

Pretty Lights

Transducing Sound into Visuals

Babatunde Falade

Michael Kane

Stacie Reynolds

Ryan Rychak

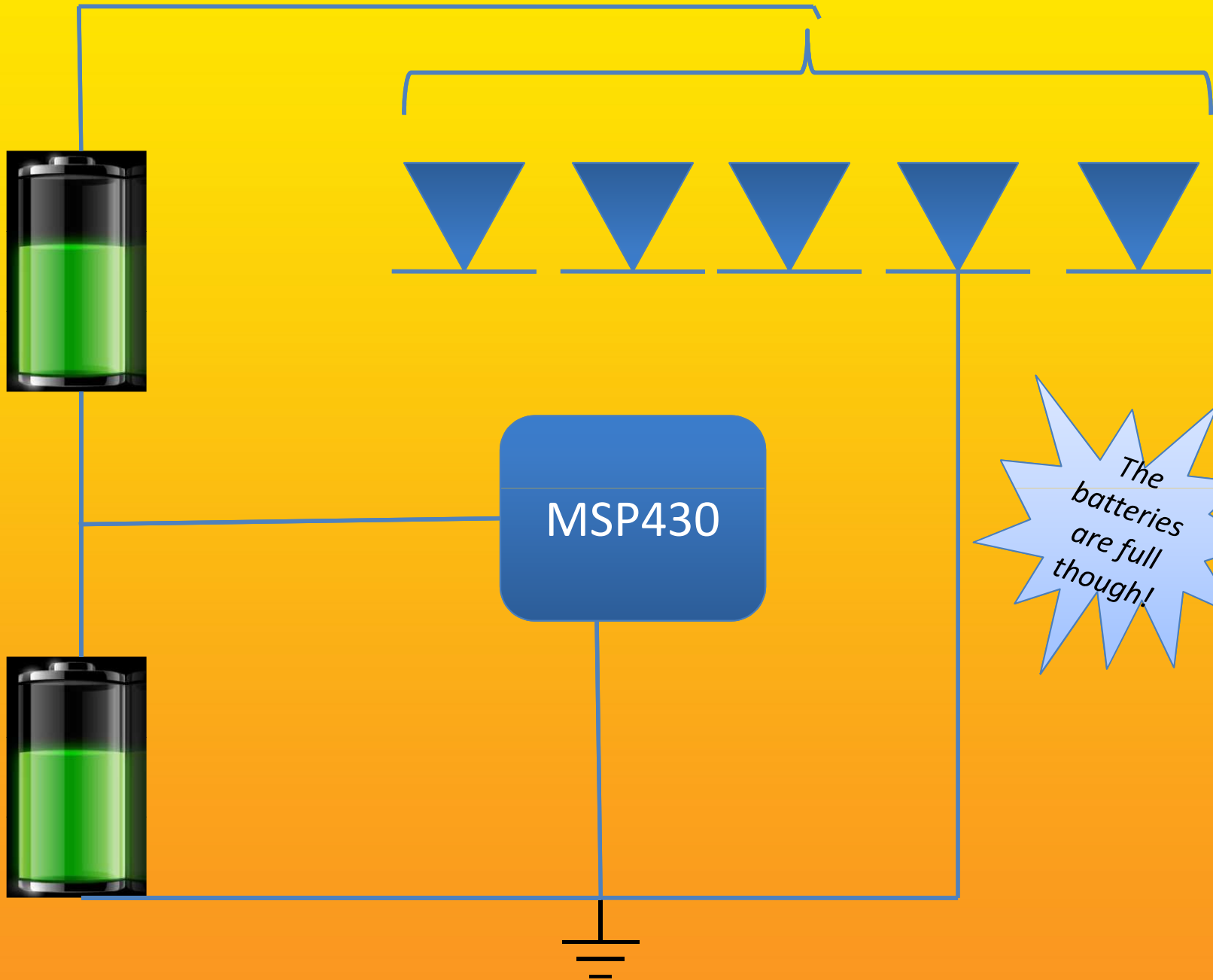
Final Product

- We succeeded!
- But we had to make some concessions.
 - Power supply, algorithm, choice of LEDs.
- We won't make you listen to Lady Gaga! She's weird.



