



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

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Project Title Using 3D-Printing Technology to Improve the Cost-Efficiency of the EyeWriter	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project was to increase the cost-efficiency of The EyeWriter by utilizing 3D-printing technology.</p> <p>Quick Background Info: The EyeWriter is an eye-tracking device that allows Locked-in Syndrome (paralysis excluding the eyes) patients to use their eyes like mouse cursors on a computer screen. The EyeWriter is a public project initiated by Zach Lieberman with the goal of providing low-cost eye-tracking technology to patients. I sought to improve the cost-efficiency even further.</p> <p>Methods/Materials Software with a "Catch Me" mode created by Zach Lieberman. The standard* EyeWriter was created following the directions posted on instructables.com/id/The-EyeWriter. The 3D-printed model was designed and built with no instruction. Tested both prototypes using the Catch Me mode, in which a box is randomly placed on the screen, and stays until the eye cursor is placed on it for 1.2 seconds.</p> <p>*standard refers to the EyeWriter design created by Zach and currently used (no 3D printing); it acts as the "control" for comparison</p> <p>Results The average speed of the standard EyeWriter was 9.8 boxes caught per minute. The average speed of the 3D-printed EyeWriter was 11.4 boxes per minute. The cost of the standard EyeWriter was \$42.45. The cost of the 3D-printed EyeWriter was \$34.89. The cost-efficiency of the standard was 0.23 boxes/minute/dollar. The cost of the 3D-printed model was 0.33 boxes/minute/dollar. The 3D-printed EyeWriter is 43% more cost-efficient than the standard.</p> <p>Conclusions/Discussion This experiment shows that I successfully improved the cost-efficiency of the EyeWriter with 3D-printing technology. This means more Locked-in Syndrome Patients can be treated more effectively with less money. Future projects should probably also utilize 3D-printing technology to maintain cost-efficiency.</p>	
Summary Statement Utilizing 3D-printing technology, I improved the cost-efficiency of the EyeWriter, an eye-tracking device for Locked-in Syndrome patients, who can only control their eyes.	
Help Received Zach Lieberman's instructions allowed me to build a replica of the standard and currently used model, and his software is necessary to use the device. While I designed and built the 3D-printed prototype myself, my friend Nathan Smith allowed me to use his 3D printer.	