# Smart Curtain System Final Presentation

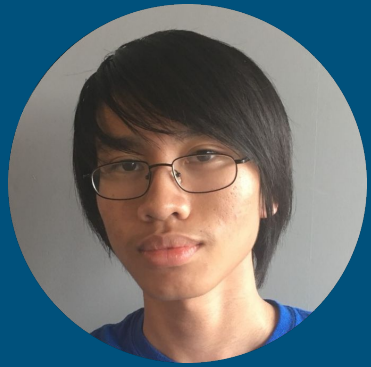
Team 3N3

# Meet the Team

Arthur Chen, ‘22
Project Leader

David Erdner, ‘22
Systems Design

James Streets ‘22
Hardware Design



Pierre Vu, ‘22
Software Design

Caleb Key, ‘22
Testing, Technical Reporting

# Agenda

- Problem and Requirements
- System Design
- Engineering Standards
- Project Management and Teamwork
- Results

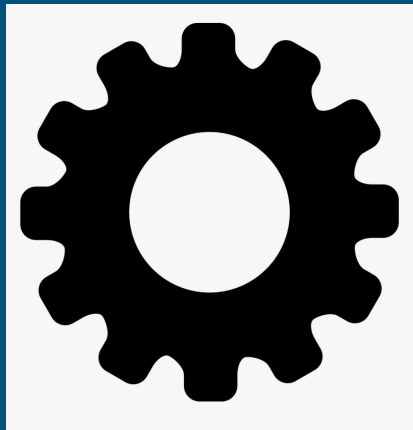
# Problem and Requirements

- No Smart Curtain System Available on Market right now
  - Current products do not have environment measuring ability so no automatic energy saving algorithm applied

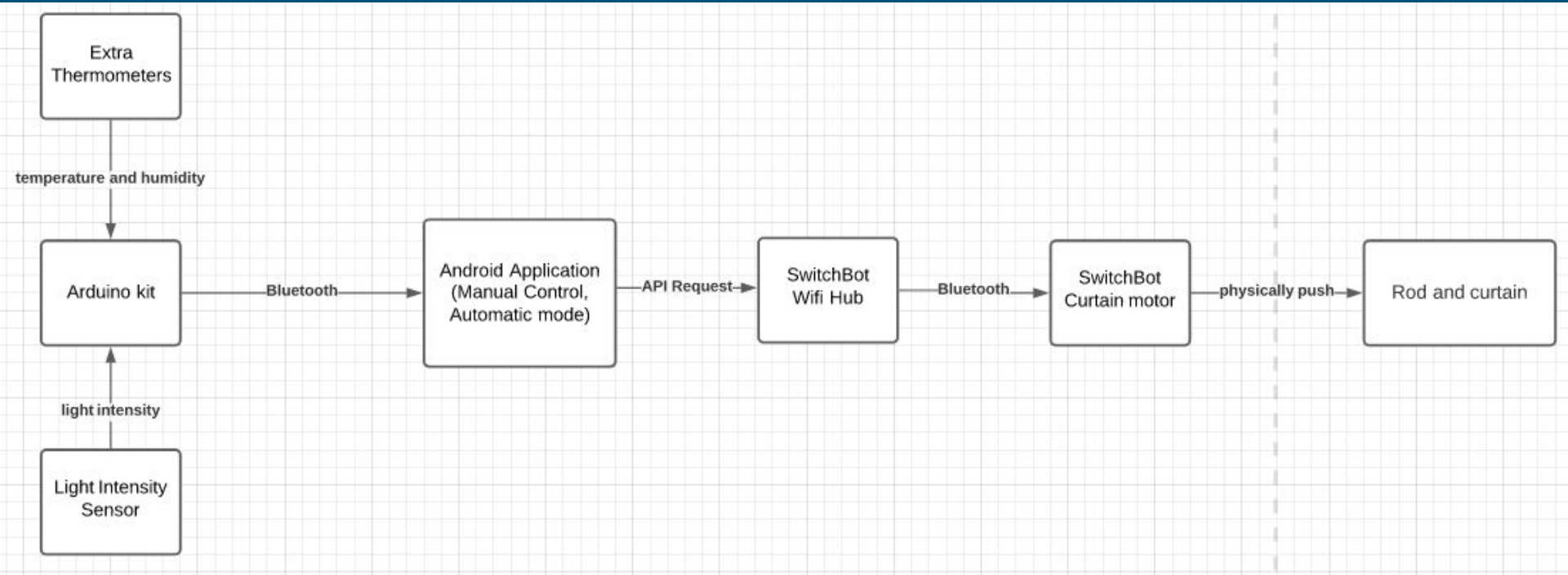
- Requirements for our system to solve problem:
  - Measure Environment and Surroundings
  - Automatically Control Curtains via Android Application
  - Save Energy by Opening/Closing Curtains Based on Environment