Power

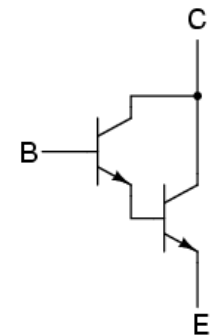
- Considered a Gorilla Power Module
 - 120VAC → 5VDC
 - Awesome and expensive (\$45)
- Portable design? No.
- Safe? Questionable.
 - Live electricity, heat emissions inside closed box...deal breakers.
- Instead opted for 4 1.5VDC D-cell batteries in series.
 - 6.6V for LEDs, 3.3V for MSP



The batteries are full though!

Transistor as Switch

- Anodes are pulled to 6V, cathodes tied to collector of a Darlington transistor
- Emitter tied to ground
- Current will only flow through LEDs when base is given some intermediate voltage
 - Namely, 3.3V provided by MSP



Original Algorithm

- Sampling Rate = 1kHz
- Long average = 1 sec
- Short average = 0.02 sec
- Signal = Short Average – Long Average
- If it crosses the threshold.... Pretty Lights!!!

Problems

- Have to track 1000 samples...
- Sampling and storing to flash was taking 30mSec, (avg 10 mSec with DMA)
- Sampling music slowly is difficult, threshold becomes very complicated and not linear



Solution 1: Simplify

- Do the same algorithm, without writing to flash.
- Instead of storing every sample, store an avg of every 32 samples.
- Allows us to sample a bit faster.



Solution 2: Direct Line in

- Sampling music slowly is difficult.. Volume and avg are independent at lower sampling rates.
- Microphone allowed to volume to vary wildly.
- Could make more robust product in the given time without mic

LED hold algorithm

- If LED turns on/off when signal crosses threshold, lights can flicker alot.
- Hold algorithm forces LEDs to stay on for a few mSec upon crossing, then stay off for few mSec.
- This lets your eyes catch up to the LED action.

LED Concept

- LED COLOR USED
 - RED, GREEN AND BLUE
 - 3mm and 5mm through the hole LEDs
 - Forward voltage for red and green is 2v and for blue is 3.5v

Other Considerations

- Multicolor LEDs - 2 dice different colors connected back to back
- Tricolor LEDs - 2 dice of different colors with a 3 wire connection
- RGB LEDs - contain red, green and blue emitters, generally using a 4 wire connection with one common (anode or cathode).
- Alphanumeric LEDs – Display on this are available in 7 segments and it display all numbers and limited set of letters.
- However, we chose the single color LEDs because it fits the objective of the project which was to light up different colors of LEDs together at a particular pace.
- Also, because of the complexity that comes with some of these LEDs, they require more power.

LED Sequencing

- The LEDs are programmed into the MSP430 to light up for the duration of 15seconds before switching to the next combination of colors.
- 8 modes of different combinations.
- Output = **Green**;(for 15 sec)
- Output = **Green**+ **Blue**;(for 15sec)
- Output = **Red** + **Green**;(for 15sec)
- ...
- Output = **Blue**;(for 15 sec)

Appearance

- External Housing
 - 6 Polystyrene Sheets
 - Bonded with Plastic Glue and Silicon Caulk
 - Foil used to reflect light throughout the box
- Internal Housing
 - Project enclosure wrapped in foil
 - LED circuits passed through hole to distribute Pretty Lights throughout the box.

Future Expansions

With a little more time we could:

- Create an enclosure that would support rotation with stepper motor
- Construct an enclosure to have a slot for each individual LED
- Use a hinge with a latch for the door of the enclosure.

Time for the show!



