Reaction Report X: Turning Corners into Cameras: Principles and Methods

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Identify one idea in the paper that you feel is a major contribution or a major limitation, explain it, and discuss why it is important

The author proposed a method to reconstruct the hidden scene from the corner using analyzing the way light bounces off surfaces (0.1% intensity changes captures), note that the information is captures from the penumbra (effect of change on ground's radiance) instead of the shadow. I think the major contribution of this work is because its universality, it works for both indoor and outdoor environments, on various type of surfaces, using consumer camera instead of traditional expensive time of light camera, it doesn't require prior information of the target (e.g. shape, material), and even can use stereo vision to estimate location of object in case of multiple corners! The authors found that the reflected light as varying angle and the observed could explain the intensity or light on the penumbra. To be specific, the angular derivative of the penumbra's difference from the reference frame is a good indicator for the change in hidden scene overtime. In practice, at every time step, the observed pixels are related to the 1D angular projection using likelihood, also this discrete approximation is improved by spatial smoothness and a maximum a posteriori due to limit information. This contribution cleared the path of many potential application such as surveillance, search and rescue in extreme environment.

Describe one idea of yours that builds on the paper and expand on that idea as much as possible

Two potential directions from this research could be camera and light condition. As the paper stated, this could help automotive pedestrian safety, but I think for moving car the system needs to take into account of both motion and light. Motion problem could be compensated by precise sensors such as lidar, but for no-lidar system such as Tesla, the relative speed of the car versus that of pedestrians is to high and camera without glimbal could be shaky. I am not sure it would make a difference in safety control, unless it is used to track other cars (may be we can estimate the speed of hidden objects). In the other hand, this system would be very useful for rescue/surveillance missions (e.g. hard to reach areas, toxic environment). I think the authors can focus more on settings with multiple corners to localize and track the moving subjects in hidden scenes. Also I wonder how the uncommon light settings (flashing) would affect the system, perhaps the separating the light patterns could be a solution too.