

### Rolling Shutter Phenomenon

Sensors start exposuring row by row sequentially Camera motion during exposure period causes unique distortions Classical problems need novel approaches

#### Change Detection



Register a reference undistorted image with the given rolling shutter and motion blur distorted image detecting changes between the two images simultaneously.



Vijay Rengarajan, A.N. Rajagopalan, and R. Aravind, "Change Detection in the Presence of Motion Blur and Rolling Shutter Effect," ECCV 2014.

# Study of Camera Motion in Rolling Shutter Cameras Vijay Rengarajan, Indian Institute of Technology Madras

apvijay.github.io

#### Distortions based on total row delay and exposure period

Top row





Total row delay

#### Super-resolution



Produce a super-resolved image without any rolling shutter distortions given rolling shutter distorted low-resolution images without motion blur. Assume one undistorted low-resolution reference image.





Input low resolution images

Output rolling shutter-free high resolution image

Abhijith Punnappurath, Vijay Rengarajan, and A.N. Rajagopalan, "Rolling Shutter Super Resolution," ICCV 2015.

Exposure time









on inverse warping







## **Doctoral Consortium**

Vijay Rengarajan, A.N. Rajagopalan, and R. Aravind, "From Bows to Arrows: Rolling Shutter Rectification of Urban Scenes," CVPR 2016.