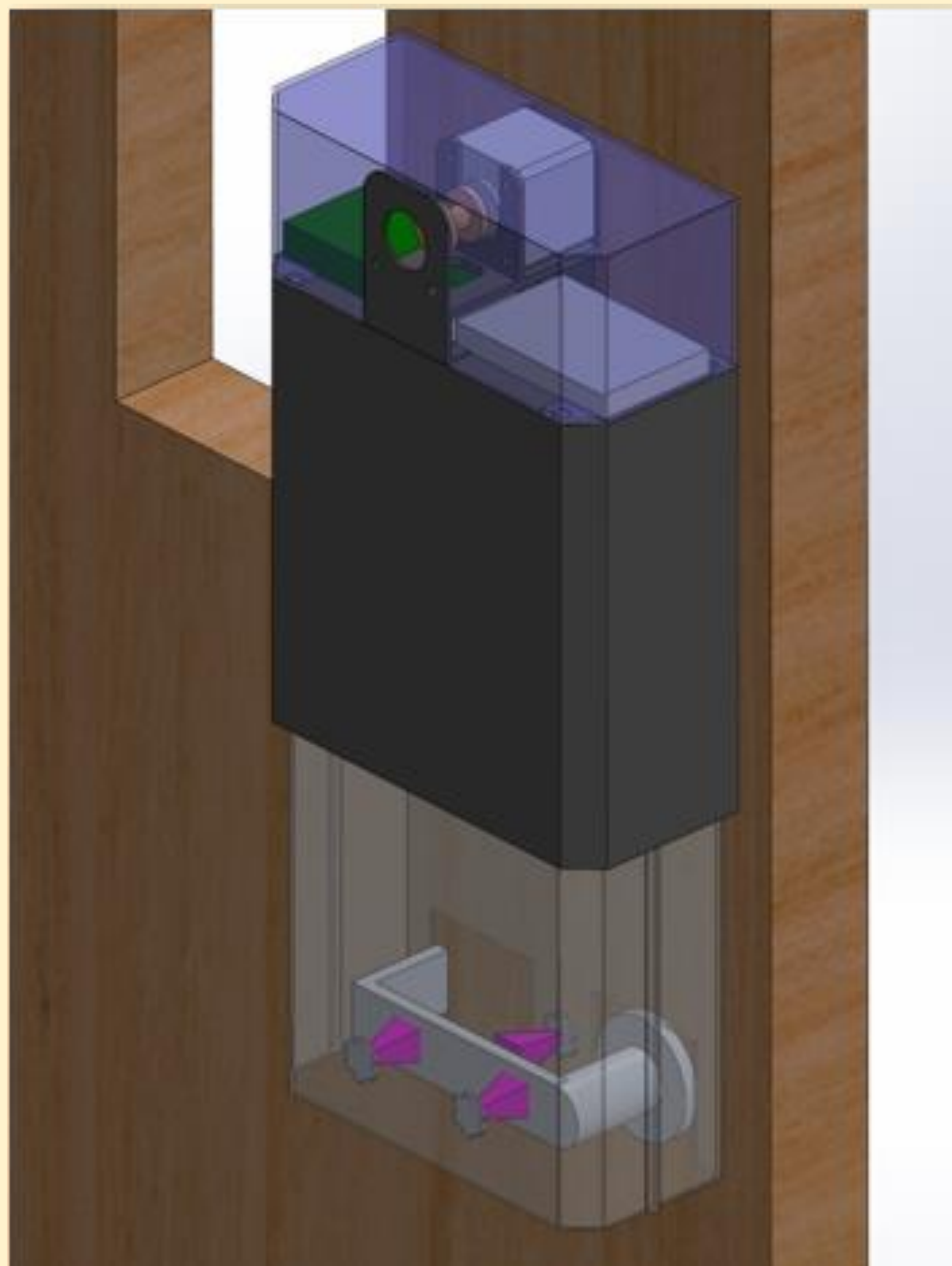A doorhandle sanitizing device, named "The Knight Light".

Components:

- Arduino UNO
- PIR Motion Sensor
- Status LEDs (indicate cleanliness status)
- NEMA 17 Stepper motor
- 3 Sanitizing UV LEDs

Design Requirements:

- Device shall not interfere with normal door operations.
- Device shall not impede use of the door in emergency situations (fire, earthquake, tornado, etc).
- Device shall be easily attached or removed from any compatible door.
- Device shall sterilize and sanitize at least 97% of bacteria on the doorhandle.

