

Salamander Research Image Competition

2026



Showcasing FPE Research!

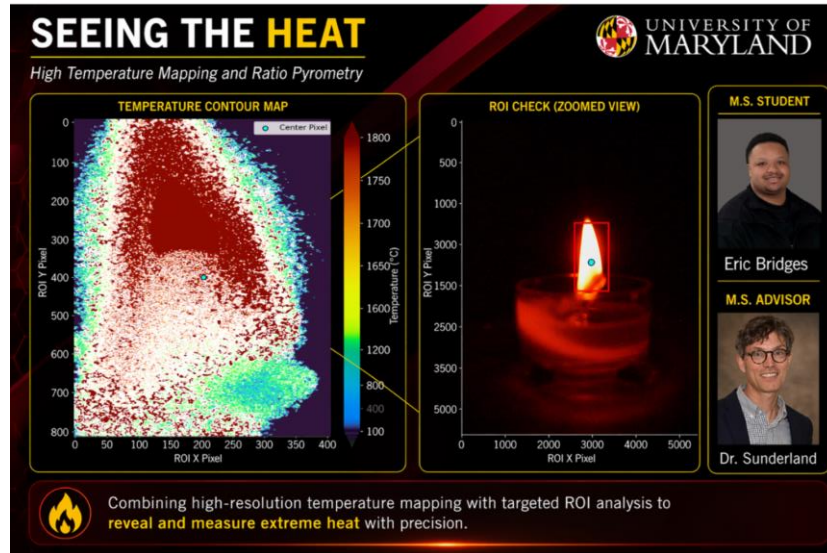
The UMD Fire Protection Engineering Research Image Competition is an opportunity for graduate and undergraduate research students to showcase their innovative research through compelling imagery. We encourage submissions that highlight the visual aspects of your work, whether it's experimental data, simulations, or visualizations.



Seeing the Heat: High Temperature Mapping and Ratio Pyrometry

Photo by: Eric Bridges, master's student

Faculty Advisor: Dr. Peter Sunderland



The images shown depict a temperature contour plot generated by converting the RGB pixel channel intensities from a photograph captured with a digital camera into quantitative temperature data. By analyzing the red, green, and blue light values recorded at each pixel, the imaging process estimates spatial temperature distributions and transforms them into a visual map of thermal gradients. This allows areas of varying temperature to be identified and compared through contour patterns and color variation.

Transient Flame Behavior of PMMA in a Fire Propagation Apparatus

Photo by: Farnaz Beygi Khosrosha, PhD student

Faculty Advisor: Dr. Stanislav Stoliarov



A flame burning above a clear PMMA sample inside a Fire Propagation Apparatus (FPA), a system used to study material flammability under controlled conditions. As the material heats and softens, the fuel release becomes unsteady, leading to visible changes in the flame. The heaters were turned off, capturing the flame as it decays toward extinction.

Lithium-Ion Batteries on Fire

Photo by: Jessica Gallo, undergraduate student

Faculty Advisor: Dr. Noah Ryder

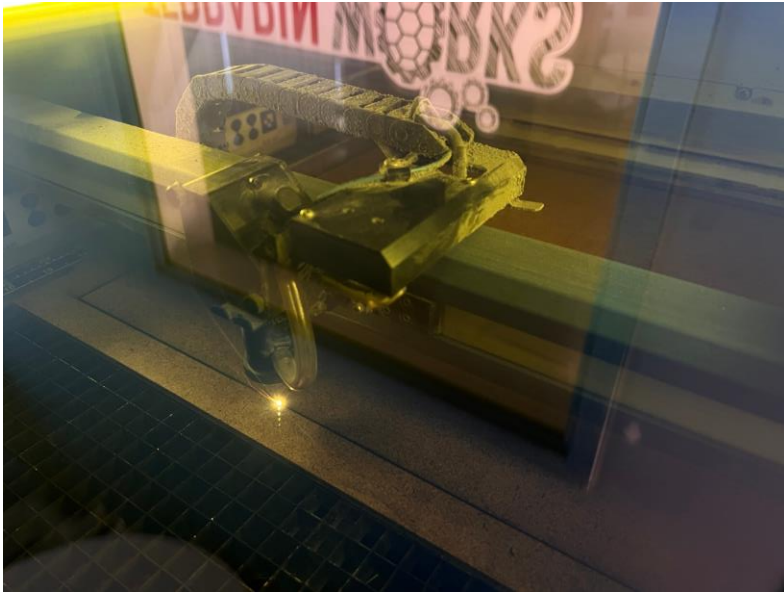


Three different battery chemistries are shown during thermal runaway. The left is a lithium nickel manganese cobalt (NMC) battery, producing jet-like, sparking flames similar to an electrical fire. The middle is a lithium iron phosphate (LFP) battery, exhibiting broader, more uniform flames resembling a gaseous fuel fire. The right is a sodium-ion battery, which typically burns with smaller, less intense flames.

