XXV Twenty-Fifth Annual ENGINEERING ■ DESIGN expo 2018

Wireless Tower of Lights

A Capstone Design Project by Adrian Beehner, Andrew Butler, Kevin Dorscher, and Paul Martin

University of Idaho
College of Engineering

Problem

Tower Lights is a project developed a few years ago, where LED light bars are put into windows and illuminated in synchronization with music. The current system relies on unused ethernet wiring, which makes the system unusable in any place that does not have this wiring.

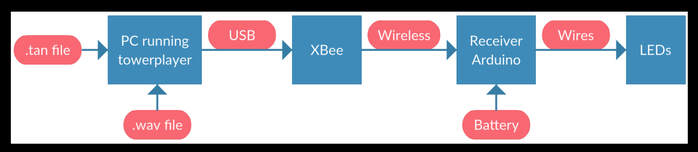
Goal

As envisioned, the new system would involve the development of micro-processor based wireless modules that would be attached to each lightbar. The battery operated modules would respond to wireless signals sent from a laptop.

Requirements

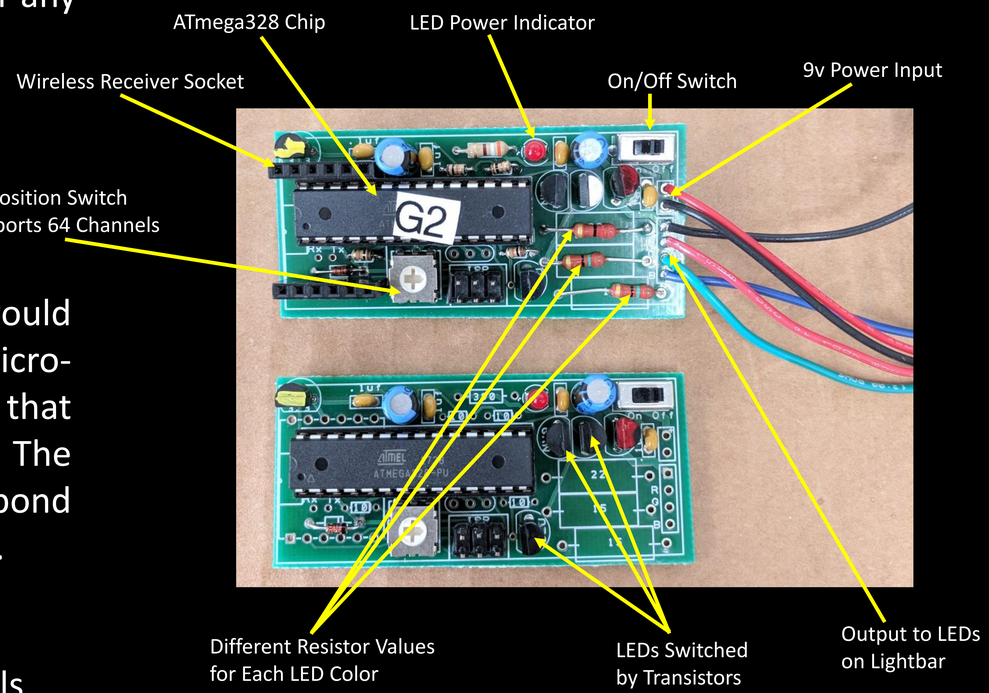
- Support at least 40 lightbar channels
- Low power usage, able to stay on for three days followed by a 1-hour show
- Use relatively inexpensive and readily available technology

Our Design Flow



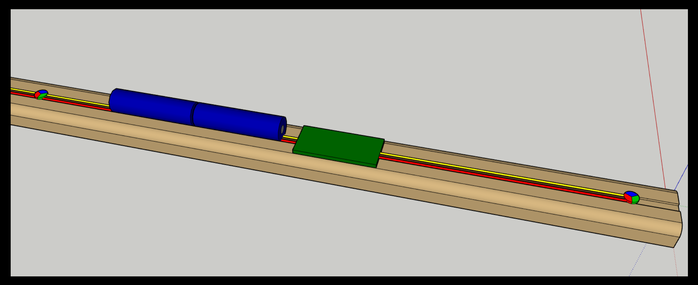
Solution

We chose to use a circuit board from the Goofy Glasses project at University of Idaho. By modifying the LED wiring we are able to support 4 LEDs per lightbar, and our code base supports 64 channels.



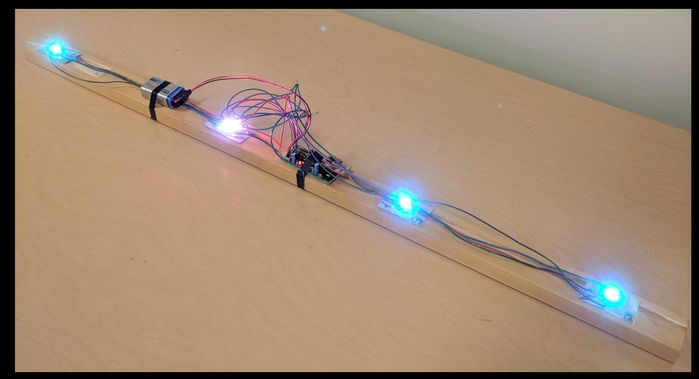
Lightbar Design

Before prototyping, we developed a CAD model of our physical design.



Prototype

We created multiple prototype lightbars in order to prove our design. Using our new software and transmitting over the 802.15.4 wireless protocol, our wireless lightbars are fully functional.



Validation

Extensive testing of our battery life, wireless range, and support of up to 64 channels has shown that we have met all of the client's needs with this design.

Summary

This new wireless lightbar design allows the Tower Lights show to be taken beyond the Theophilus Tower, anywhere.

Acknowledgements

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