

### Abstract

One effective infection prevention method is regularly disinfecting the environmental surfaces of public areas. However, no method currently identifies where and how much others have touched a particular door or shelf. This exhibition introduces a visualization system that identifies touched places by overlay projection. When a person touches an object, her hand's heat remains on its surface. This heat trace can be captured by thermography cameras. By combining Near Infrared (NIR) and thermography cameras, we can **detect the touched places with a light algorithm**. This technology enables us to **identify the objects or places that others have touched**, although the virus itself remains invisible to the naked eye. We believe that our system will help relieve anxiety during the COVID-19 pandemic. It will also enable us to gather statistics and data about the places touched by people and improve the efficiency of disinfection activities.

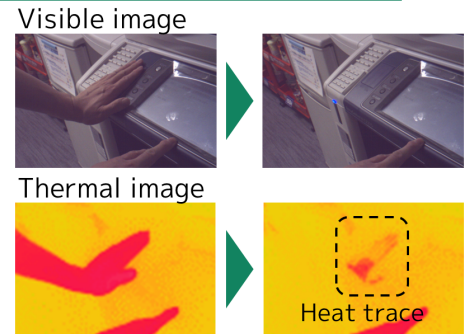
### COVID-19 related anxiety

- Infection prevention
  - Hands → washing and sanitizing
  - Air → ventilation
  - Environmental surfaces (public areas)
    - Regular disinfection steps
    - Where and how much did others touch?

Visualizes touched places

### Touched-places detection using heat traces

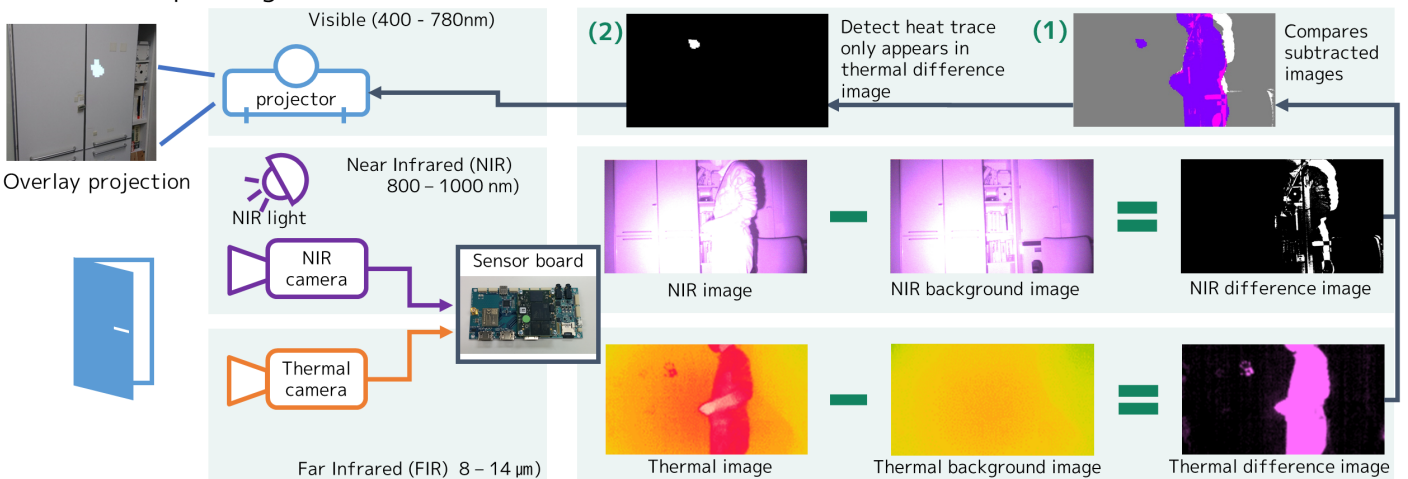
- Heat from hands remains on object surfaces after they are removed.
- Touched places can be detected by heat traces captured by thermography.



### System architecture

- Separate wavelengths simplify image processing
- Visible: information projection
- NIR: capturing people's movements (no influence from projector)
- FIR: capturing heat trace

- **Light algorithm** to detect heat traces by combining thermography and NIR cameras.
  - (1) Compares their background images
  - (2) Detects heat trace that only appear on thermal images.
- **Enable us to identify the touched places** by others.



### References

[1] Y. Kishino, Y. Shirai, Y. Yanagisawa, K. Ohara, S. Mizutani, T. Suyama, "Identifying Human Contact Points on Environmental Surfaces using Heat Traces to Support Disinfect Activities," *SenSys2020 COVID-19 Pandemic Response*, 2020.

### Contact

Yasue Kishino / Learning and Intelligent Systems Research Group, Innovative Communication Laboratory  
 Email: cs-openhouse-ml@hco.ntt.co.jp