

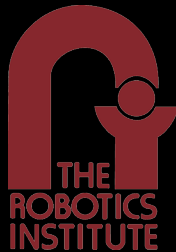
Passive Micron-scale Time-of-Flight with Sunlight Interferometry

Alankar Kotwal ¹

Anat Levin ²

Ioannis Gkioulekas ¹

¹ Carnegie Mellon University



² Technion



https://imaging.cs.cmu.edu/sunlight_interferometry



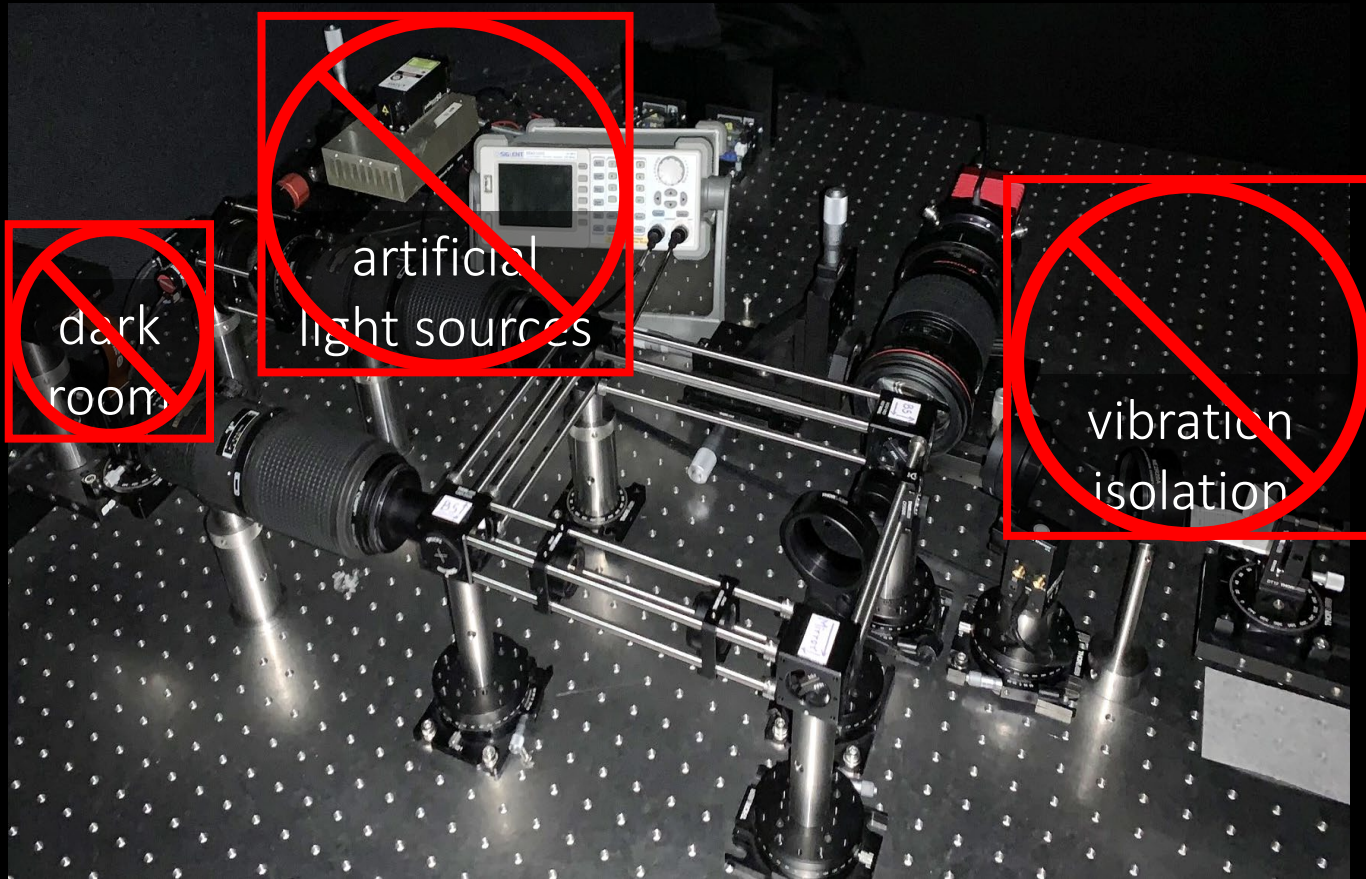
dark room
with curtains

artificial
light sources

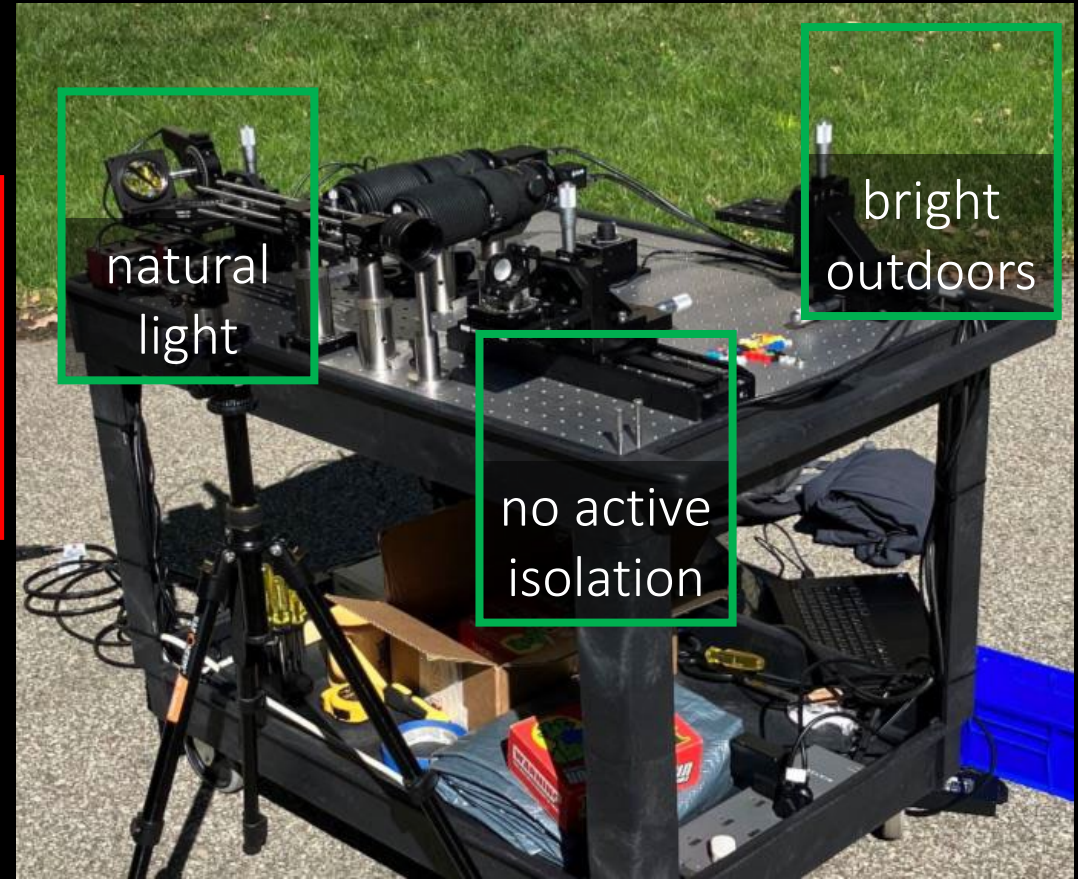
pneumatic
vibration
isolation



Passive micron-scale depth sensing

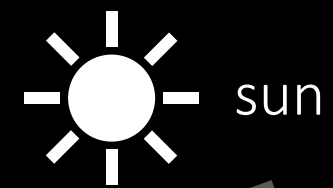


[Kotwal *et al.*, 2020]

