

Governors Highway Safety Association

Behavioral Traffic Safety Cooperative Research Program (BTSCRCP)

FY 2024

This is an opportunity to suggest research needs for the Behavioral Traffic Safety Cooperative Research Program (BTSCRCP – <https://www.trb.org/BTSCRCP/BTSCRCP.aspx>). These problem statements are **not proposals** to conduct the research, but rather identify real-world research needs that will be considered for potential funding by the BTSCRCP.

The BTSCRCP undertakes research for any **behavioral** issue faced by traffic safety stakeholders. Particular emphasis areas are alcohol-impaired driving, autonomous vehicles, bicyclists and pedestrians, child passenger safety, distracted driving, drowsy driving, drug-impaired driving, law enforcement, mature drivers, motorcyclist safety, seat belts, speed and red light cameras, speeding and aggressive driving, teen driver safety, and traffic records.

Anyone can write or submit a problem statement or statements. The BTSCRCP is dedicated to diversity of ideas, panelists, disciplines, and research contractors. Submissions from individuals and organizations outside the traditional fields of traffic safety are also encouraged.

Research Problem Statement Template

I. POSSIBLE PROJECT TITLE – Keep it short, concise

Regulation of Light Emitting Diodes in Transportation

II. RESEARCH AREA (if more than one applies, check the one you think best applies)

<input type="checkbox"/> Alcohol-Impaired Driving	<input type="checkbox"/> Mature Drivers
<input type="checkbox"/> Autonomous Vehicles	<input type="checkbox"/> Motorcyclist Safety
<input type="checkbox"/> Bicyclists and Pedestrian Safety	<input type="checkbox"/> Seat Belts
<input type="checkbox"/> Child Passenger Safety	<input type="checkbox"/> Speed and Red Light Cameras
<input checked="" type="checkbox"/> Distracted Driving	<input type="checkbox"/> Speeding and Aggressive Driving
<input type="checkbox"/> Drowsy Driving	<input type="checkbox"/> Teen Driver Safety
<input type="checkbox"/> Drug-Impaired Driving	<input type="checkbox"/> Traffic Records
<input type="checkbox"/> Law Enforcement	<input type="checkbox"/> Other: _____

III. RESEARCH PROBLEM STATEMENT – Describe the problem this research can help solve. Describe why the research is needed, how it will address a current behavioral traffic safety issue, and how it could be applied by State Highway Safety Offices.

The switch to Light Emitting Diodes by the auto industry and government has created significant and serious safety hazards. LEDs emit a directed beam of spatially non-uniform visible radiation

that does not disperse over distance following an inverse square law. Neither the government nor standards bodies have created any regulations for these LED devices to ensure the comfort, health, and safety of the public.

What is needed is a new set of regulations for LED products used in the transportation sector. The regulations would specify restrictions on peak luminance, spatial non-uniformity, spectral power distribution, and square wave flicker. In addition, the use of LED strobe lights has created dangerous conditions for those who cannot neurologically tolerate this type of pulsed visible radiation. Restrictions must be set to protect people with epilepsy, migraines, autism, PTSD, and others.

IV. RESEARCH OBJECTIVE – Identify the outcomes/products to be produced by the research.

First, identify the differences between curved surface light sources such as tungsten filament and gas-discharge and flat surface light sources such as LEDs. Clearly show that LEDs emit a directed energy beam that has a Lambertian spatial shape and that does not disperse over distance following an inverse square law.

Second, identify the neurological responses of LED visible radiation on among the wide range of human sensitivities. It has already been documented that LEDs trigger seizures, migraines, anxiety, and eye injury. Identify how many people are adversely affected by LED visible radiation.

Third, identify the impacts of spectral power distribution on vision and eye cells. Blue wavelength light can be particularly toxic and can cause long-term cumulative cell damage. Blue wavelength greatly increases disability glare.

Fourth, identify the impacts of square wave flicker on the nervous system, especially for those who are highly sensitive to such square wave flicker.

Fifth, identify the impacts of pulsed LED visible radiation such as used in RRFBs, LED signs, and the LED strobe lights used on emergency vehicles.

Sixth, propose regulations to protect the public from the harms and distractions of LED directed energy visible radiation, including restrictions on peak luminance, spatial non-uniformity, spectral power distribution, square wave flicker, and flash characteristics.

V. IMPLEMENTATION PLANNING - Identify any significant barriers that could constrain implementation of research results, and suggest any activities you think would be helpful to facilitate and expedite implementation.

The current barrier to implementation is the lack of understanding by government and industry scientists about the characteristics of flat surface LED visible radiation. While the physicists and engineers in the LED display industry are fully aware that the brightness of LEDs must be measured with luminance in lumens per steradian per square meter, the majority of physicists and engineers in the LED lighting industry are unaware of this. A research and education process is necessary to correct this misunderstanding of LED visible radiation characteristics.

VI. RELATED RESEARCH (OPTIONAL) - List related research you are aware of; describe gaps, and describe how this proposed research project would address the gaps.

Dr. Nisa Khan - Derivation and Experimental Verification of the Near-field 2D and 3D Optical Intensities From a Finite-size Light Emitting Diode (LED):

<https://ieeexplore.ieee.org/document/8879542>

Cree Lighting – Is Street Lighting Damaging Our Health?:

<https://online.flippingbook.com/view/702884488/>

Soft Lights Foundation – Petition to FDA to regulate LED products -

<https://www.regulations.gov/document/FDA-2022-P-1151-0001>

Soft Lights Foundation – Petition to DOE - <https://www.softlights.org/wp-content/uploads/2022/12/Combined-DOE-Petition.pdf>

Soft Lights Foundation – Petition to NHTSA - <https://www.softlights.org/wp-content/uploads/2022/12/NHTSA-Petition-to-Require-Inverse-Square-Law-Lamps.pdf>

The Department of Energy claims that the visible radiation from LEDs has the same characteristics as the visible radiation from a tungsten filament. This is incorrect. NHTSA claims that the spatial characteristics of the light source for an LED headlight are immaterial. This is incorrect. These research studies and petitions explain why these statements from the DOE and NHTSA are incorrect. A formal research study would make clear for the DOE, NHTSA, and the FDA that LED visible radiation has entirely different characteristics compared to curved surface light sources and that LEDs need an entirely new set of regulations.

Guidance on how to submit found [here](#).

Questions on the process can be directed to egriswold@nas.edu.