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JOPEL DESIGNS JD
Project Portfolio

Robo-Butterfly

Brief

The customer envisioned filling the entrance of their corporate office with a Kaleidoscope of butterflies. A dynamic encounter was envisioned, surrounding participants as they enter the building. We delivered the experience using approximately 120 Flexinol shape-memory-alloy actuated butterflies. Seemingly, every butterfly flaps at random, encouraging a sense of wonder and awe. The experience would be installed in the vestibule entry-way of the corporate headquarters.

Role

I was asked by the artist to create the electronics necessary to implement the design. The most important aspect was Budget. A close second was quick installation by non-technical persons. The third concern was a robust design, capable of operational longevity and serviceability.

Development

The shape-memory-alloy muscle draws considerable power while the butterfly wings contract, and require a cool down period afterward. A compromise was made linking three butterflies to flap synchronously, reducing the number of control channels required. A design with 48 channels was chosen to drive the approximately 120 butterflies.
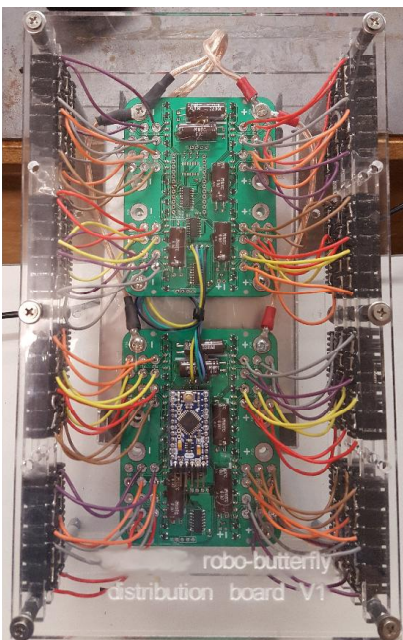
Construction

To minimize production cost a PCB was designed to serve multiple roles.The system uses a Host and cascading Node architecture, but in this case only one Node is used since each PCB contains 24 driver channels. One PCB contains an Arduino controller and the other is driven by a signal from the first. The design is scalable to suit other installations and actuators.

Maintenance

This system runs from a 15V 'line-lump" power supply that is easy to replace. Each channel powers three 5V butterflies connected in series. This means there must be 3 butterflies on each channel to function. Doing the math, this leaves 8 channels open for redundancy. Resistive "bypass" jumpers were also provided to compensate for any failed butterflies or wiring faults.

Timeline: 6 weeks   Delivered: Device running custom software
Cost: ~$1200