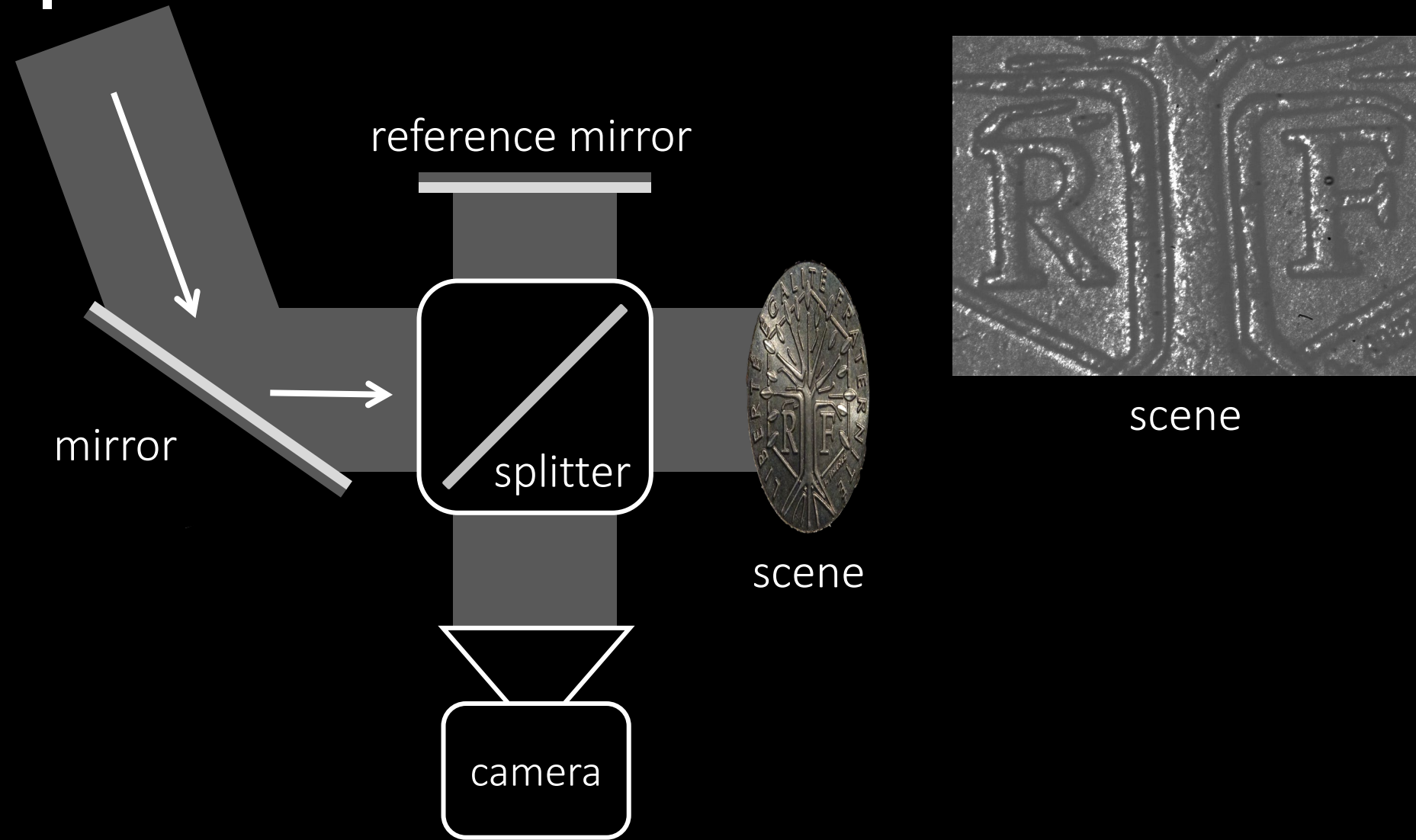


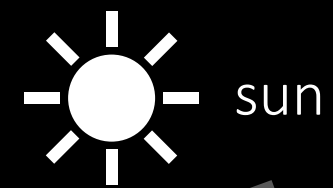
ours



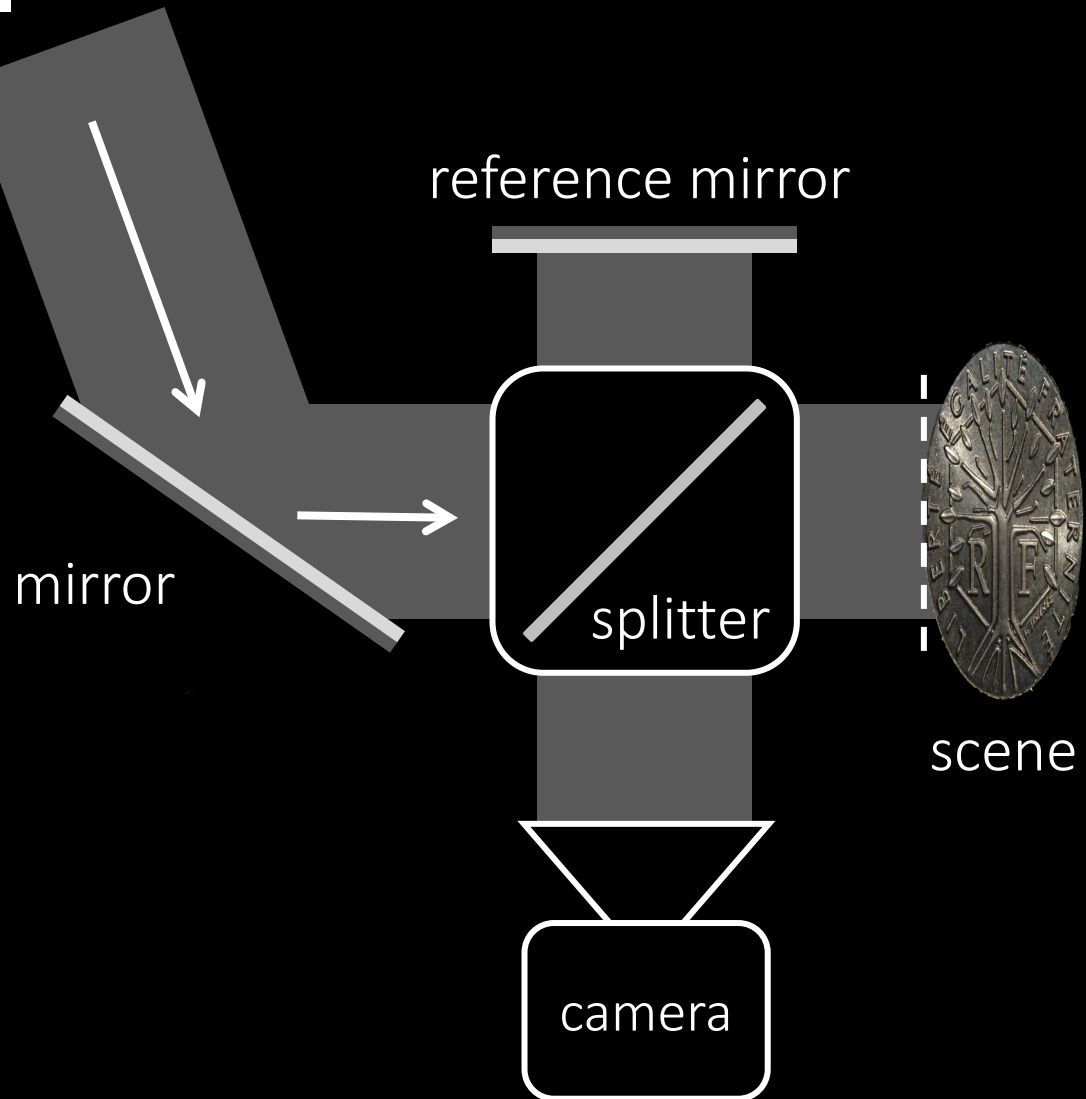


Passive micron-scale depth sensing