# System Design - Alternatives Considered

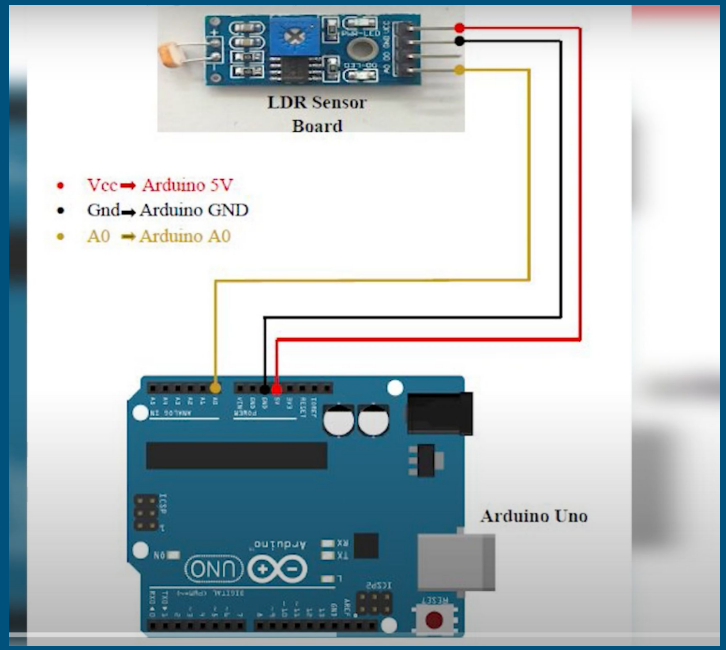
- Building our own motor
  - Would have made unbalanced hardware/software components of the project
- Using Simple Smart Curtains
  - Too bulky, not available for open source development
- Graywind Motorized Shades
  - Too bulky, too expensive

