

June 13, 2021

Dear Professional Engineers in California Government,

It is a great honor for me to receive the prestigious Marilyn Jorgensen Reece Award at the 71<sup>th</sup> Annual Los Angeles County Science and Engineering Fair 2021. I would like to thank the Professional Engineers in California Government (PECG) and California Department of Transportation for selecting my project from a large pool of candidates, and for organizing a memorable award ceremony to celebrate science and engineering.

I admire Reece for being a pioneer female engineer. She became the first licensed female professional civil engineer (PE) in the State of California, which also recognized her contribution by naming the Santa Monica Freeway and San Diego Freeway Interchange as the Marilyn Jorgensen Reece Memorial Interchange. I am incredibly honored to receive the award representing her achievement and trailblazing spirit.

My research project is titled A Consumer Internet-of-Things Device for On-Site and Regional Earthquake Early Warning. The initial idea came to me after reading a paper in Science about how the earth got “quiet” in terms of seismic noise as a result of the COVID-19 lockdown. I found this really interesting and wondered if I could measure seismic noise right from my home, which quickly evolved into whether I can apply that to earthquake early warning.

The problem I am addressing is earthquakes. Earthquakes are a major global risk, which impacts less developed regions and communities disproportionately. The current earthquake early warning (EEW) systems face many challenges, with their dependence on public funding further exacerbating the issue. The solution I pursued was an alternative consumer-based

approach, developing a low-cost Internet-of-Things (IoT) EEW device that can be mass deployed for earthquake early warning, akin to a smart smoke detector but for earthquakes.

I designed, built, and tested the device over a few generations and many months. The device costs less than \$100 for me to make and is about the size of a Rubik's cube. The low cost and small size are designed to enable consumer adoption. The device successfully detected all earthquakes over the magnitude of M 3.0 near the Los Angeles metro area since September 2020. For earthquakes above the alert threshold, the device issued EEW alerts, sounded the alarm, and sent out text messages to local subscribers. This low-cost EEW device and the consumer-based approach it enables can open great opportunities for earthquake early warning, saving lives and reducing damages.

Once again, I am thrilled to receive the recognition from PECG for my project. I want to thank everyone involved in reviewing the projects, interviewing the candidates, selecting the winners, and hosting an amazing ceremony. I know it was especially challenging this year to organize all the events due to the pandemic, but PECG has made it seamless and memorable. The Marilyn Jorgensen Reece Award will continue to inspire me in science and engineering.

Sincerely,

Vivien He

Palos Verdes Peninsula High School