EL with the Raspberry Pi Camera Module 3

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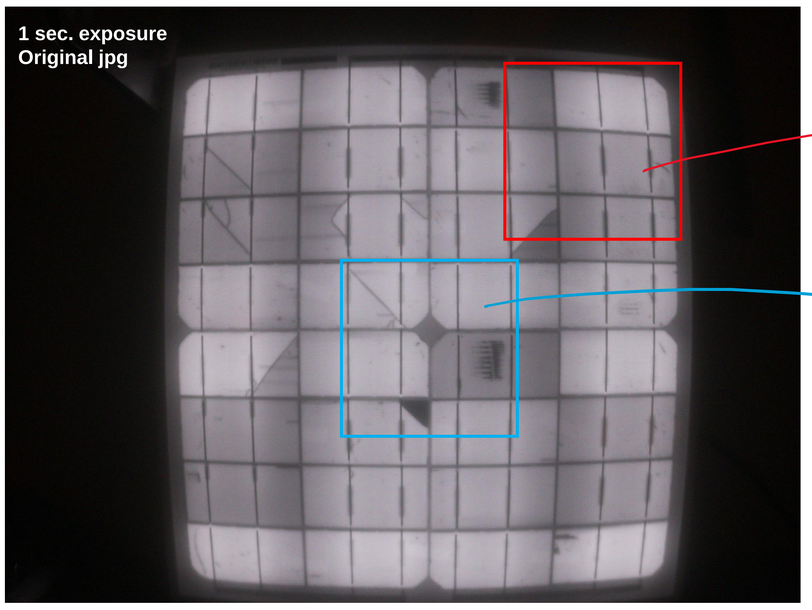
PREPRINT

Summary: Raspberry Pi released a new Camera Module 3 (“V3”) camera. The NoIR version works well for EL compared to the more expensive HQ camera, has auto focus, and only costs $25.

HQ Camera [1]
6 mm lens*
$75
12.3 MP
1.55 µm pixels

*Can use any C/CS-mount lens



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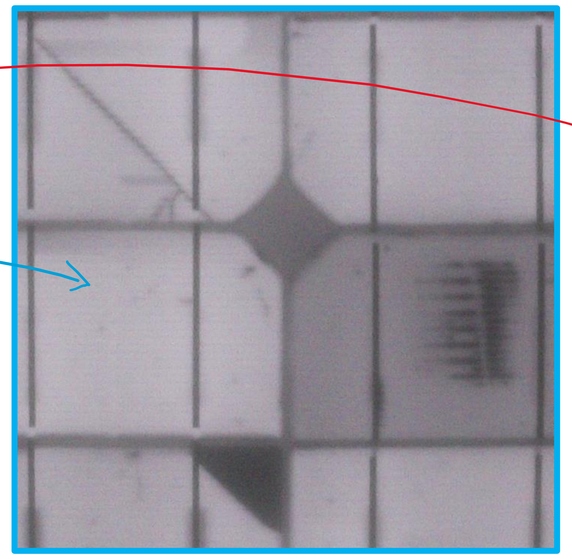

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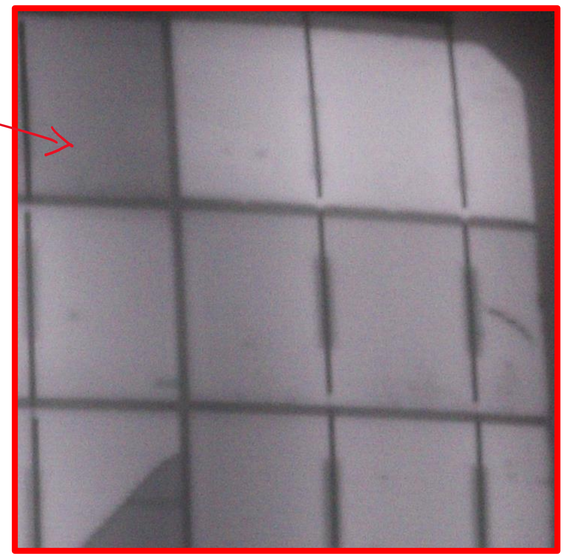
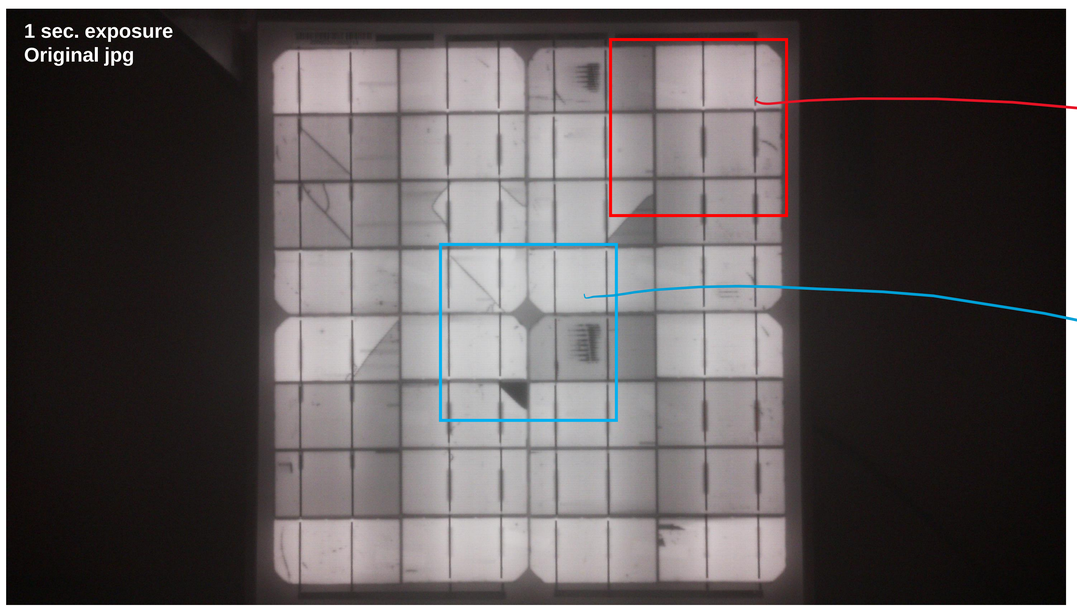


