



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> Adam Z. Noworolski	<b>Project Number</b> <b>J0919</b>
<b>Project Title</b> <b>Stove Alert! A Programmed Safety Device to Aid People with Hearing Loss</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Currently $\frac{1}{4}$ of all older people cannot hear over 4 kHz sounds, which is the sound that stove timers commonly make. The main goal of this project is to create a device that plays a lower pitched sound when it hears that higher pitched one. <b>Methods/Materials</b> First, I developed python code that created a sound recorder, a sound analyzer, and a sound player. Then, I viewed a sonogram that showed that stove alarms beep at 4.0 kHz. After that, I constructed code to listen and detect 4.0 kHz sounds with a bandpass filter, then I played a lower frequency sound. Later, I created a small device. Then, I tested it in a kitchen while an alarm was playing and/or people conversing. Finally, I created a threshold to balance true positives and false alarms. <b>Results</b> I understood what sound kitchen appliances make: 4.0 kHz. Stove Alert! had a 100% sensitivity, specificity and negative predictive value. It also had a 91% positive predictive value. <b>Conclusions/Discussion</b> Over a testing period of 36 hours, or five-million one-hundred and eighty-thousand time samples, the Stove Alert! worked well. Since the purpose was to have hearing disabled people always hear their stove alarm, the 100% sensitivity was the most important feature. The project met the objective.	
<b>Summary Statement</b> The Stove Alert! is a programmed device that assists hearing disabled people with hearing stove timers.	
<b>Help Received</b> Mom and Dad reviewed poster slides and helped teach me about sounds and filters and Dad fixed the sound drivers on the BeagleBone Black.	