

Beam It! A Li-Fi System

Giannina Duran, Josh Sohan, Ernst Masseant
Senior Design 2 Dr.Zhuang
College of Engineering & Computer Science
Florida Atlantic University

BEAM IT! A LI-FI System

Problem Statement

- Today, there is an increasing demand for a faster and more secure wireless communication. There is a pressing need for a new medium of wireless communication as the radio spectrum is already crowded. Visible light is a medium that can address both of these needs.
- Visible Light Communications (or Li-Fi) is a relatively new technology that we will be exploring in Beam It (VLC). Li-Fi known as Light Fidelity is a bidirectional and wireless mode of communication using light. It uses the unused visible spectrum and reduces the load on radio spectrum.
- In our project, “Beam It!” will explore the need for Li-Fi and its applications.

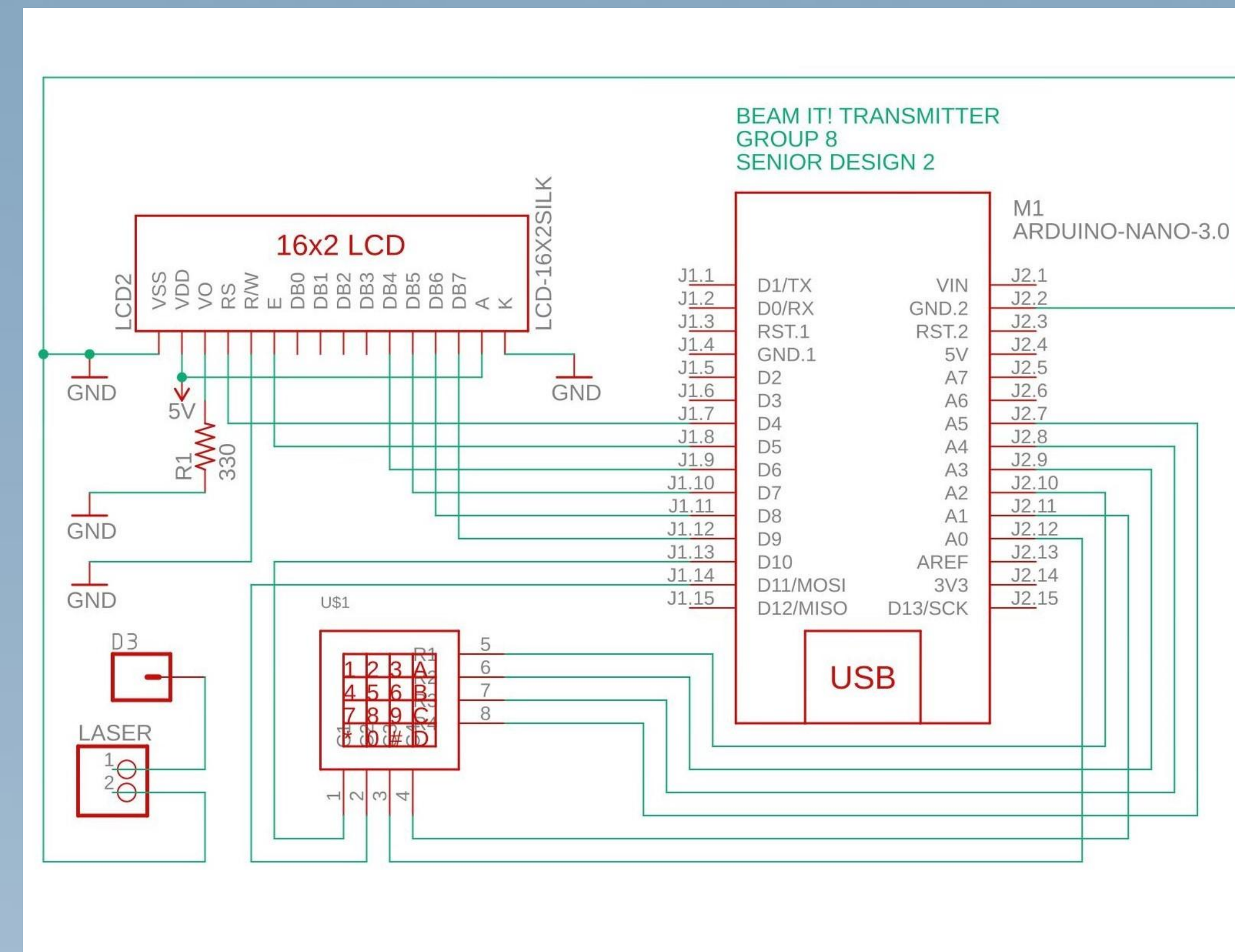
Concept

Using the vast light spectrum to sending digital and analog data through visual light to provide an alternative to radio waves that have no potential side effects.

