



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2019 PROJECT SUMMARY**

<b>Name(s)</b> <b>Affan Mala</b>	<b>Project Number</b> <b>J1020</b>
<b>Project Title</b> <b>LiFi, A Bright Idea: Using Sound Output to Analyze the Effect of Distance on Data Transmission through Light Waves</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Using sound output to analyze the effect of distance on data transmission through light waves.</p> <p><b>Methods</b> To do this, I first made a Li-Fi model (Li-Fi is a wireless optical networking technology that uses LEDs for data transmission.) imitating real Li-Fi concepts which consist of a transmitter and a receiver. The transmitter in my model includes an LED, a resistor, wires, a 9v battery, and a phone. The receiver includes a solar panel, a PAM 8403 amplifier and a speaker. I then used a ruler to measure 25.4cm, 91.44cm, 182.88cm, 985.36cm. then I measured how many lux were hitting the solar panel, the sound produced in decibels and the width of the light beam from each distance.</p> <p><b>Results</b> As we increased the distance between the transmitter and receiver, signals started to weaken. However, I could still get strong signals by using a small 10mm LED to transmit signals to distances of up to 985.36cm and still be able to receive sound up to 55 Db.</p> <p><b>Conclusions</b> I used a small circuit and 10mm LED and I was able to transmit audio to as far as 975.36 cm (10.6 yards). Imagine how good Li-Fi would work if it were outfitted in LEDs in our homes. Imagine networking speeds of 224 Gbps. If I were to have the facility and the equipment, I would have done my project on a grander level by transmitting video and recording the (DTR).</p>	
<b>Summary Statement</b> I measured the efficiency of data transmission through light waves by transmitting data from various distances to see how far I can transmit via a 10 mm led and recorded the output in decibels	
<b>Help Received</b> This project was done entirely by myself and was based on research I performed. All the experiments, research were performed by myself without any help.	