B.L.I.N.D.S.

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Product Pitch

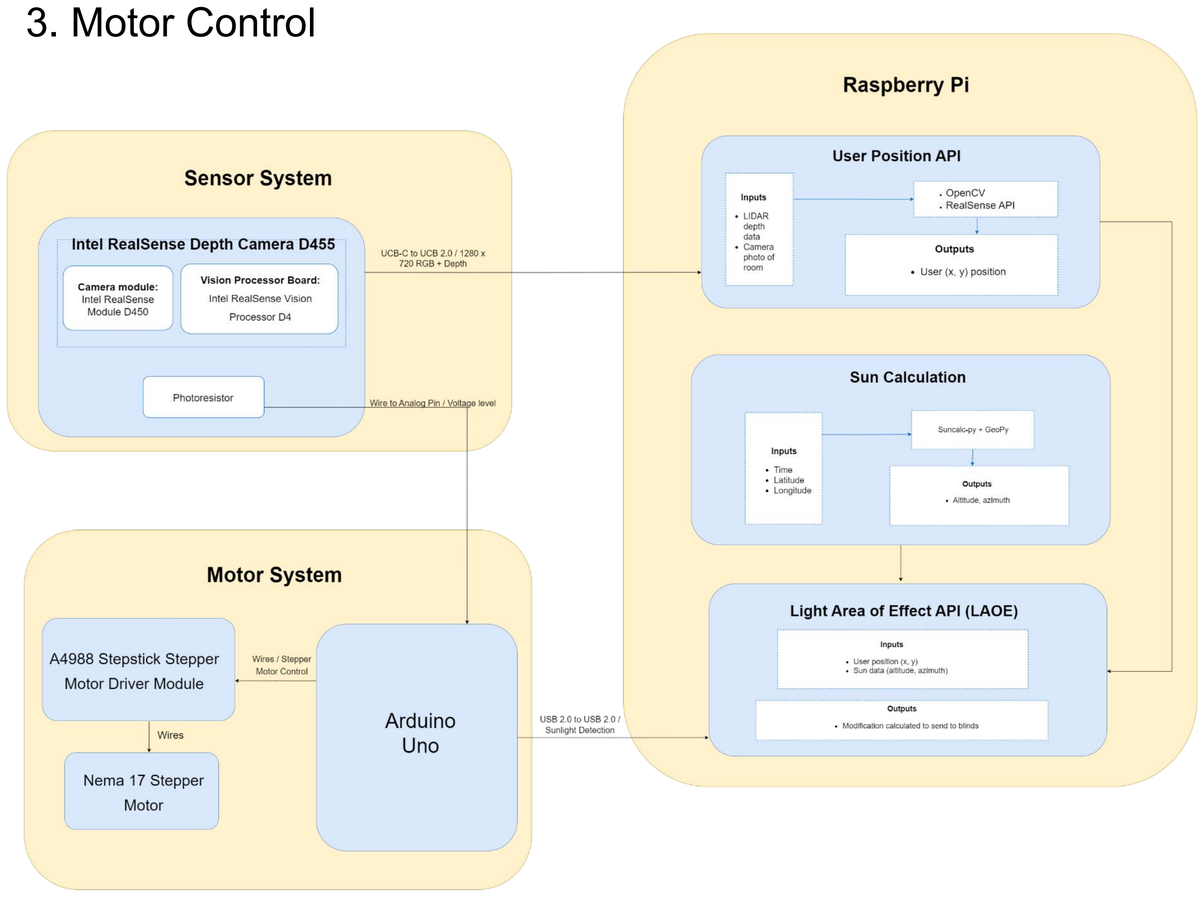
Our product aims to tackle the issue of needing to continuously adjust a room's blinds in a way so there is minimal sunlight that hits one's face, but maximal natural light in the room.

To solve this issue, we created B.L.I.N.D.S (Blocking Light in Domestic Spaces), a set of automated blinds that blocks specifically the light that reaches a person's face by identifying the user's position.

