

Texas Science and Engineering Fair Abstract and Certification

LIFE SHIELD - A Novel System to Minimize Road & Workplace Accidents using a combination of Real Electromechanical & Software Systems, AI & Machine Learning

Shivam Gupta - Friendswood High School, Friendswood, Texas, USA

Time category

Pick one only—
Mark an "X"
in box at right

Animal Sciences	☐
Behavioral & Social Sciences	☐
Biochemistry	☐
Biomedical & Health Sciences	☐
Biomedical Engineering	☐
Cellular & Molecular Biology	☐
Chemistry	☐
Computational Biology and Bioinformatics	☐
Earth & Environmental Sciences	☐
Embedded Systems	☒
Energy: Sustainable	☐
Materials and Design	☐
Engineering Technology: Statics and Dynamics	☐
Environmental Engineering	☐
Materials Science	☐
Mathematics	☐
Microbiology	☐
Physics and Astronomy	☐
Plant Sciences	☐
Robotics & Intelligent Machines	☐
Systems Software	☐
Technology Enhances the Arts	☐
Translational Medical Science	☐

Last year, my mother almost lost her life after getting hit by drunk & drowsy drivers which motivated me to do this project. Moreover, DMV & OSHA estimate that one person dies or sustains severe injuries every 39 minutes due to vehicle accidents or machine mishaps because of drowsiness, fatigue & intoxication. Broadly speaking, approximately 50% of accidents occurring every year are due to these three compromised statuses resulting in loss of thousands of lives and billions of dollars worldwide. LIFE SHIELD is a novel system offering modular, scalable & usable design with a potential to be integrated with new vehicles / machines built. The hardware system accomplishes two critical functionalities – detection of intoxication in real time and detection of drowsiness & fatigue using AI, computer vision / machine learning & IoT. The software system is a simulation that analyzes data feed of the driver's and/ or machine operator's behavior / expressions to detect & predict abnormal behaviors or postures using AI, machine learning through application of sophisticated CNN algorithm (Densenet121 model), & computer vision (OpenCV). In either hardware or software system, if the system detects compromising behavior, it will sound an alarm to alert the driver / operator. The system's front-end and back-end are meticulously designed using Anaconda (open-source artificial intelligence platform for Python) and Spyder (open-source cross-platform IDE) respectively. Results reveal a high level of precision & accuracy in intercepting & processing data and predicting results. I believe my system will significantly improve driver safety and minimize impairment-related accidents.

- As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

☐ human participants	☐ potentially hazardous biological agents
☐ vertebrate animals	☐ microorganisms ☐ rDNA ☐ tissue
- This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only.

☒ yes	☐ no
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- I/We worked or used equipment in a regulated research institution or industrial setting.

☐ yes	☒ no
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- This project is a continuation of previous research.

☐ yes	☒ no
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- My display board includes non-published photographs/visual depictions of humans (other than myself)

☐ yes	☒ no
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- I/We hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work.

☒ yes	☐ no
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Trudi Skinner

Trudi Skinner

Abstract: Science and Engineering Fair of Houston

3210

LIFE SHIELD - A Novel System to Minimize Road & Workplace Accidents using a combination of Real Time Electromechanical & Software Systems, AI & Machine Learning

Shivam Gupta

Envision Academy, Houston, TX

Category

Energy and
Transportation

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- ☐ yes ☒ no

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- ☐ yes ☒ no

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- ☐ yes ☒ no

6. I/We hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work.

- ☒ yes ☐ no

