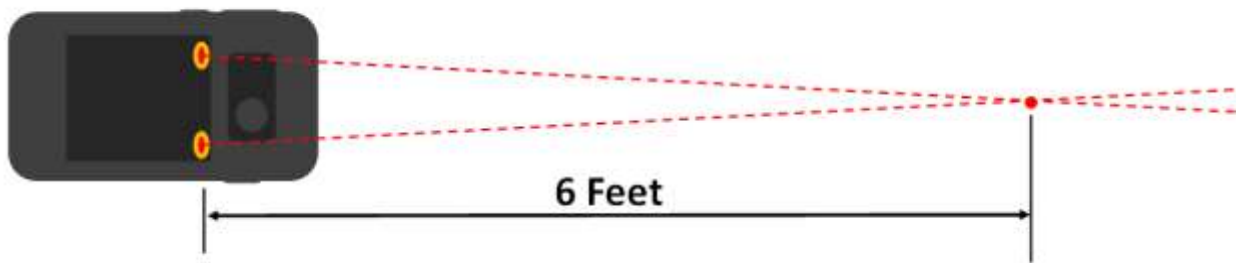


The Isolaser Hands-Free Product Description

Joseph Hall

Introduction

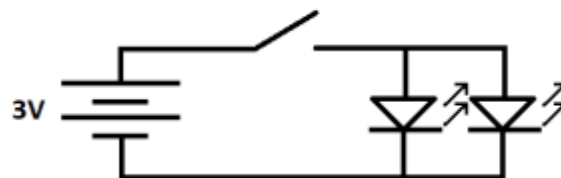
We've all been there, wondering how far 6 feet actually is when around our peers. Some people are good at gauging distance, but when we get the call that someone we were around *has it*, that 6 ft mark is the difference between normal life and 2 weeks of isolation. Nobody is going to go around with a tape measure or a 6 ft radius hoop skirt to keep people at bay, so allow me to introduce an alternative: the Isolaser. With just a quick point and a click, you can tell whether your peers are too close to you, no estimating or tape measures necessary, and if you're slick, they might not even know that you checked.



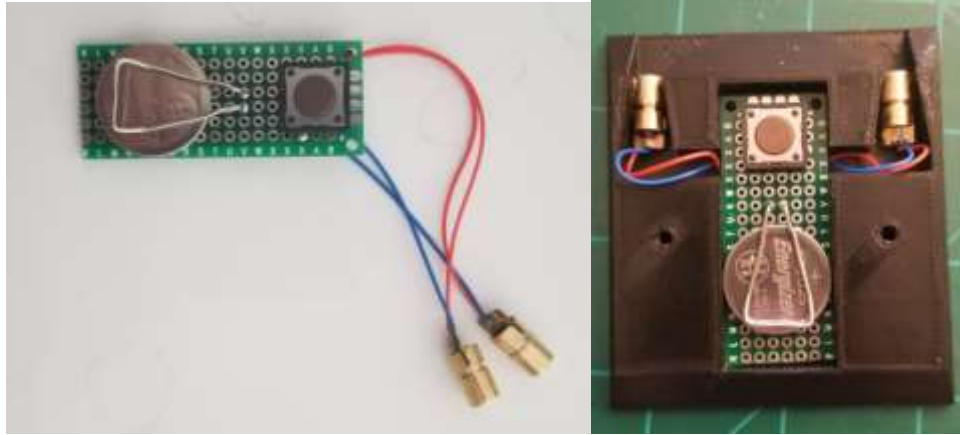
The Isolaser is a small hand-held remote-like device that can be kept in your pocket, or even mounted to your phone. Its double-barrel red diode lasers intersect at 6 feet away, allowing the user to determine whether or not their peer is too close for a pandemic. Its slick compact design allows for subtlety in use, and the use of diode lasers allows for measurement without need for long-range physical tools which helps maintain social distancing during this crucial time.

Methodology

The author started with the circuitry, as that would determine the necessary housing for the device. At its core, the Isolaser is a simple circuit, shown below, consisting of only a 3 volt button battery, a press-to-close button switch, and two red-diode lasers run in parallel.



