Thermal Non-Line-of-Sight Imaging
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How to see around corners?
We propose a novel non-line-of-sight (NLOS) imaging framework with long-wave infrared (IR). Surface reflectance has a much stronger specular reflection in the long-wave IR spectrum than in the visible light spectrum. We formulate a light transport model that leverages these favorable physical properties of long-wave IR. Specifically, we demonstrate 2D shape recovery and 3D localization of a hidden object. Furthermore, we demonstrate near real-time and robust NLOS pose estimation of a human figure, the first such demonstration, to our knowledge.

Our Novel Approach: Integrate Thermal BRDF Model with Pose Estimation
The canonical scene setup consist of a camera looking at the wall at a corner.

Our approach:
1. Integrate Thermal BRDF Model with Pose Estimation
2. Demonstrate 2D shape recovery and 3D localization of a hidden object
3. Demonstrate near real-time and robust NLOS pose estimation of a human figure

Comparing the proposed methods with the related NLOS imaging methods.

References

Conclusion
We believe that long-wave IR could be the method of choice to see around corners for many applications. Our results are powered by the simplicity of a one-bounce problem and a strong specular surface reflectance. Future work can build upon such favorable physics to further realize the vision of a camera that can see around corners.

Analysis on failure cases.
Comparing HOG features in raw frames and denoised frames.

Future work can build upon such favorable physics to further realize the vision of a camera that can see around corners.