Sounds that Spark (Joy)

Photo by: Jillian Tamayo, undergraduate student

Faculty Advisor: Dr. Stanislav Stoliarov



When laser cutting a piece for your next project, what do you notice? Maybe it's the frantic little sparks that remind one of a stormy summer day in the middle of July, or perhaps it's the smell of burnt wood reminiscent of a roaring campfire. Maybe it's the whirring of the machine singing the tune of progress, or perhaps the push and pull of trial and error. The laser cutting of this fiberboard is one of the many steps involved in investigating the utilization of sound in silencing flames.

A Phantom Over Ventura - An ELMFIRE Simulation

Photo by: Mateo Giorgi, PhD student

Faculty Advisor: Dr. Arnaud Trouve

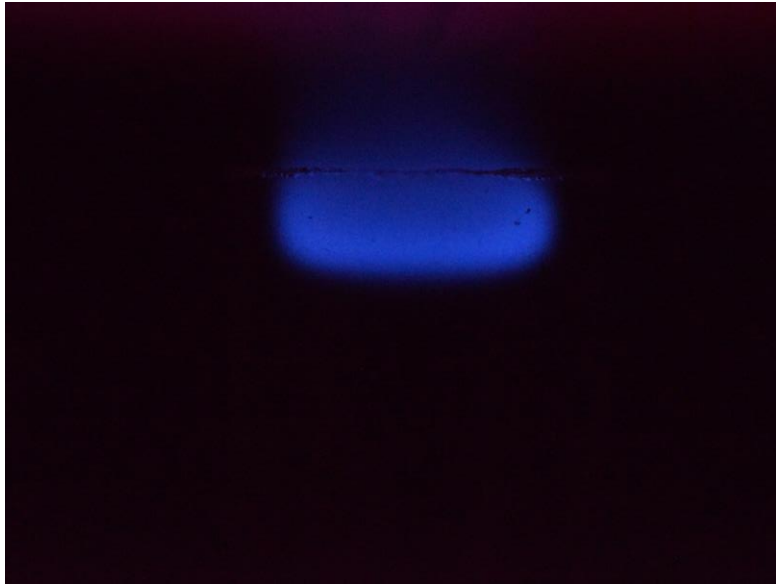


This image overlays multiple fire perimeter snapshots, captured at successive hourly intervals, from an ELMFIRE physics-based wildfire spread simulation of the 2017 Thomas Fire (Ventura County, CA) onto satellite imagery. Together, these temporal layers form a fiery silhouette (evoking Calcifer from Miyazaki's Howl's Moving Castle) hovering over the city, a visual record of how one of California's largest wildfires evolved across the landscape, supporting research into fire propagation and firebrand transport in Wildland-Urban Interface environments.

Cool Diffusion Flame of Heptane

Photo by: Subhojit Roy, PhD student

Faculty Advisor: Dr. Peter Sunderland

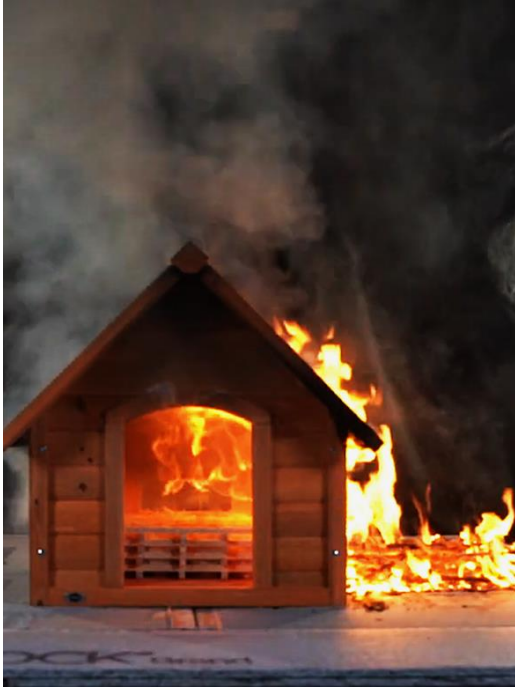


Cool diffusion flames are low-temperature flames where we don't see the usual yellow or red flame. Instead, it is a blue flame that burns at a very low temperature, around 700K. It has low emissions compared to hot flames. Cool diffusion flames can open doors to new combustion technologies by increasing the combustion efficiency