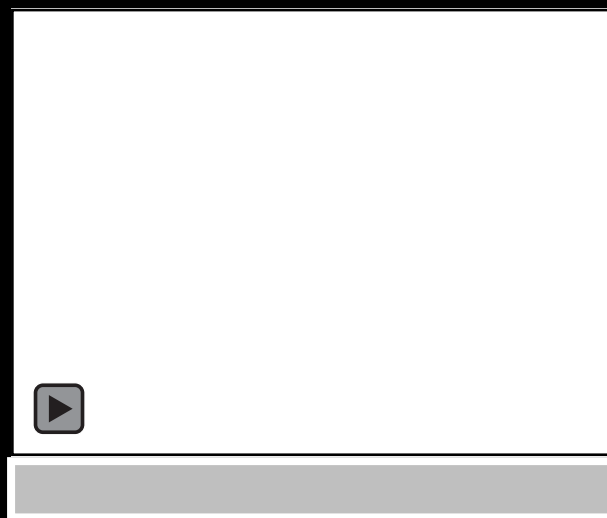
Passive micron-scale depth sensing



scene



depth map

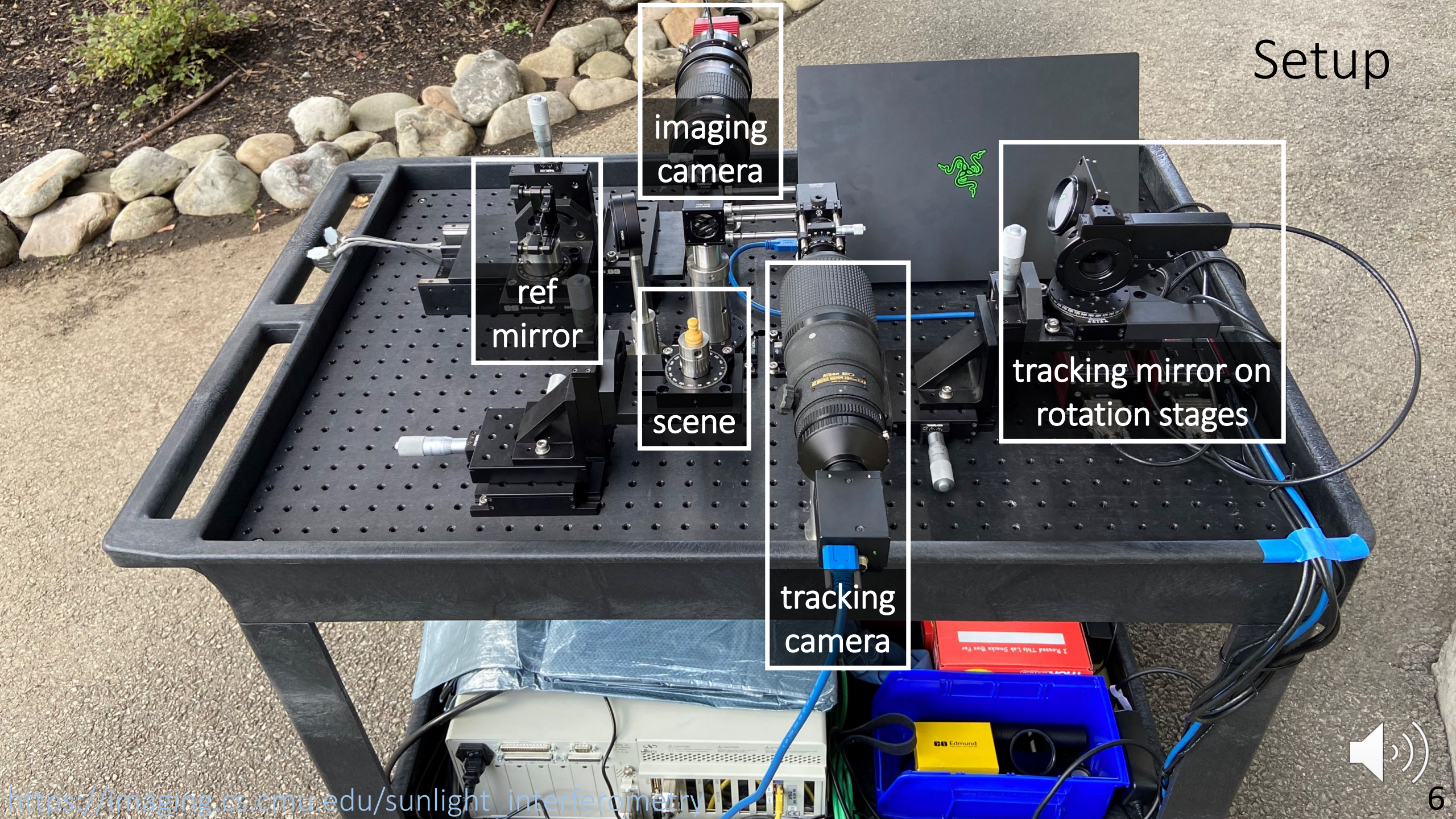


