On Utilizing Smartphone Time-of-Flight Sensors to Detect Hidden Spy Cameras Sriram Sami, Sean Rui Xiang Tan, Bangjie Sun, Jun Han 1. Problem 2. Our Solution: LAPD • Automatically locating hidden cameras using • Hidden Cameras are laser time-of-flight sensors on smartphones • Inexpensive **Difficult to detect** Ο **①** Time-of-Flight (ToF) Laser • Background: Hidden Cameras Reflect More Light Than Other Objects



- State-of-the-art "Hidden Camera Detectors" are Limited
 - Manual human judgement with high false positive rates
 - Must additionally carry specialized "one-use" device



• Insights

Reflection from

hidden camera

- ToF sensors can detect reflected light **intensity**
- Bright reflections could be hidden cameras Ο

ToF Reflected Light Intensity

2 Reflection

Extra

Material

5





Detector





• Solving Challenge 2: Low ToF Resolution and Bit-Depth

• Use physics-based and deep-learning filters to maximize information

Candidate	
Region	Extraction

Shape and **Distance Filters** **Deep Learning Filter** (Mobile, Real-Time)

Final Output







- Using smartphone flashlight to improve accuracy





Limitations

- Per-object scan speed
- ToF sensor availability

