



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> <b>Janel (Jihyeon) Lee</b>	<b>Project Number</b> <b>S1413</b>
<b>Project Title</b> <b>An Enhanced Method for Fusing Multiple Exposure Images for High Dynamic Range Scenes</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The goal of this project was the design and construction of a technique that effectively removes blurring and ghosting artifacts in the process of high-dynamic-range (HDR) imaging. The project was targeted toward handheld devices with cameras, including smartphones, which do not have the same capacity as large computer processing units (CPUs) and graphics processing units (GPUs). This improved technique takes HDR images that compensate for changes due to brightness or movement in a scene, producing images of a better quality than currently available. <b>Methods/Materials</b> Using a computer, a program to run the enhanced algorithm was created using Open CV and Matlab. Data sets were found and chosen to compare existing methods to the enhanced method. A camera was also used to test the algorithm on an actual device. <b>Results</b> A better algorithm was developed to successfully remove artifacts that arise due to scene motion and brightness changes in a scene. Without increasing computational complexity, it outperforms other methods by using contrast differences calculated with a Laplacian operator and Poisson blending to adjust images before they are fused. <b>Conclusions/Discussion</b> This project uses the power of HDR imaging to address human error in the use of technology. For point-and-shoot cameras, camera shake and brightness change are common problems, which in turn creates artifacts in photos. This project presents an enhanced solution to remove blurring and ghosting artifacts, producing better results without having to use more computational power. The improved method not only resolves the problems but provides a simplified, more effective solution to be used in handheld devices.	
<b>Summary Statement</b> This project resolves human error in HDR imaging by removing artifacts that are caused by scene motion and brightness change without increasing the complexity of the process, making it fit to be implemented in handheld devices.	
<b>Help Received</b> Mother helped glue things on board	