Our system's main use-case requirements involve accurately identifying the location of the user in a room, calculating whether the user's face is in sunlight, and precisely computing the degree the motor connected to the blinds need to be adjusted to meet our use case. We were able to successfully create a system that met our accuracy goals.

System Architecture

Our full system consists of 3 primary interconnected systems, each with separate subsystems:
1. Sensor System
2. Processing Unit (RPi)
3. Motor Control

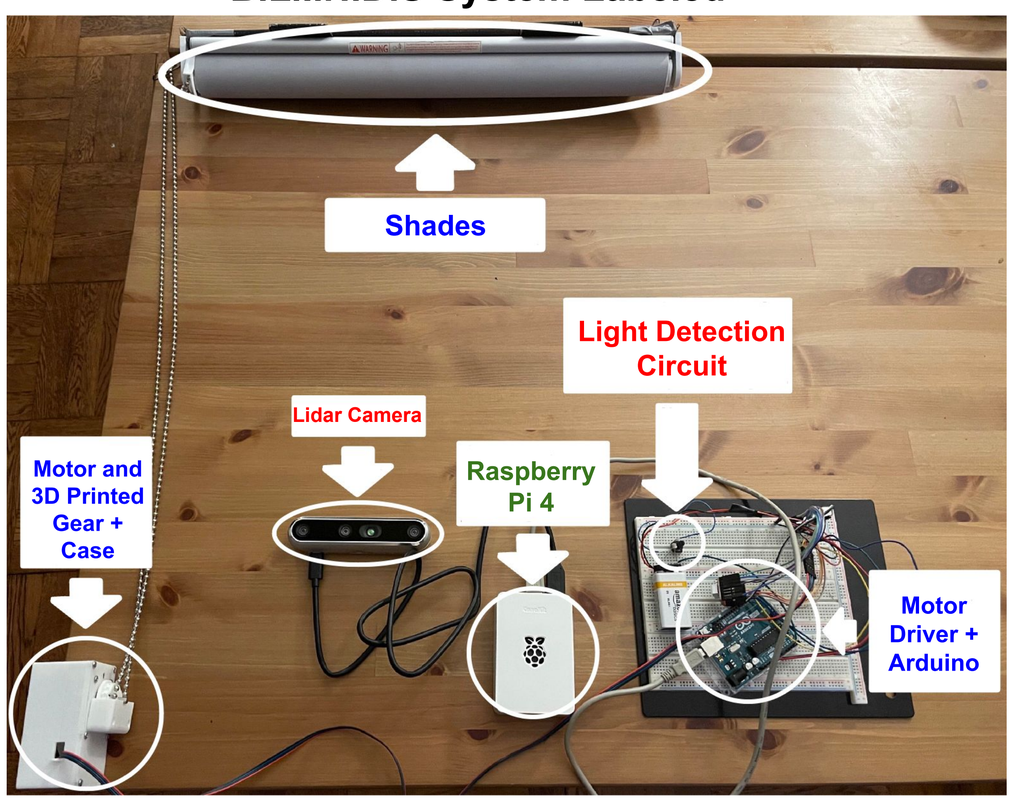


Additional Information

http://course.ece.cmu.edu/~ece500/projects/s23-teamc1/

System Description

B.L.I.N.D.S System Labeled



Motor System, **Sensor System**, **Software System**

System Evaluation

Our testing process included:
- Measuring the distance to a person's face and comparing that with the calculated distance we found using information from the LiDAR-Camera
- Measuring how far a human's face could be detected using OpenCV
- Measuring the location of the projected area of sunlight from the window onto the floor, and comparing that with our predicted area
- Measuring the time it takes the motor to fully unfurl our blinds
- Measuring the amount of time it takes for our system to calculate the area of light and user position
- Testing the number of times a person's face is in the sunlight after our motor adjusts the blinds

	Requirement	Result
User Position Extraction	300 ft^2 room	5m x 8m (430 ft^2)
	≥90% Accuracy	87% for x-axis 85% fory-axis 94% for z-axis
LAOE	≥90% Accuracy	96.93%
Physical Latency	60s	~58.6s
Feedback Latency	10s	~1.9s
Overall Accuracy	≥90% Accuracy	90%

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