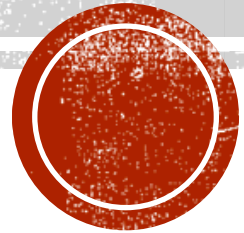
RAPID PROTOTYPING



Week 4 Finishing up

PLANNED AGENDA

1. Finishing Soldering
2. The Lamp App
3. 2D with Tinkercad and Cricut
4. Advanced topics
    1. Next step in 3D design software
    2. Digital capture
5. Demonstration of a prototyping project
6. Workshop feedback

1. SOLDERING REVIEW

- Tools and safety
- Wire
- Soldering techniques
- Project connections, Arduino to button/ring:
    1. 3V3 to button
    2. GND through resistor to button other side (shrink)
    3. D2 to button other side (pull up)
    4. D6 to data input on ring
    5. +5V to Power 5V DC on ring
    6. GND to Power Signal Ground on ring

2. THE LAMP APP

- Adafruit NeoPixel guide: http://tinyurl.com/l863jst
  - Library https://github.com/adafruit/Adafruit_NeoPixel/archive/master.zip
  - Download and extract
- Use Arduino software to add library
  - Arduino > Sketch > Include Library > Add Zip Library… > Adafruit_Neopixel-master
- Open the buttoncycler sketch and upload it to your Arduino
  - Arduino > File > Examples > Adafruit Neopixel > Buttoncycler
- Sketch parts: include library, definitions, button detect, case selections

```
void startShow(int i) {
  switch(i){
    case 0: colorWipe(strip.Color(0, 0, 0), 50);    // Black/off
            break;
    case 1: colorWipe(strip.Color(255, 0, 0), 50);  // Red
            break;
    case 2: colorWipe(strip.Color(0, 255, 0), 50);  // Green
            break;
    case 3: colorWipe(strip.Color(0, 0, 255), 50);  // Blue
            break;
    case 4: theaterChase(strip.Color(127, 127, 127), 50); // White
            break;
    case 5: theaterChase(strip.Color(127,   0,   0), 50); // Red
            break;
    case 6: theaterChase(strip.Color(  0,   0, 127), 50); // Blue
            break;
    case 7: rainbow(20);
            break;
    case 8: rainbowCycle(20);
            break;
    case 9: theaterChaseRainbow(50);
            break;
  }
}
```

strip.COLOR(RED,GREEN,BLUE), SPEED

3. 2D WITH TINKERCAD AND CRICUIT

- 2D output from Tinkercad
- Other software to generate SVG files
- 2D digital fabrication
- Cricuit hardware
- Designspace software