input images



scene transient

Setup



imaging
camera

ref
mirror

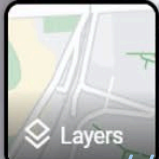
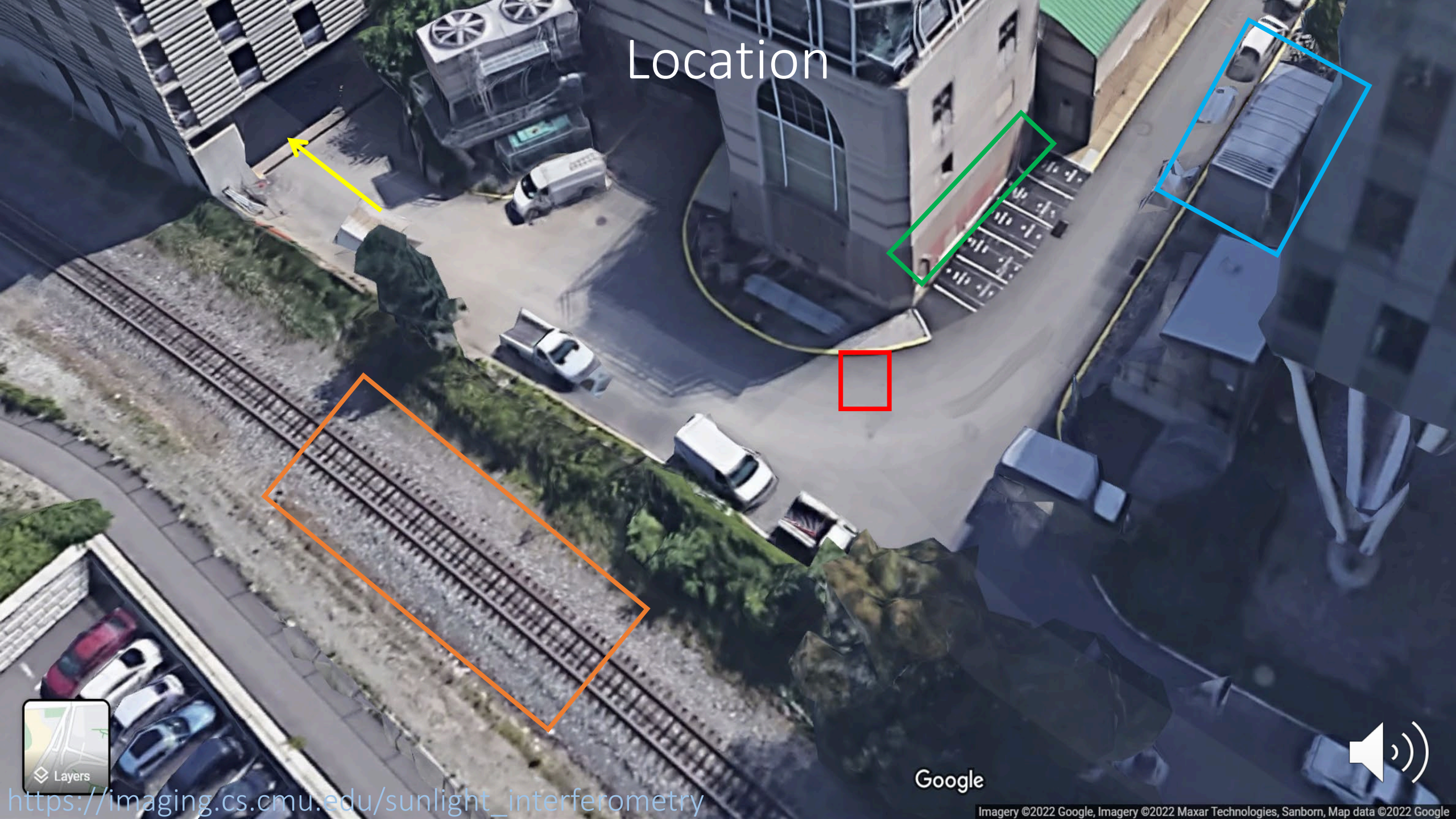
scene