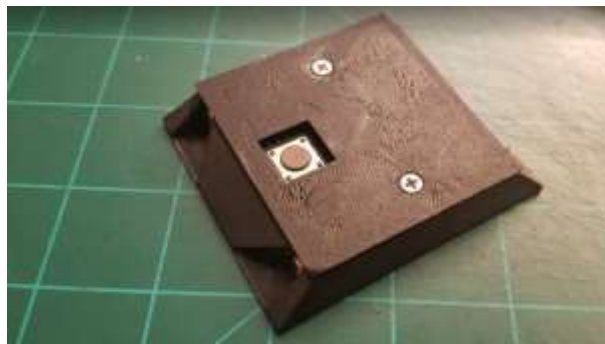
The Battery is held to a circuit board by a flexible metal bracket that also serves as the anode connection, while the cathode is connected by the solder from the diodes. The switch is also mounted to the circuit board, and the laser wires are soldered in as shown, but the wires were left long so the diode directions could be controlled. The final circuit board is shown below.



After the circuit board was constructed, housing was designed in Fusion 360 to keep the circuit board protected, and to hold the diodes in the proper direction, all while maintaining a low profile. The final design for the housing is shown below.

The housing was designed to be wide and flat so as to be mounted to the back of a phone, and the recessed button prevents the diodes from being activated while the Isolaser is in the pocket. The chamfered edges of the design also allow for smooth movement in and out of the pocket.

The housing was printed in black PLA, and the circuit board slips in and can be removed for ease of replacing the battery. The Diodes were then manually focused to a point 6 ft away and secured with glue. Once this was accomplished, the lid was mounted using two screws, the device was adhered to the back of a phone case, and the Isolaser was completed.



Results

The final Isolaser is shown below. The slick black design blends well with the phone case shown, although it can be adhered to many different phone sizes depending on dimensions. To use, simply point the device at one's peer. If there are 2 dots, move the device further away from you, and if they get further apart, then you need to move further away! If there is one dot, you are at least 6 feet away.

The casing is robust and light, and the battery can be replaced with ease. Aside from red clothing, the laser dots show well for a clear measurement. Additionally, the components are simple and cheap which means the Isolaser is a cost-effective way of maintaining socially distanced, especially considering the potential cost of staying home for two weeks in isolation.



Future Work

At its core, the Isolaser is a modified laser pointer, and the simplicity of the circuitry lends itself well to large scale manufacture. Though the housing was 3D printed for the prototype, the design has no cavities, so it would adapt well to injection molding. The manual focusing of the point at 6 ft is the limiting factor, though this may be streamlined with higher precision instruments, but may still require inspection by hand to ensure accuracy before release.

Depending on availability, a combination of laser colors could be used to facilitate measurements. A red laser on one side and a green laser on the other, for instance, would help determine on what side of the focus one may be on.