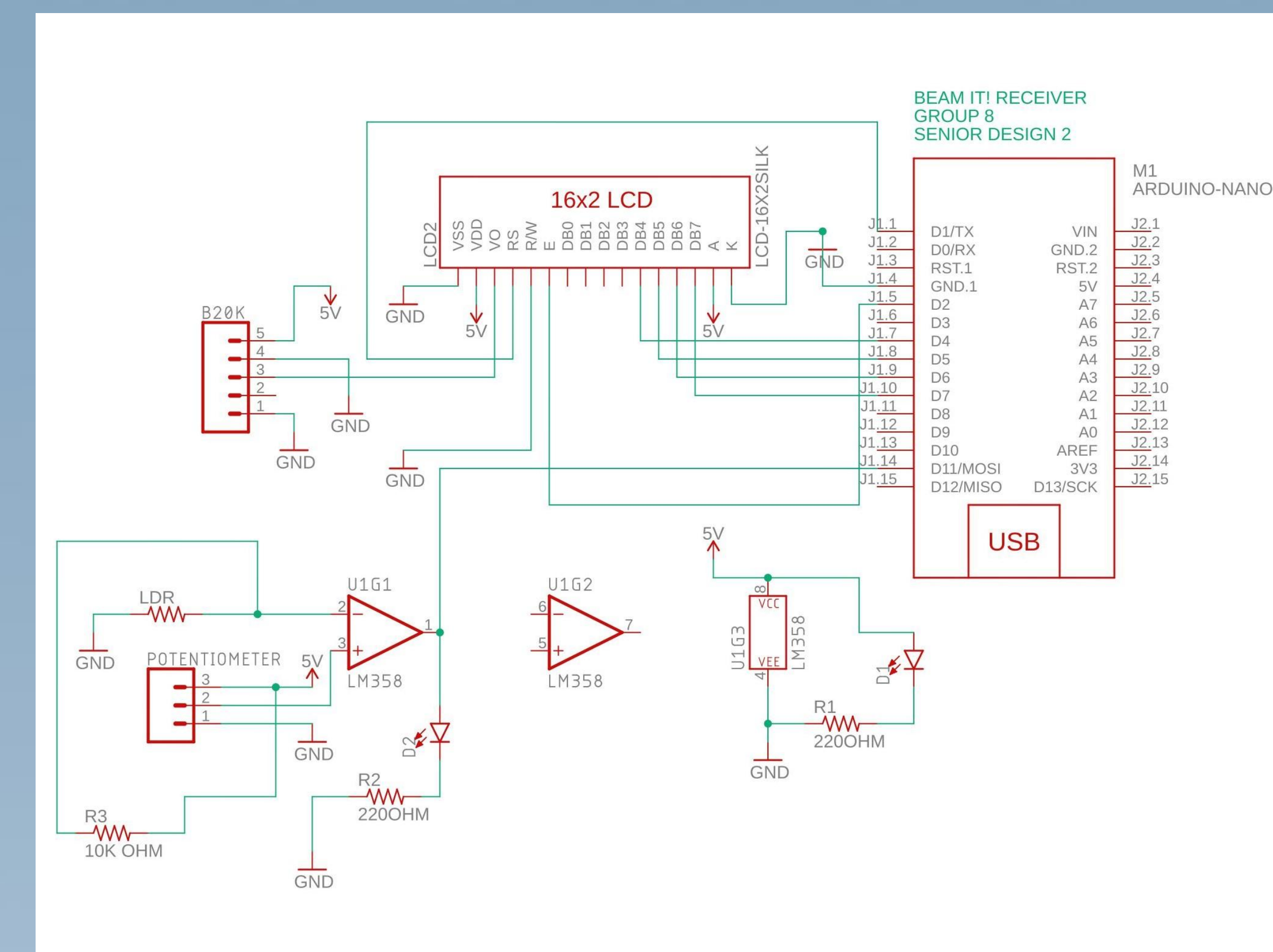
Details

- Digital: Our approach was to use a microcontroller to serialize text data to be transmitted via laser module. To receive this data we used a module we designed our selves which consists of a photodiode, two 220K resistors, a 10k potentiometer, and and OP Amp
- Analog: Using a spliced aux cord connected to our phone we were able to send analog signals through our laser module and receive them using a solar panel an amplifier to play these signals through a speaker

Design of System: Transmitter



Design of System: Receiver



Objective

Design and implement transmitter and receiver modules. These modules will work together to send and receive digital/analog data via visual light.

Approach

- Digital: Using a laser module, photoresistors, resistors, potentiometers, an op amp, and two microcontrollers, we were able to transfer text data through light at distances greater than fourteen feet.
- Analog: Using a solar panel, a laser module, an audio amplifier, and a speaker, we were able to send sound waves derived from a spliced aux cord to distances greater than ten feet.

Conclusion

After multiple prototypes, we found that our system worked best with a laser on the transmitter. As a result, both our transmitter and receiver were able to communicate effectively. The Beam It! system was successful as it allowed us to send and receive text as well as audio.

References

- [1] Mamidkar, Sapna, and Rasmiranjan Samantray. “A Survey on Li-Fi Technology and Its Applications.” *International Journal of Science and Research (IJSR)*, July 2018, doi:10.21275/ART2019122.
- [2] Tran, Bao. *LIFI COMMUNICATION SYSTEM*. 28 July 2016.
- [3] Yamada, Masashi, and Kousuke Nakamura. *VISIBLE LIGHT COMMUNICATION TRANSMITTER AND VISIBLE LIGHT COMMUNICATION SYSTEM*. 3 Sept. 2013.