tracking
camera

tracking mirror on
rotation stages



Location



Google

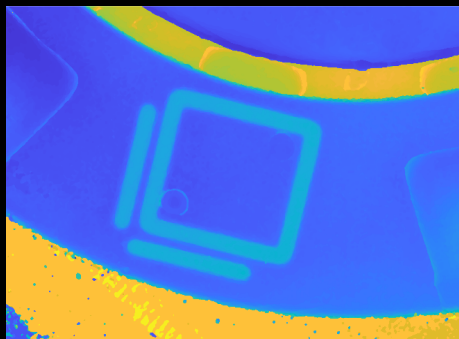




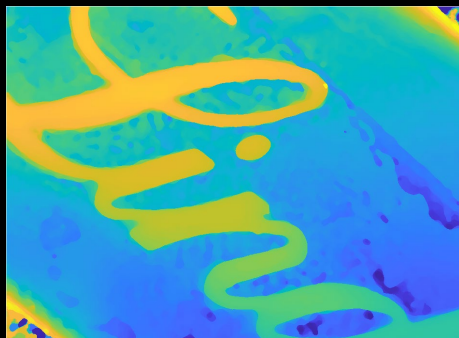
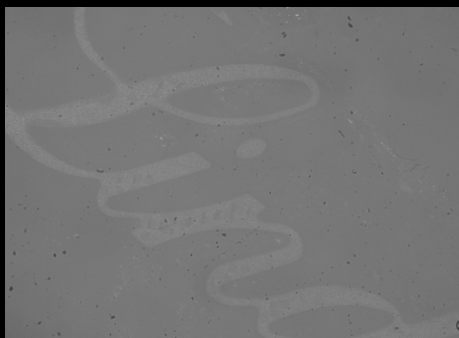
depth →

Depth sensing

chip



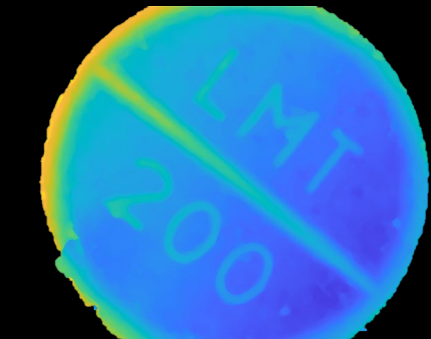
chocolate



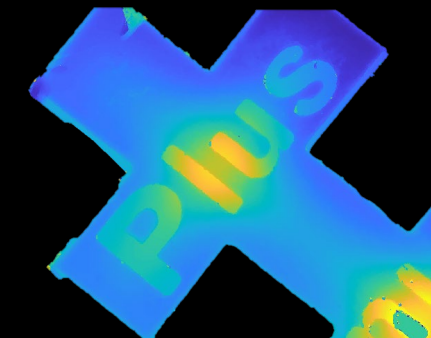
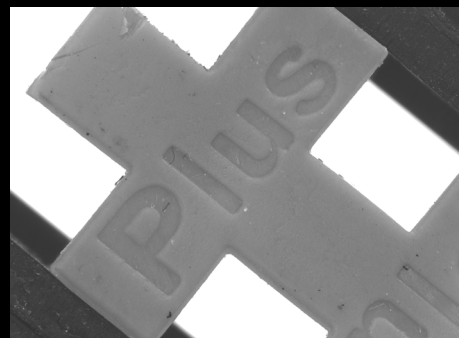
coin