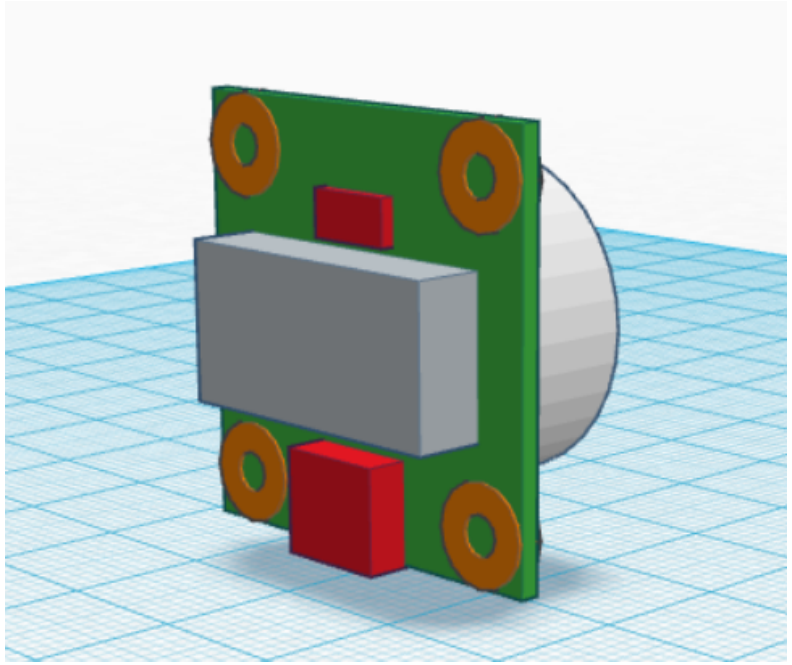
4. ADVANCED TOPICS

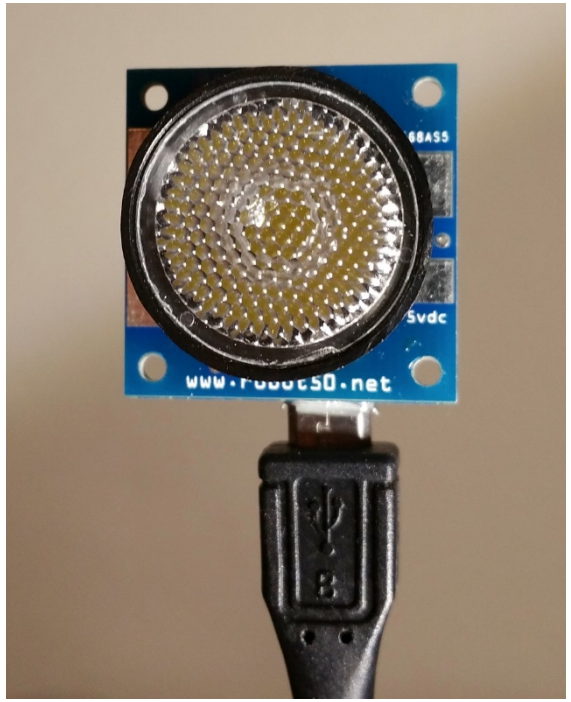
- Next level in 3D design software
  - 123D Design
  - Fusion 360
- Digital Capture
  - 123D Catch
  - Hardware solutions

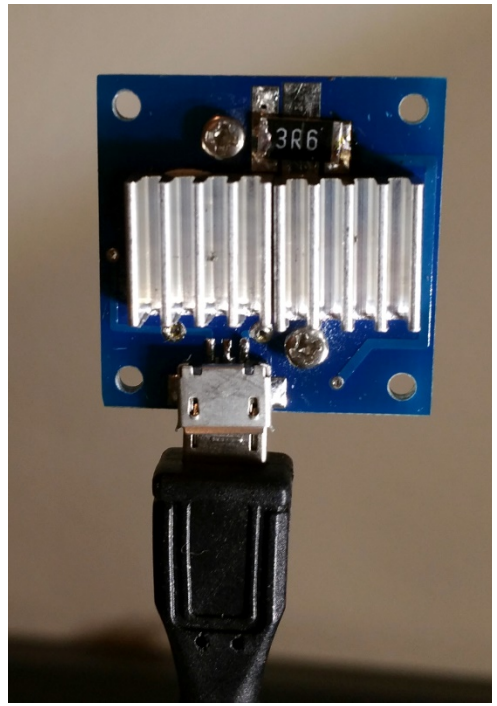
5. DEMONSTRATION OF A PROTOTYPING PROJECT

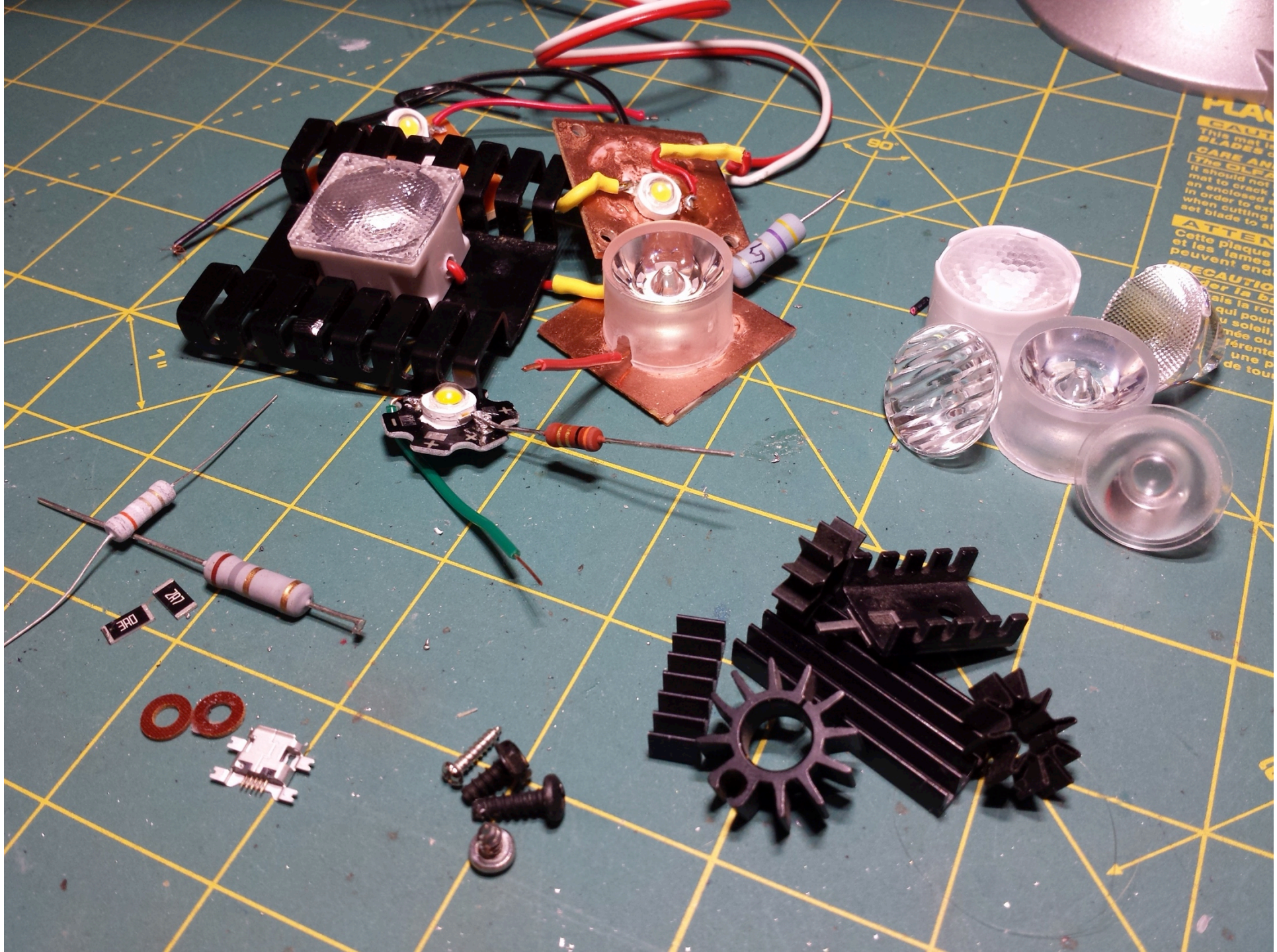
- Goal of the project: to provide 3D printer owners something functional to create with their machine.
- Product: a LED lamp module for sale and accompanying free 3D design files for printing.
- Process (for the LED module):
  - Scan for competing products
  - Paper sketches
  - 3D designed and printed looks-alike prototypes
  - Hand fabricated works-alike prototypes

