# Solar Panel Performance Assessment through Four-Band Thermal Mosaicking

ENV 704: Workshop on Remote Sensing and Photogrammetry with Drones
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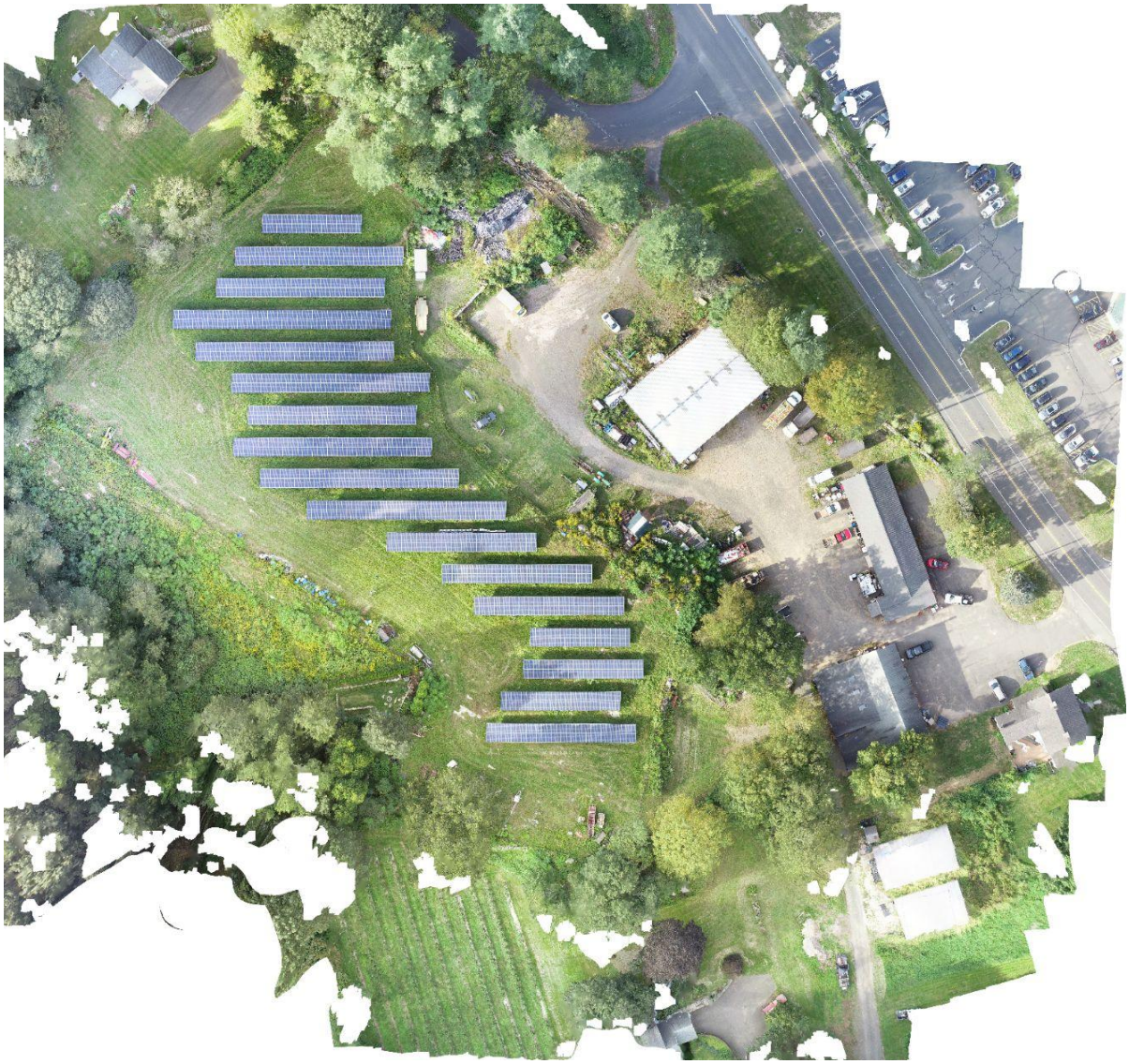
**Abstract**