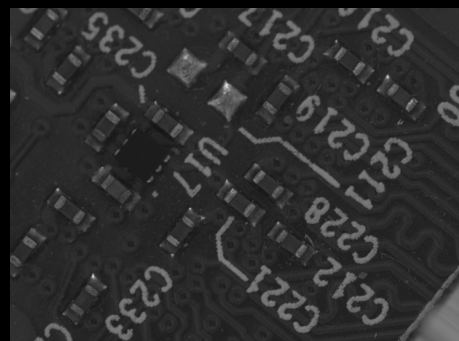
pill



Plus-Plus



circuit



scene

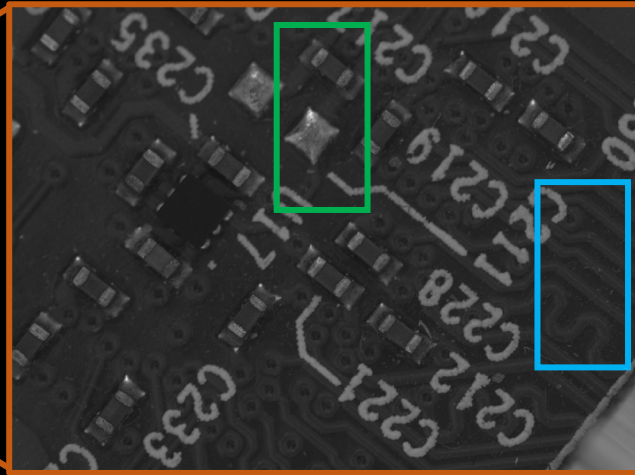
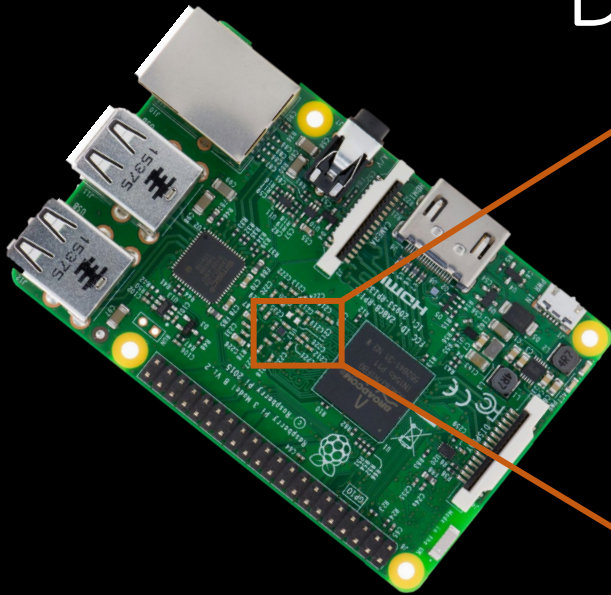
depth