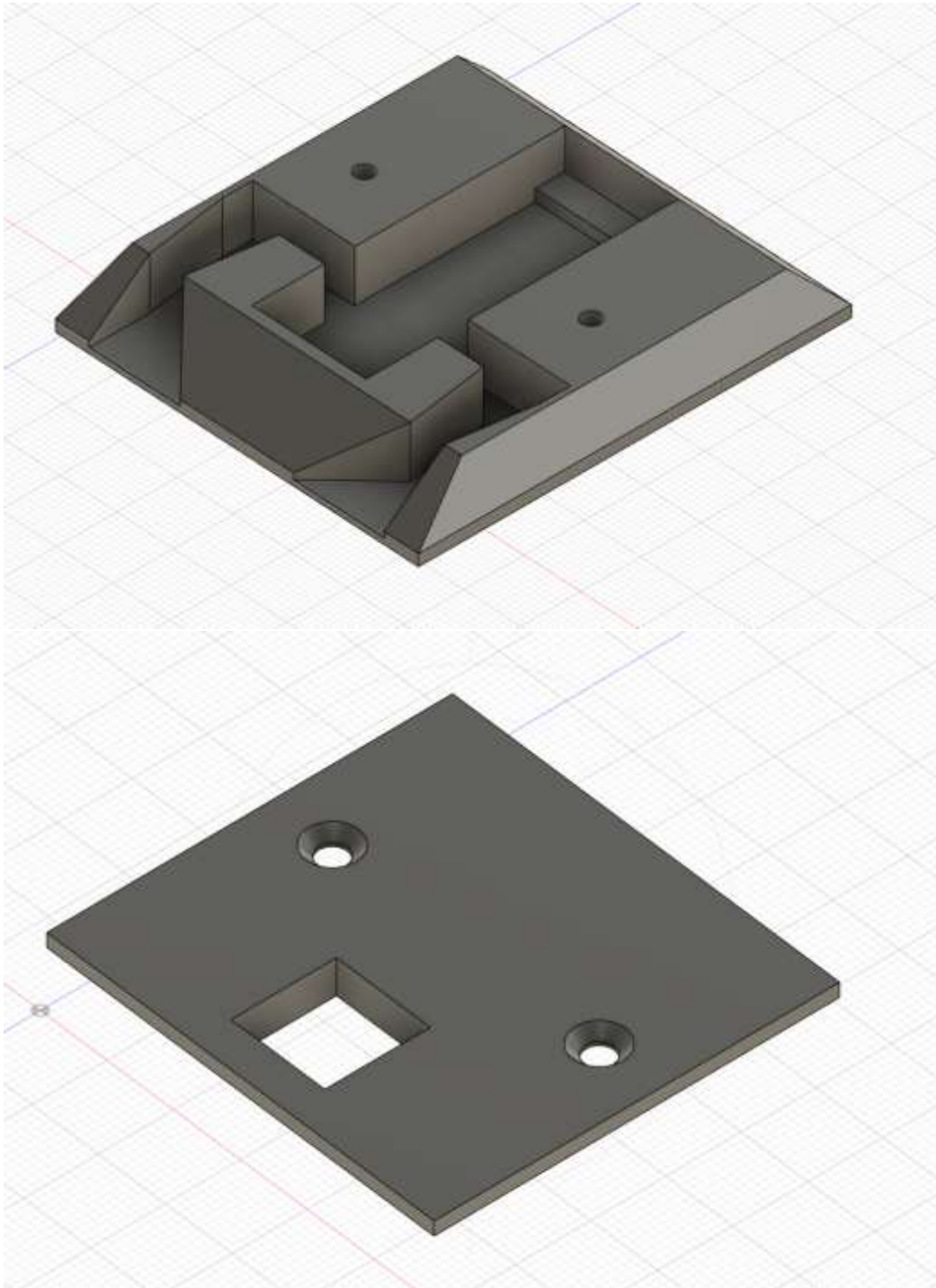
Different mounts could also be applied to the Isolaser to attach it to perhaps a belt, a baseball cap, a clipboard, etc. depending on frequency of use and degree of sleuth desired by the user.