- Iterating prototypes of the LED module to balance:
  1. Small size
  2. Low cost
  3. Minimal part count
  4. Design for manufacturing
  5. High light output
  6. Neutral light color
  7. Good light dispersion
  8. Appropriate power consumption
  9. Acceptable heat generation
  10. Flexibility for different applications
  11. Ease of use

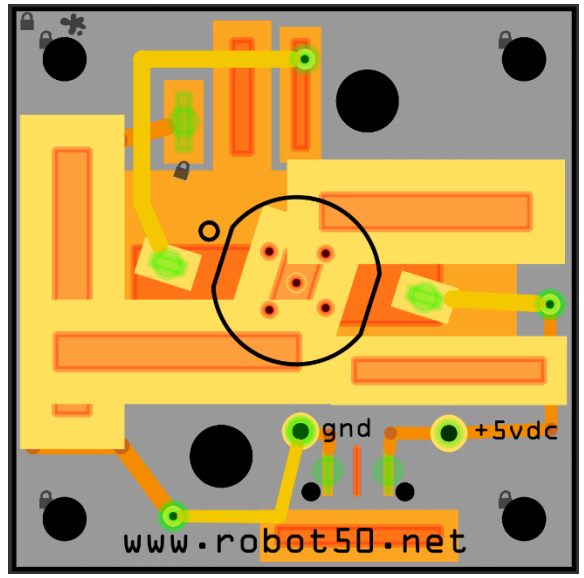


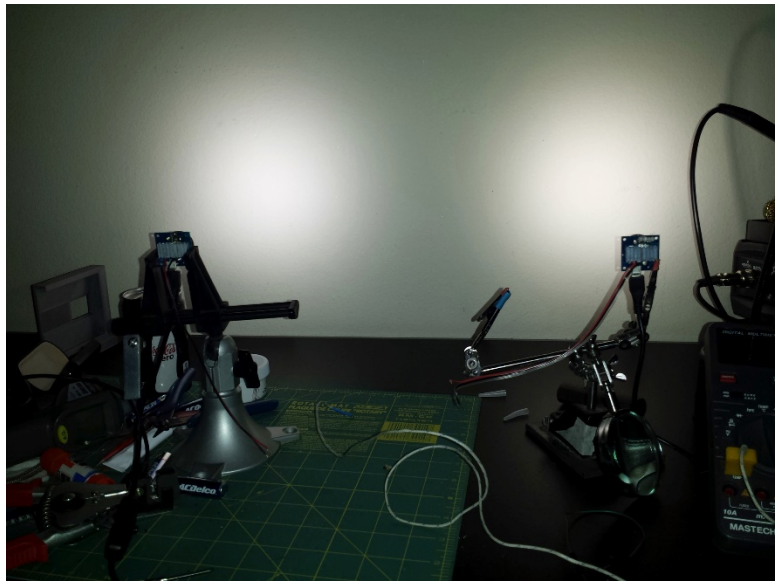






- Individual prototypes were made for:
  1. Electronics schematic
  2. Component placement (switch, USB jack)
  3. Color of LED emitter
  4. Lens spread and surface pattern
  5. Heat sinks
  6. Overall size
  7. 3D printed mounting rings
  8. 3D printed lamp components





6. FEEDBACK

- Anonymous comments please
- What was good or bad about the experience?
- How could the workshop be better in the future?
- What additional topics would you like covered in additional workshops?