scene

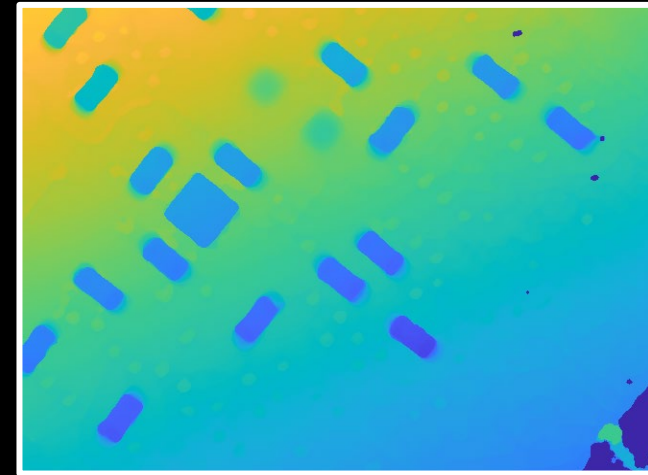
depth



Depth sensing: Raspberry Pi



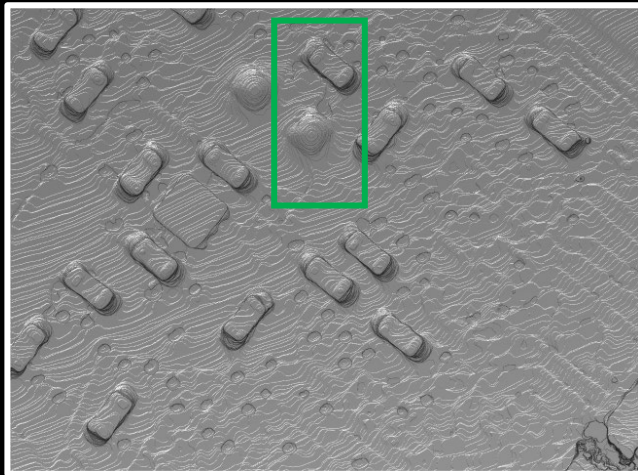
scene



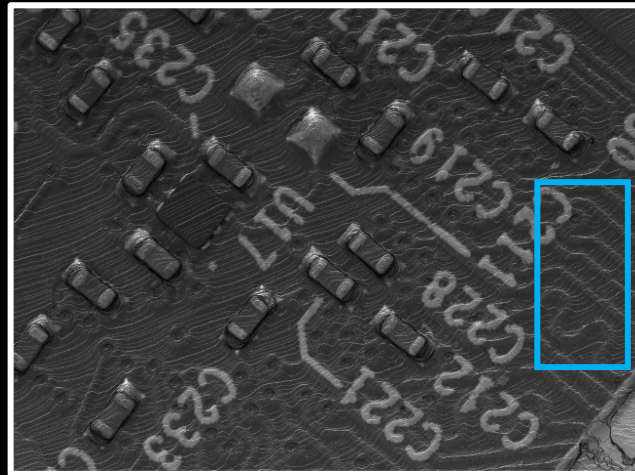
1.5 mm

0 mm

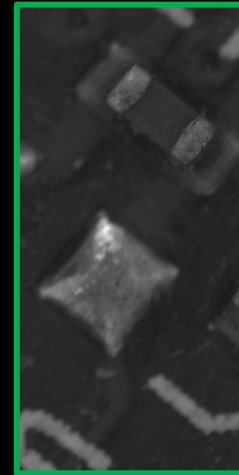
depth



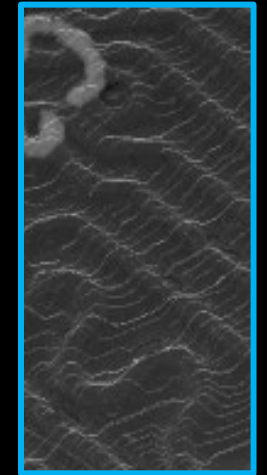
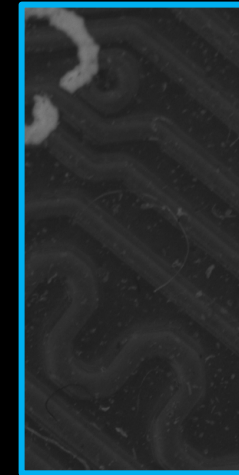
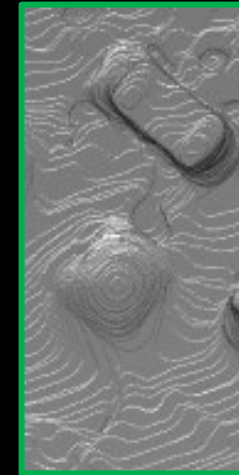
rendered depth