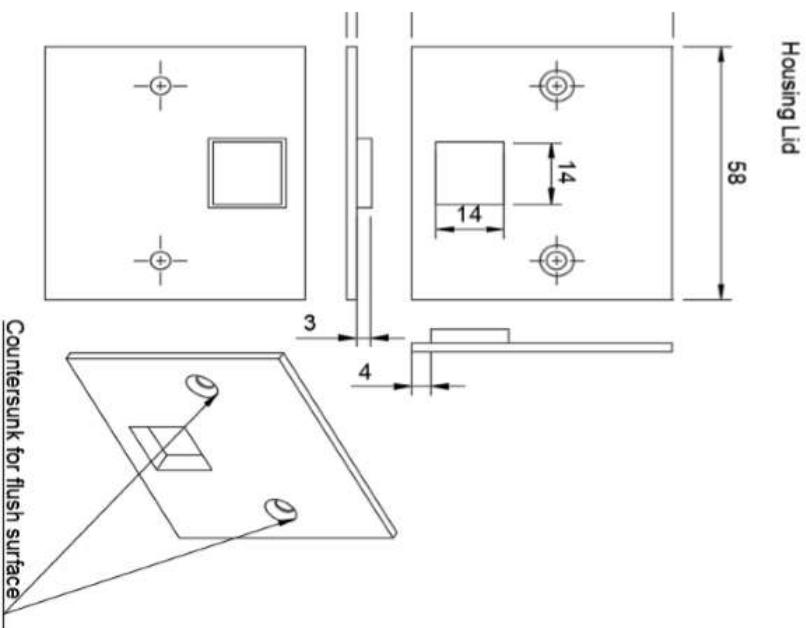
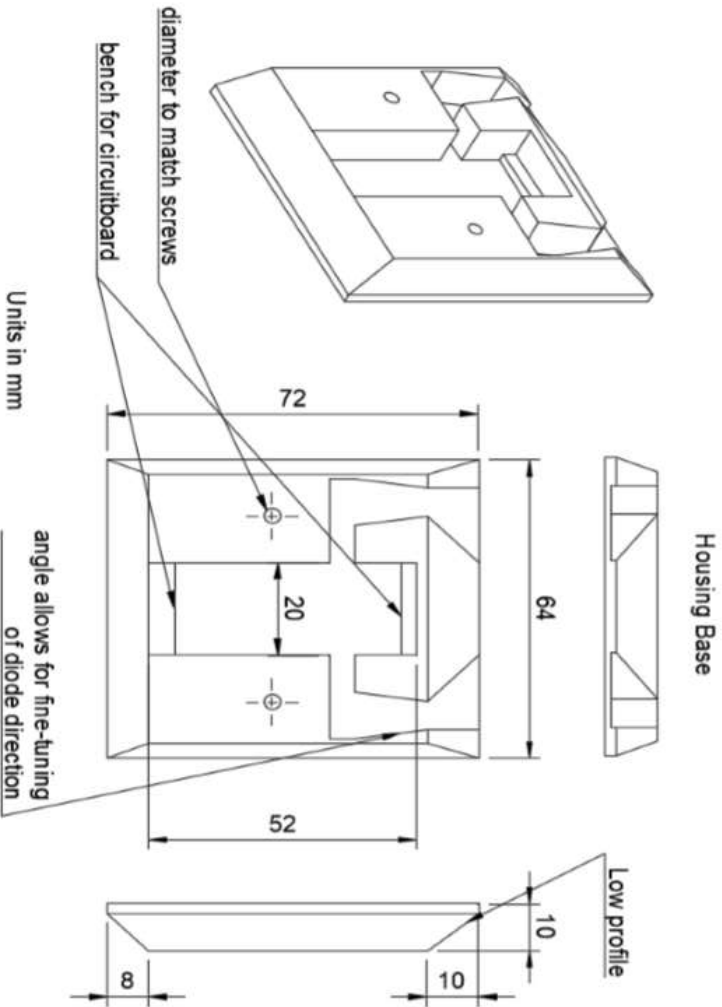
Appendix

Bill of Materials

Product Name	Isolaser	BOM Level	Part #	Part Name	Description	Quantity	Units	Approx. Unit Cost	Cost
Approved By	Joseph Hall	0	1	Isolaser	Base Product	N/A	N/A	N/A	N/A
Approval Date	3/27/2021	1	2	3 Volt Button Battery	Lithium, Energizer 2025	1	each	\$0.79	\$0.79
Part Count	13	1	3	Lid Screws	Phillips head, countersunk	2	each	\$0.36	\$0.72
Total Estimate Cost	\$3.85	1	4	Housing base	black PLA	1	each	\$0.46	\$0.46
		1	5	Housing lid	Black PLA	1	each	\$0.21	\$0.21
		1	6	Phone Adhesive	Adhesive tape	30	cm	\$0.01	\$0.01
		2	7	Red Dot laser Diode	5V 650 nm, 6mm diameter	2	each	\$0.60	\$1.20
		2	8	circuit board	mounts electronics	1	each	\$0.13	\$0.13
		2	9	battery bracket	hold battery	1	each	\$0.02	\$0.02
		2	10	Button	press-to-close button	1	each	\$0.28	\$0.28
		2	11	Wiring	rubber insulated copper	2	cm	\$0.01	\$0.01
		2	12	Solder	Tin/Lead Solder	1	cm	\$0.01	\$0.01
		2	13	Super Glue	Holds Lasers	1	each	\$0.01	\$0.01

Cad Model References





Dept.	Technical reference	Created by	3/27/21	Approved by	3/27/21
		Joseph Hall		Joseph Hall	
		Document type		Document status	
		CAD design		approved	
		Title		DWG No.	
		Housing Base		1	
		Rev.	Date of issue	Sheet	
				1/1	