Fire Spread Through Openings in Compartments

Photo by: Tejas Rawool, master's student

Faculty Advisor: Dr. Shuna Ni

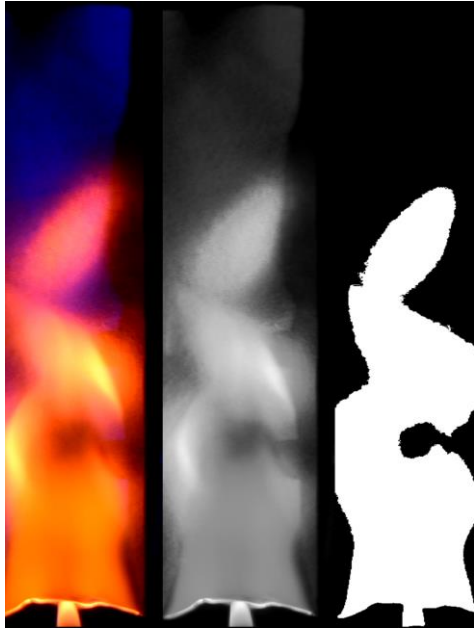


This image depicts a compartment fire in which flames from an external fuel source impinge on a structure, resulting in window ignition and subsequent internal fire spread. The flame plume illustrates intense heat transfer and the critical role of openings in enabling fire penetration. The interaction between exterior flames and structural elements highlights key fire dynamics, including flame attachment, radiative heat exposure, and ventilation-driven flow. This scenario reflects common fire spread mechanisms in built environments and underscores the importance of fire-resistant materials and design strategies to limit fire propagation.

Capturing Flame Spread and Height on Fabrics

Photo by: Thomas Roche, PhD student

Faculty Advisor: Dr. Fernando Raffan-Montoya

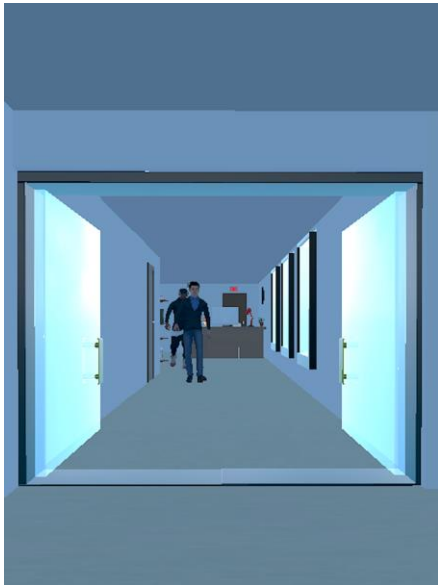


Flaming combustion along a cotton sample in the Vertical Flame Test. Left image shows the video as-captured, the middle image shows the same flame in grey-scale, and the right image shows the binarized flame. A semi-empirical model is being developed to predict the flame height and spread rate with milligram samples. These images help confirm if the model is accurately describing the expected phenomenon.

When the Familiar Becomes Urgent: Evacuation Decisions in a Virtual World

Photo by: Ziling Zhang, PhD student

Faculty Advisor: Dr. James Milke



This image depicts a virtual reconstruction of our department's front entrance, faithfully replicating the real hallway, front desk, and entry doors. Familiar spaces become the setting for urgent decisions as virtual occupants move toward exits, transforming everyday environments into simulated emergency scenarios. By examining the interactions among people, exit signage, and social influences, this research reveals patterns in evacuation behavior and decision-making. The insights gained support the design of more effective evacuation strategies and guidance systems, helping transform familiar places into safer spaces when emergencies arise.

Judging Criteria

Visual Appeal

How aesthetically pleasing and engaging is the image?

Scientific Significance

How well does the image represent the research and its impact?

Clarity & Explanation

How clear and informative is the accompanying caption?

**Protect people. Protect property. Defend the Environment.
Fire Protection Engineering research saves lives!**



Two Award Categories

Popular Vote

Open to UMD students and the community during Maryland Day 2026

Faculty Vote

The fire protection engineering faculty were invited to choose a technical winner

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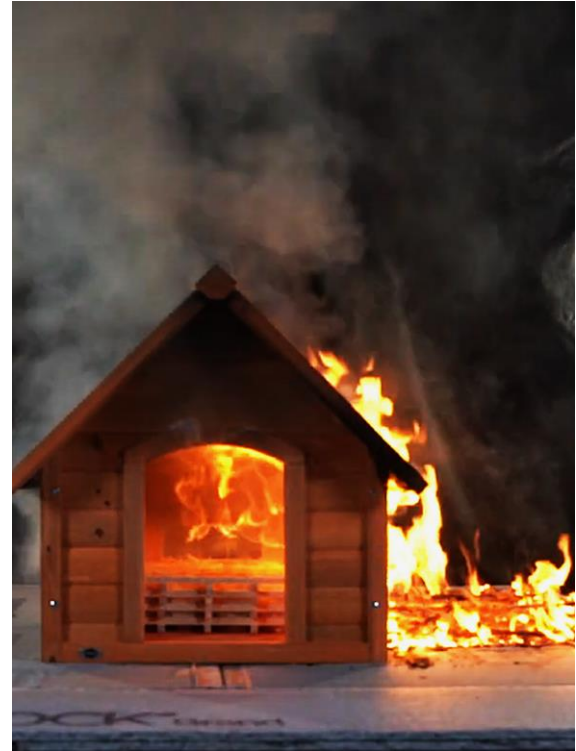
➤ AND THE
WINNERS ARE....



POPULAR VOTE WINNER!

Fire Spread Through Openings in Compartments

Photo by: Tejas Rawool, master's student
Faculty Advisor: Dr. Shuna Ni



TECHNICAL VOTE WINNER!

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THANK YOU

To all students who submitted photos, and the faculty, staff, student, and community members who voted.

