# Cool Coat: An Advanced Wearable Thermal Management Solution for Harsh Environment

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## Background

- Workers are often exposed to harsh environments with extreme temperatures, posing **serious risks to their health and safety**[1].
- The Cool Coat project utilizes **carbon veil fabric**, known for its high thermal conductivity, combined with **thermoelectric cooling** sources and fans to create wearable garments for efficient thermal management.
- This innovation aims to enhance comfort and productivity for workers in **harsh environments**, potentially benefiting first responders and military personnel in hot conditions.

## Objectives

- Demonstrate the Cool Coat concept integrating carbon veil fabric, fans, and thermoelectric coolers with a focus on user comfort and functionality.
- Compare performance between Cool Coat and a control coat, **analyzing temperature, efficiency, and wearer comfort.**
- Evaluate the effectiveness of the Cool Coat in **cooling distribution.**
- Identify **areas** for improvement for future iterations.

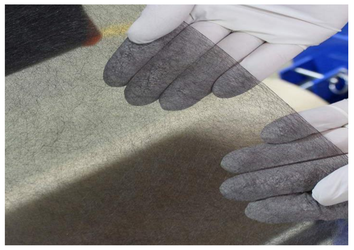
## Research Design and Methods

**Design & Fabrication:** Introducing the Cool Coat with integrated carbon veil fabric, thermoelectric elements, and controlled by an app, alongside a basic control coat for comparison.

**Experimental Setup:** Using infrared cameras, the performance of both coats is assessed during light, medium, and heavy exercise scenarios.

**Data Analysis:** Detailed evaluation of the Cool Coat's thermal efficiency and comfort against the control coat with statistical insights.

## Preliminary results

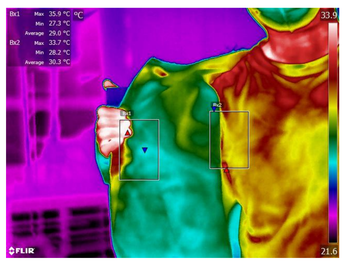


Carbon veil fabric

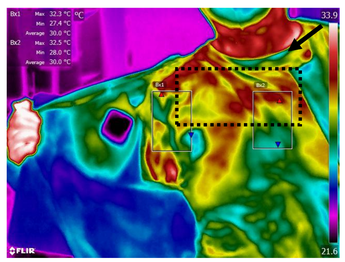

Thermoelectric device

Fans jacket

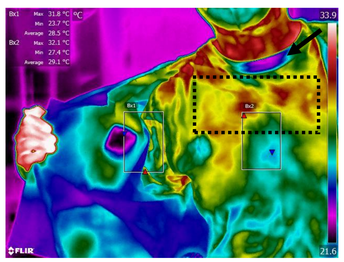
Infrared camera FLIR T640



No cooling



No carbon veil + cooling



Carbon veil + cooling

## Expected results

- Cool Coat shows superior thermal management compared to control coat, **regulating temperature and reducing heat risks.**
- Novel approach of **wearable thermal management** utilizing carbon veil, thermoelectric devices, and fans.
- Potential to transform personal thermal management with **a cost-effective, lightweight, and user-friendly design.**
- Prospect of influencing future wearable tech advancements, **boosting safety and health** in demanding conditions.

## Future directions

- Scale up production exploration
- Real-time temperature tracking and notifications.

## Acknowledgement

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## References

1. Kanan et al, Automation in Construction 88 (2018): 73-86.
2. Chen et al, Aiha Journal 643 (2003): 352-359.