Upgraded Smart Shades

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Product Advancements (Term Project Vs. Propeller Project)

- Basic Functionality Improvements
  - Reduced Speed at Which Shades Move
  - Altered Accel/Decel Profile to Dampen Actuator Noise
  - Implemented Individual Shade Control
    - Left and Right Shades can be Moved Simultaneously or Independently of Each Other
Product Advancements (Term Project Vs. Propeller Project)

- Enhanced User Experience
  - Developed Web Application Hosted by Raspberry Pi
  - User can now Control Shades From a Browser on any Device on Their LAN (i.e. Laptop, Smart Phone)
Product Advancements (Term Project Vs. Propeller Project)

● Additional Control Modes
  ○ Users can Toggle Between Manual Control, Light Control and Time Control on our Web Page
  ○ Added Gesture Control
    ■ User can Control Shades with Hand Signals from Anywhere Using Their Laptop Camera
  ○ Added Voice Control
    ■ Effectively Added Google Home Capabilities to Smart Shades Device
    ■ User can Open and Close Shades Through Speech
Microcontroller Usage & Integration

- Stuck with Propeller for its Multi-Core Functionality
  - Had Trouble Establishing Bidirectional Serial Communication Between Prop and R Pi
- Changed Prop Code Logic so Different Smart Shades Commands are Executed when Certain Digital I/O Pins are Pulled High or Low
  - Ordered 5V to 3.3V Level Converters to Safely Connect Prop I/O Pins to Pi GPIO Pins but Shipment was Delayed
- Decided to use Arduino as Intermediary Between Pi & Prop Instead
  - Pi Talks to Arduino Through Serial Connection & I/O Pins on Arduino are Directly Connected to Prop I/O Pins
  - Gave us Opportunity to Test our Knowledge of all 3 Microcontroller Covered in this Course
Web App Design

- .NET Core 2.2 Application
  - Cross Platform
- MVC Architecture
- Javascript/HTML Client Side
  - Bootstrap 4.0
- C# Server Side
- SQL Server Database
Data Flow Chart

Web Application Running on Raspberry Pi

Gesture Control Application Running on User’s laptop

Google Home Voice Control Running on Raspberry Pi

SQL Server Database

Python Script Polling SQL Database Running on Raspberry Pi

Send Data Over Serial Connection to Arduino

Arduino Sends Signal to Propeller Through I/O Pins

Smart Shades Execute the Command
Web App Control Demo
Gesture Control Demo
Voice Control Demo
Refine Electronics Packaging
  ○ Combine Arduino & Propeller onto Custom PCB

Design Wall Mounting System for Linear Rails & Develop Brackets to Attach Curtains to Actuator Carriages

Make Gesture & Voice Control More Accessible to the User (i.e. Give User Ability to Enable These Control Modes Without Needing to Run Python Scripts)

Modify Raspberry Pi to Automatically Start Programs