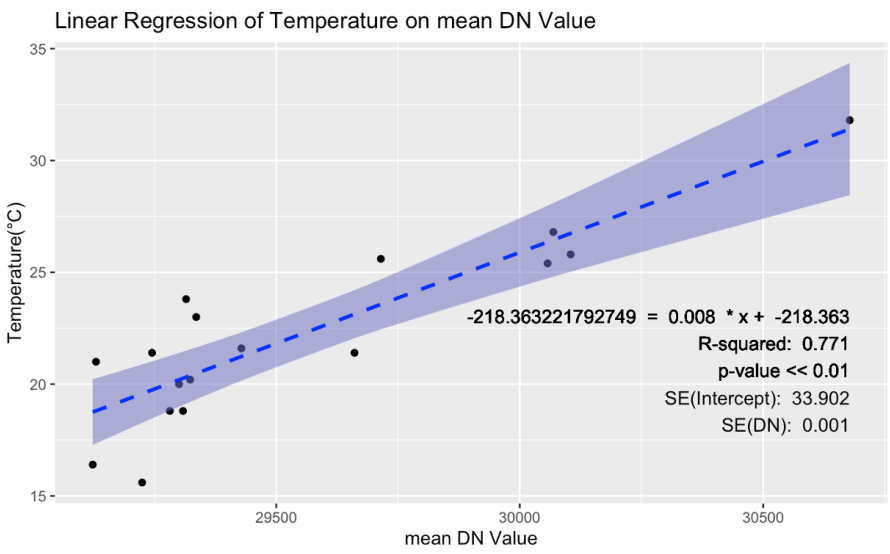
Solar energy has assumed a pivotal role in the global pursuit of sustainable and renewable energy solutions. With the expanding deployment of solar panels, there arises a pressing need for advanced methodologies to comprehensively evaluate their functionality and efficiency. Despite existing methods for estimating solar system performance, the integration of thermal image processing technology with unmanned aerial vehicles (UAVs) remains a relatively underexplored domain. This study leverages the cutting-edge four-band thermal mosaicking method introduced by Yang and Lee (2019) to ascertain its effectiveness in assessing solar panel performances. The outcomes affirm the genuine efficacy of the four-band thermal mosaicking technology, revealing distinct temperature differentials among solar panels.



The RGB orthomosaics from DJI Phantom 4 Pro Quadcopter's built-in camera.

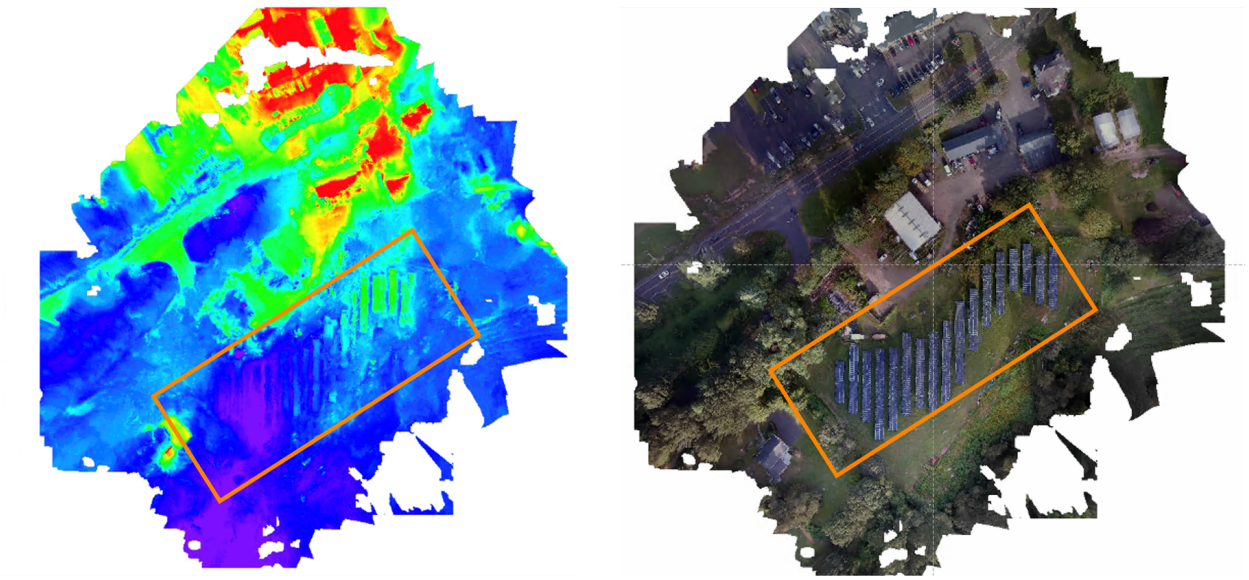
| Temperature °C | mean DN Value |
|---|---|
| 23 | 29335.61584 |
| 20 | 29300.43225 |
| 21 | 29129.83766 |
| 18.8 | 29308.51434 |
| 21.6 | 29428.33671 |
| 18.8 | 29281.49371 |
| 25.6 | 29714.81217 |
| 23.8 | 29314.82498 |
| 20.2 | 29323.29749 |
| 21.4 | 29660.67688 |
| 16.4 | 29123.09073 |
| 15.6 | 29224.53763 |
| 31.8 | 30677.72273 |
| 21.4 | 29244.98866 |
| 25.4 | 30057.22917 |
| 25.8 | 30104.54741 |
| 26.8 | 30069.01168 |

(a)




(b)

(a) Temperature measured by infrared thermometer and mean DN value extracted from ENVI. (b) Linear regression between the sampled temperature and thermal DN values.



(a) (b)

(a) temperature map. The color green indicates a higher temperature than the color purple. (b) RGB orthomosaic segregated from the four-band orthomosaic.