The NEMA 17 Stepper motor raises and lowers a carriage system that houses 3 sanitizing UV LEDs. The Knight Light detects motion utilizing the PIR Motion Sensor, which will signal the motor to retract in case of an incoming person. This prevents interference with operation of the door.
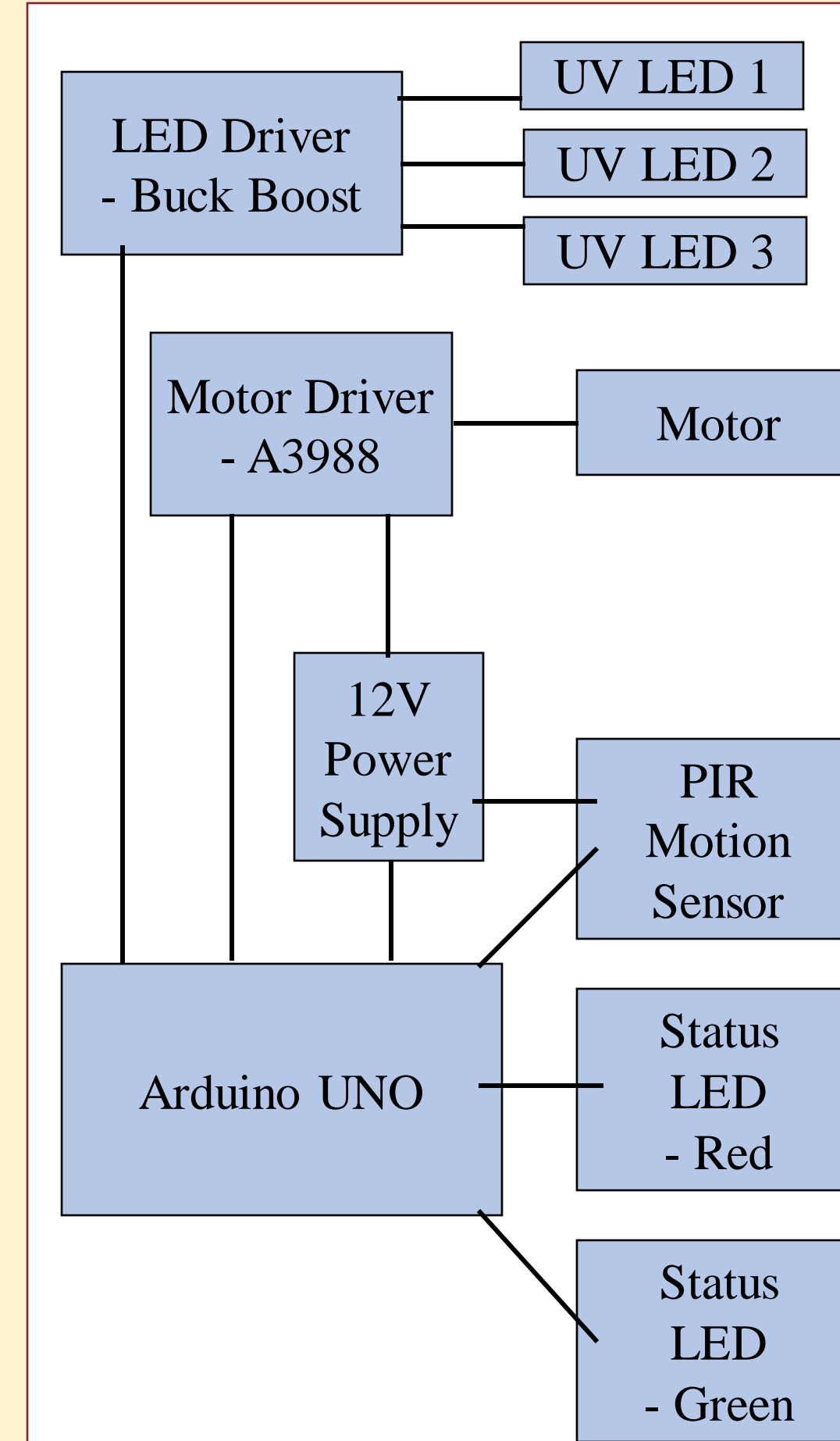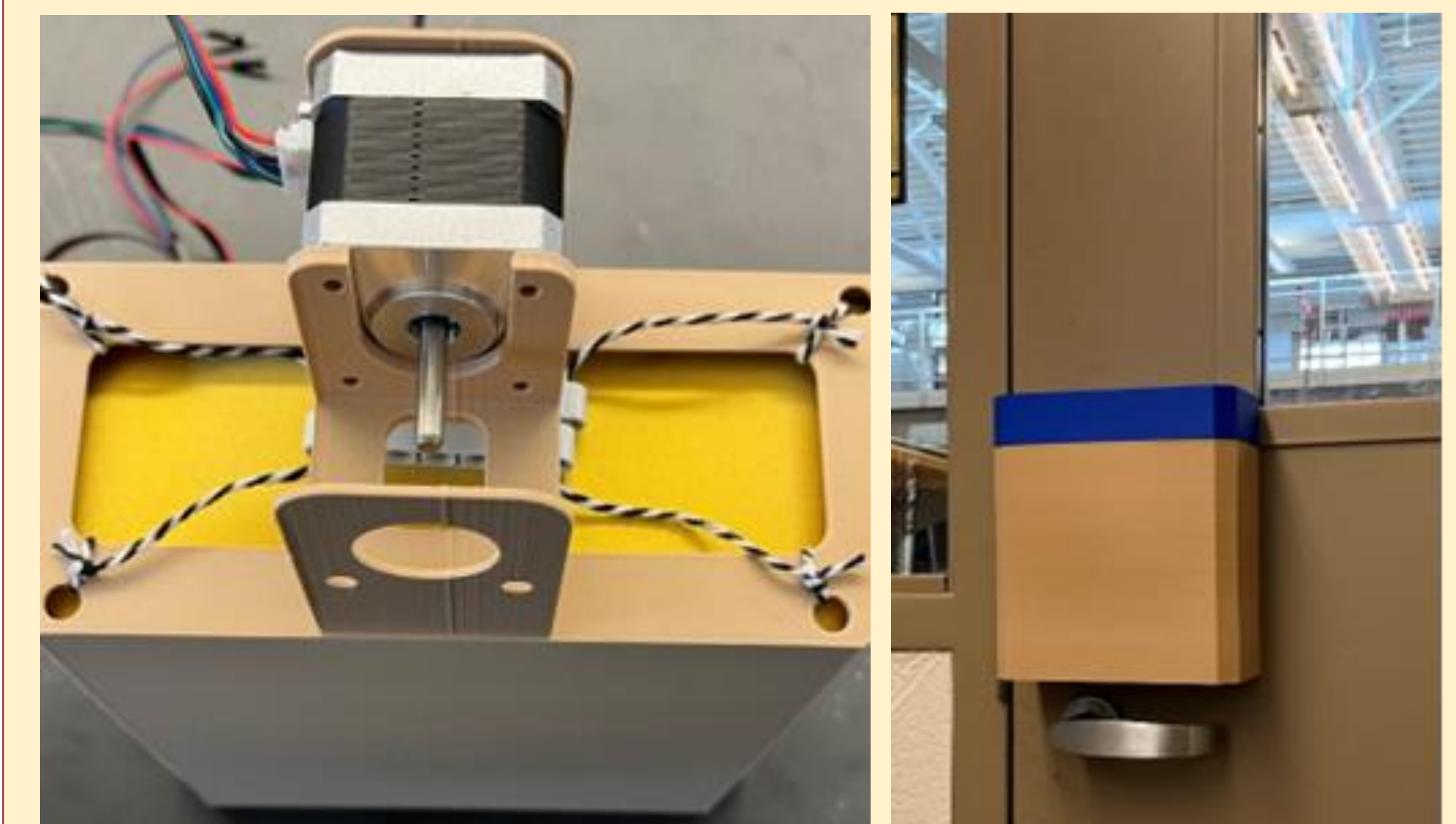
Design Overview

Specifications:

Weight: 3 lbs.

Height: 30 cm

Width: 18 cm

Distance from door: 8 cm

Sensor Range: 3 m

Material: Polylactic Acid (PLA)

UV Wavelength: 275 nm

Motor Torque: 0.27 N-m

Projected Lifecycle: 100 weeks

Maintenance Schedule: 10 weeks

Electrical Hardware Block Diagram

Motor-Pulley System and Device In Position