texture-mapped



resistor and pad

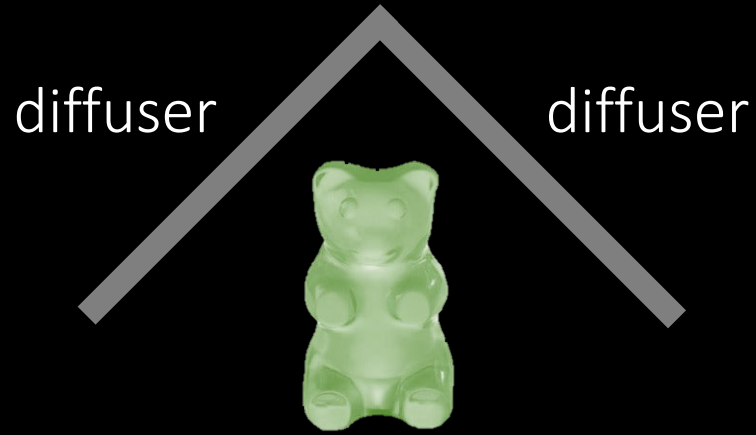


conducting track



depth →

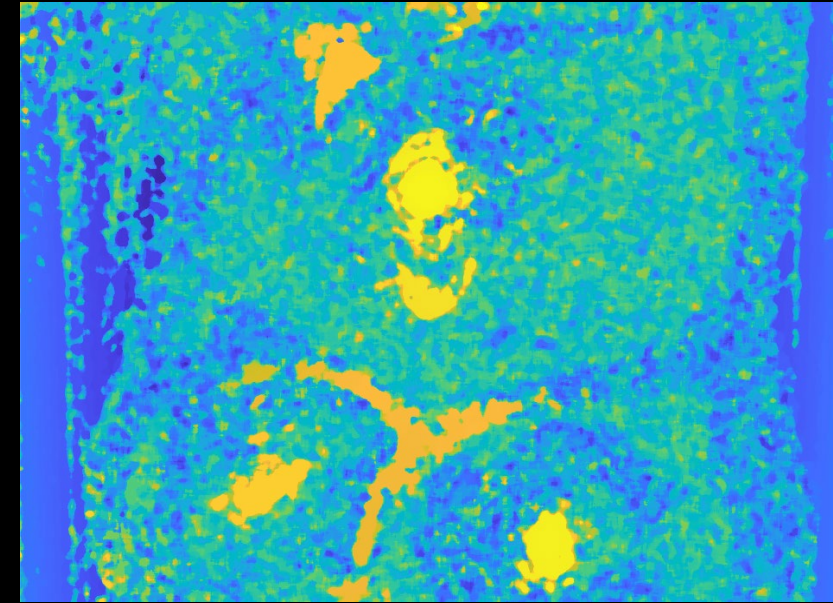
Depth sensing: gummy bear



scene



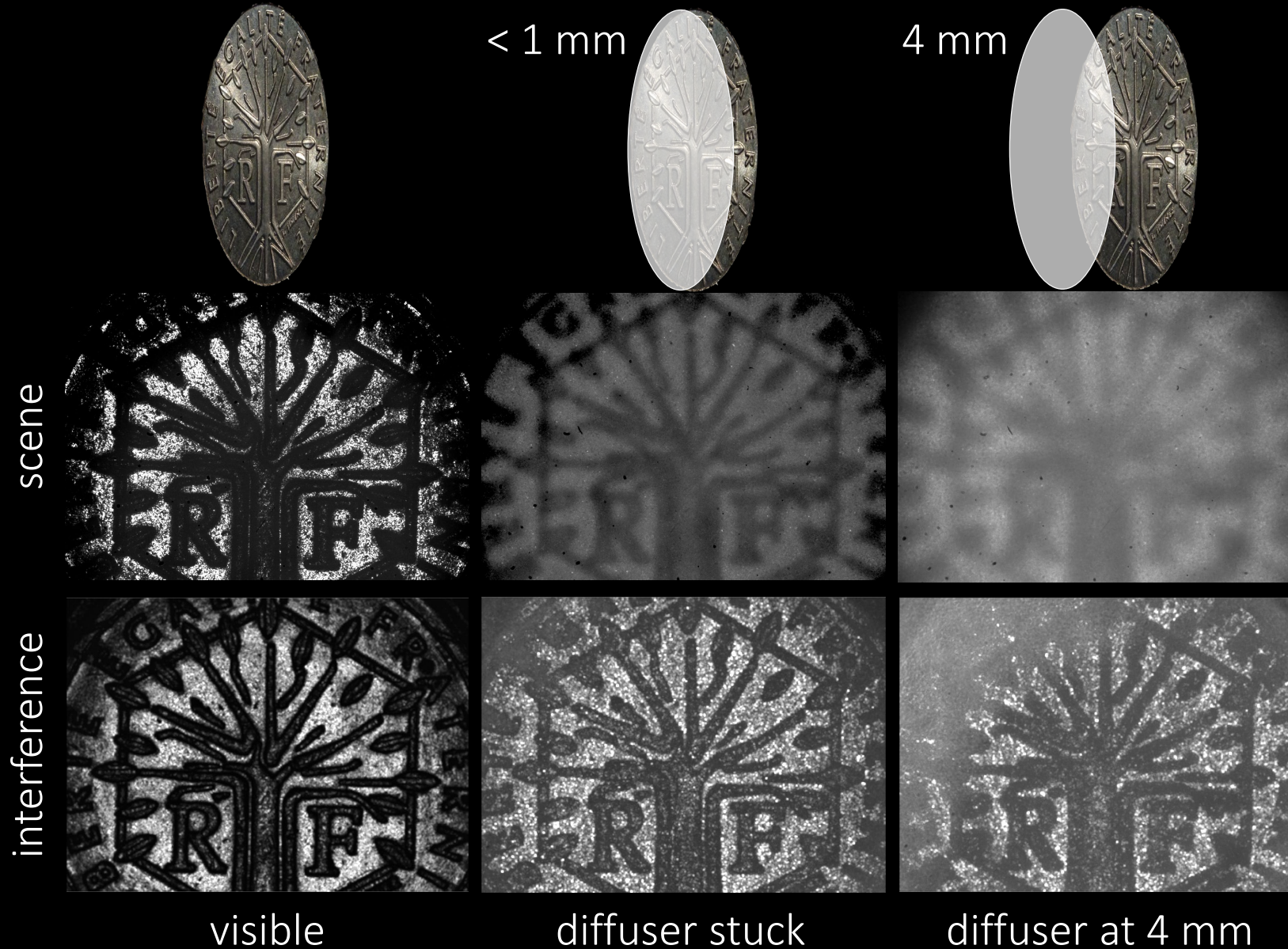
scene image



depth



Seeing through scattering with sunlight



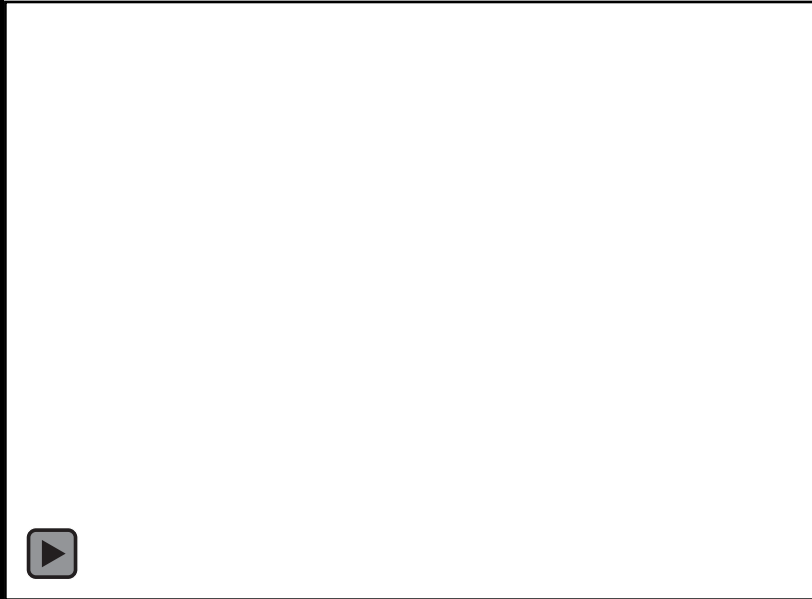


depth →

Indoor passive interferometry



scene



transient response

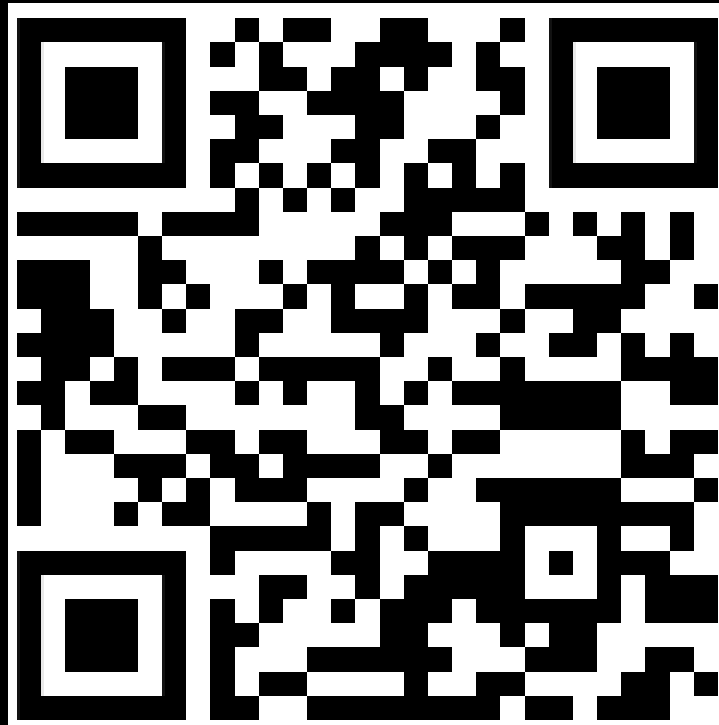


depth



Passive Micron-scale Time-of-Flight with Sunlight Interferometry

more details:

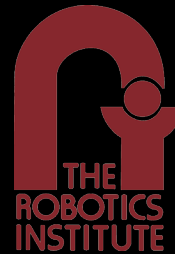


[https://imaging.cs.cmu.edu/
sunlight_interferometry](https://imaging.cs.cmu.edu/sunlight_interferometry)

many thanks to our sponsors:



SEE BELOW THE SKIN



<https://seebelowtheskin.org>