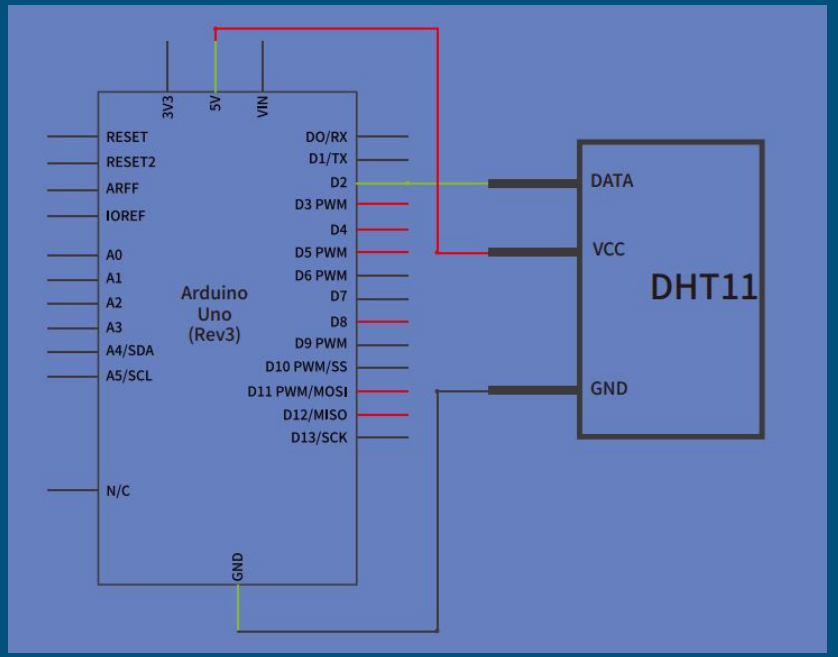


# System Design - Overall System-Level

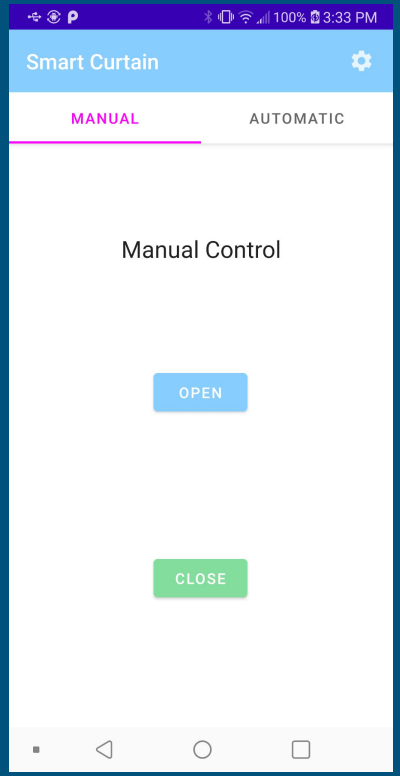


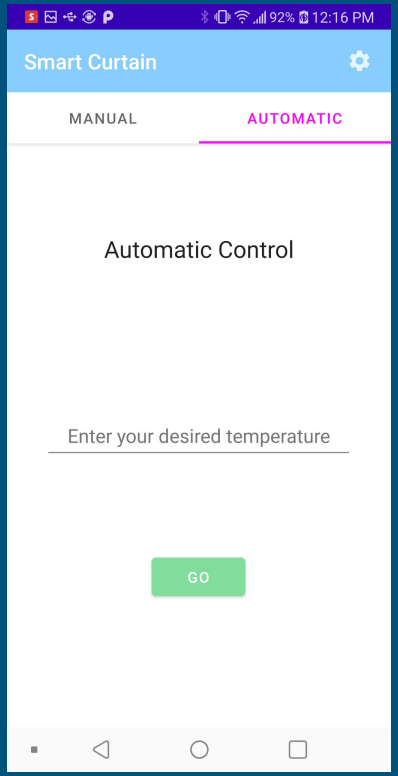
# System Design - Components: Arduino



# System Design - Components: Android App



# System Design - Components: Curtain Motor


# System Design - Components: Black Out Curtain

# Engineering Standards - Environmental, Health and Safety

- Environmental
  - Saving energy has a positive impact on the environment
- Health
  - Sedentary lifestyle
- Safety
  - Area of use must be considered
  - Must be mounted properly

# Engineering Standards - Social, Political, and Ethical concerns

- Social
  - Curtain motor can be loud, so turning on and off while user is sleeping could be distracting
- Political
  - Privacy could be an issue with automatically opening curtains
- Ethical
  - More automatic home appliances increase human reliance on technology for simple tasks

# Engineering Standards - Manufacturability, Sustainability, and Economics

- Manufacturability
  - Most of the project is done through the Android App. Only a few hardware components are required, so manufacturability is very manageable
- Sustainability
  - Motor battery life is very good
  - Arduino components have some risk of burnout
- Economics
  - Economically feasible because of the amount saved by homeowners (See results slide)

# Economics - Budget

| Component | Price |
|---|---|
| Microcontroller kit | $38.99 |
| SwitchBot Curtain motor | $99.00 |
| Curtain Remote | $16.15 |
| Extra Thermometers | $10.29 |
| Light Intensity Sensor | $10.99 |
| Bluetooth Module for Microcontroller(2) | $18.00 |
| Rod for holding curtains | $19.00 |
| Black Out curtains | $16.00 |
| SwitchBot MiniHub | $39.00 |
| **Total** | $267.42 |

# Results - Testing

- Component Testing (Hardware and Software)

- Integration Testing
  - Integrate hardware and software piece by piece
  - Satisfactory hardware frequency for software input

- System Testing separated into 2 parts:
  - Manual Testing
  - Automatic Testing

# Project Management and Teamwork

- 5 Main Roles:
  - Team Leader
  - System Designer
  - Software Designer
  - Hardware Designer
  - Testing
- Each person mainly responsible for one role
- Communication and help between roles was critical
- Discord for communication, Gantt and Flow Charts for task and schedule management, multiple weekly in person meetings

# Results - Final Product Demo: Manual Mode

# Results - Final Product Demo: Automatic Mode

# Results - Home Improvement & Energy Saved

- Home Improvement
  - The ability to open/close your curtains with the touch of a button improves the quality of life for users, and is the next step in home improvement

- Energy Saved
  - 10%-25% of thermal energy loss is through windows
  - 25% of this energy can be saved with a blackout curtain
  - If used in automatic mode, system can save the average homeowner roughly $125 per year

https://applianceanalysts.com/cost-to-run-central-air-conditioner
https://home.howstuffworks.com/green-living/blackout-curtains-save-energy.htm

# Questions?