

**PHOTONICS SOCIETY at UCSB**  
A STUDENT CHAPTER OF IPS, SPIE & OSA



## LaserComm “Light & Sound” Activity

UCSB Photonics Society w/ MOXI Science Museum

August 2019

### Summary:

Partnership between MOXI and the UCSB Photonics Society to create an exploration-focused outreach activity about communication via light. The activity is in the form of a board with modular transmitters with lighting components (lasers or LEDs) and receivers in the form of solar cells. Other modules with optical components are included. The result is the transmission of music from a source to a receiver. Target age group is young elementary school ages (5-8 yrs old).

### SAFETY NOTE:

This activity uses lasers and therefore must be run by someone aware of laser safety concerns and an understanding of basic optics. The lasers in this activity pose a minor danger if the beam is directed into someone’s eyes, either directly from the laser output or indirectly through certain optical components.

The lasers used in this activity are class IIIa and similar to those commonly used as laser pointers. Eye exposure under ¼ second, within the ‘blink response’, is typically not harmful. However, this activity involves keeping focused on the path of the laser, therefore the ‘blink response’ may not immediately occur if the laser were to be improperly directed.

The laser module(s) should be turned off prior to being picked up. Do not mount the optical modules in directions other than the original positions to prevent angling the light upwards. Do not vertically angle mirrors, keep mirror bases flat on table. All components are designed for a horizontally directed beam.

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Praevium Research Inc.: Bernie Celis & Anthony Cazabat designed the printed circuit boards and performed CNC/CAD work, and Praevium generously purchased the circuit boards.

## Suggestions:

- Playlist:
  - Not bass heavy
  - No quiet time
  - No ads
- Have backup/extra electronics:
  - Aux cables
  - Power cables
  - USB blocks
  - Music players
  - Chargers for speakers
  - Chargers for music players
- In case something breaks, have :
  - Scotch tape
  - Hot glue gun and hot glue sticks

## Components list:

- (a) Painted peg board tabletop with wooden walls (1)
- (b) Phone, tablet, or MP3 with songs and Aux output (1 or 2)
- (c) Aux cables (3 or 4)
- (d) Power cables with USB blocks (2 sets)
- (e) Speakers with Aux input (2)
- (f) Smoked Acrylic Plastic “Waveguide” (1)
- (g) Lenses/prisms on boxes (4 total, may include more)
- (h) Mirrors on flat bases (3 normal, 1 with film)
- (i) “Diffusers” Plexiglass covered with scotch tape, on pegs (2)
- (j) Plexiglass covered with protective film to act as ‘obstacles’ (1 diagonal, 2 straight)
- (k) Solar cell receiver modules (2)
- (l) Laser module, ~630 nm (1)
- (m) LED module, white, switch broken (1)
- (n) Dry ice in container, with water (1, optional, not pictured)
- (o) Kid’s laser safety glasses for red ~630 nm (optional, not pictured)

Images:

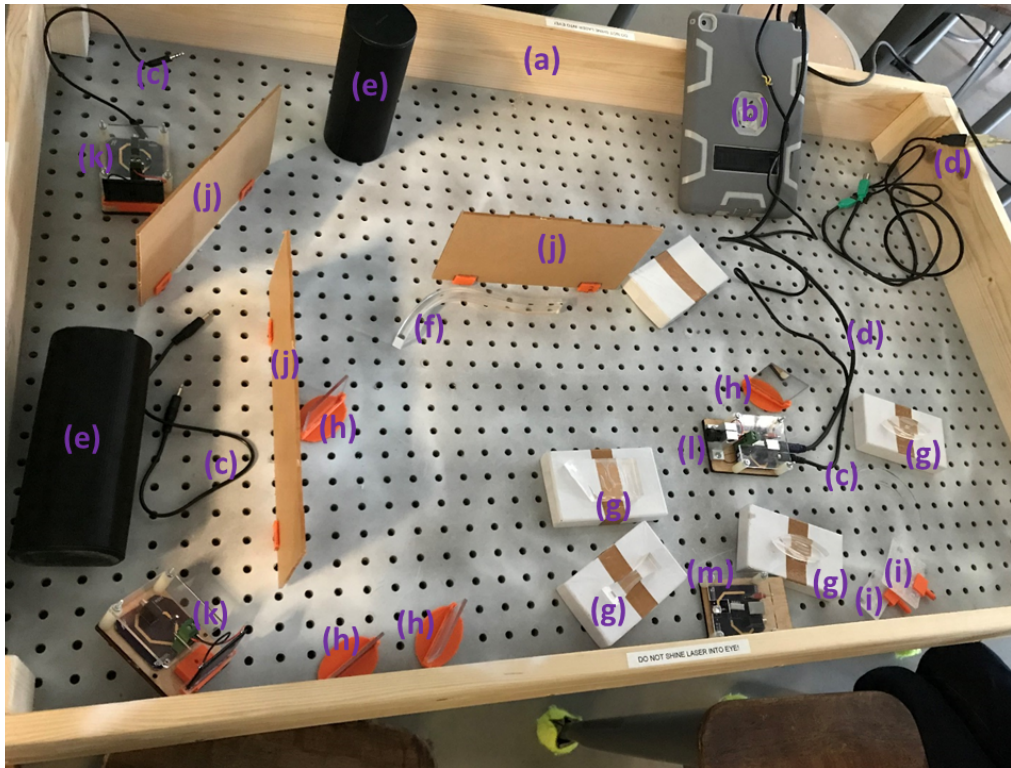


Figure 1. Overview of activity with labels corresponding to components list

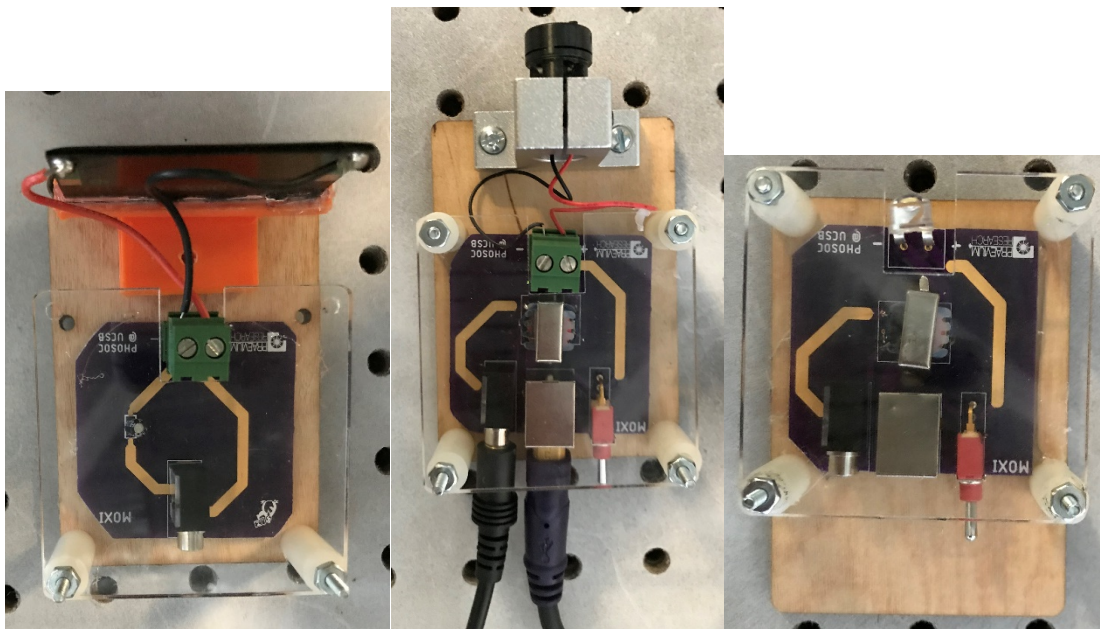


Figure 2. Solar cell receiver module (left), laser module (center), and LED module (right).

Solar cell receiver modules have only one 1/8" audio connector to connect to speakers. Laser and LED modules have an 1/8" audio input to connect to a music player on the left, a USB-B power input in the center, and a red power switch on the right. The light is directed out towards the opposite side away from the connections.