“V3” NoIR
standard lens*
$25
11.9 MP
1.4 µm pixels

*Wide angle available



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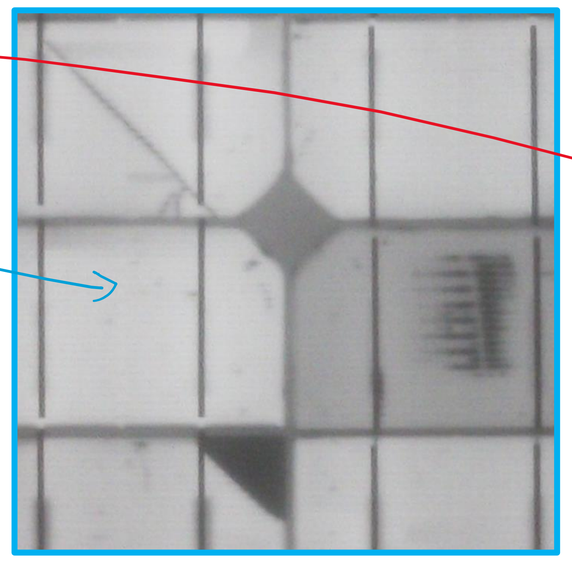

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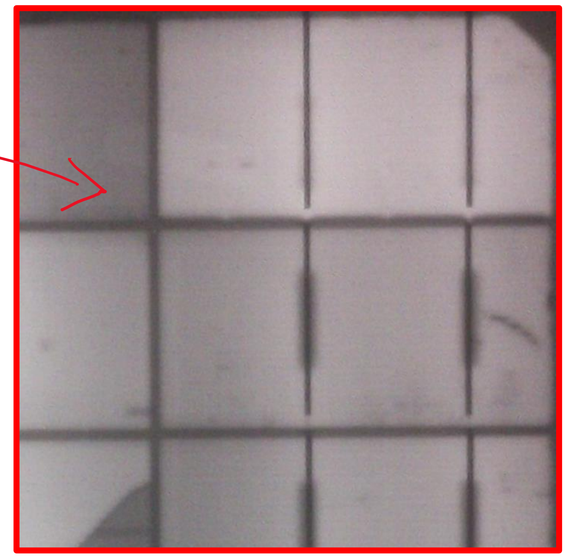
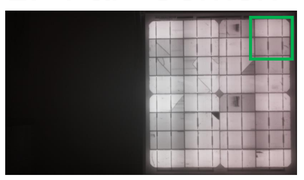
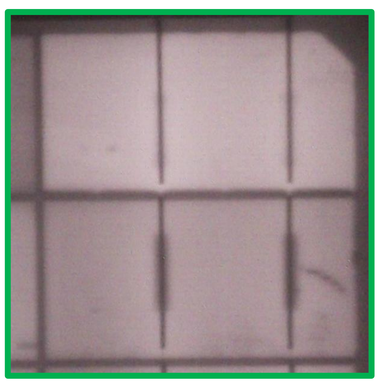


Considerations:

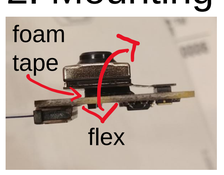
\+ 1. 16:9 aspect ratio: similar to modules, good quality in far corner
− 2. Mounting/alignment: no tripod mount, camera taped to board; case [4] may help
− 3. Minor lens hotspot (and color shift, but not in raw?)
\+ 4. Low distortion
− 5. Longpass filter mounting: not “drop-in” like with HQ, needs custom holder
+/− 6. No interchangeable lenses

1. “Far” Corner:

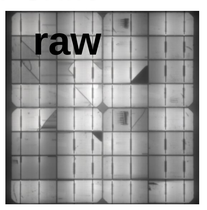




2. Mounting



3. JPG color shift



Use Cases:

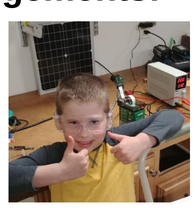
- PLatypus, replacing HQ camera (DuraMAT, P.I. Tim Silverman)
- In-situ imaging, e.g., CAST
- Cost-constrained applications

References, further reading:

[1] W. Hobbs, T. Silverman, Low-cost electroluminescence with a Raspberry Pi high-quality camera. NREL PVRW 2021. https://www.youtube.com/watch?v=h_yjCdK8aG0&t=1288s
[2] https://www.raspberrypi.com/documentation/accessories/camera.html#hardware-specification
[3] https://www.raspberrypi.com/documentation/computers/camera_software.html
[4] Arducam U6251, https://www.arducam.com/product/white-camera-enclosure-case-pi-cameras/

Acknowledgements:

Thanks to Will’s garage lab assistant, Liam!



Files at:
github.com/williamhobbs/PVRW-2023-EL

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