



CPS: Small: Localized, Geospatial Sensing of Canopy and Fruit Microclimate for Real-time Management of Sunburn in Apple

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Problem Statement

□ Abiotic Crop Loss Mgt

Apple Sunburn (6-40% crop loss)



Source*

Sunburn Browning



Source*

Sunburn Necrosis



Source*

Photo-oxidative Sunburn

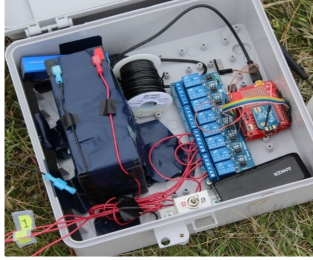
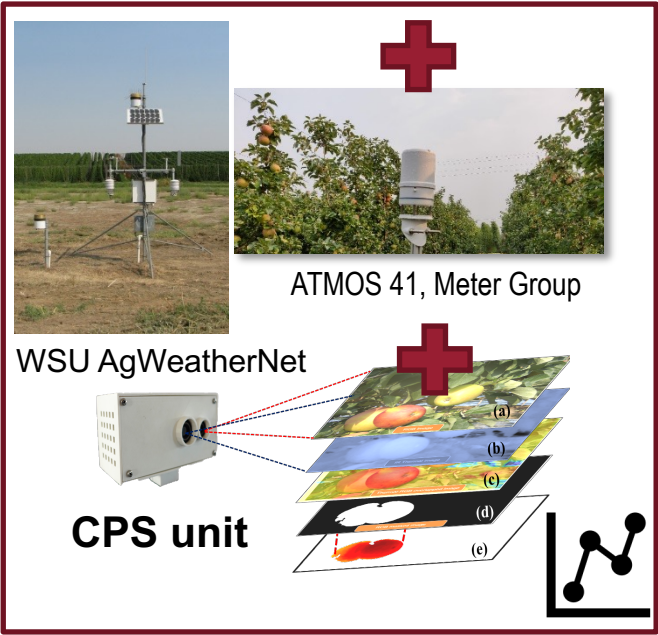
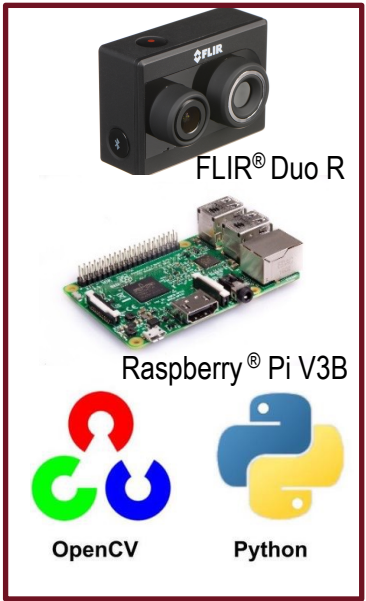
*Racsko, J., & Schrader, L. E. (2012). Critical reviews in plant sciences, 31(6), 455-504.



IoT-enabled orchard sensing network



Micro-climate, tree-fruit physiology



Evaporative cooling

Measure

Decision

Manage



Results

CPSS development and field validation

- Prototype development, testing, and revision (CPS2.0)
- Field validation (cv Honeycrisp, and Cosmic Crisp in 2019-20)
- Evaporative cooling system modification

Results

- CPS based FST was highly correlated with ground-truth data
- Improved fruit quality compared grower control



CPS2.0 deployed to monitor and actuate evaporative cooling

2019-20 Progress

Publications

- Ranjan, R., **Khot, L. R.**, Peters, R. T., Salazar-Gutierrez, M.R., Shi, G., 2020. *Computers & Electronics in Agriculture*. 175, 105558. doi: <https://doi.org/10.1016/j.compag.2020.105558>
- Ranjan, R., Sinha, R., **Khot, L. R.**, Peters, R. T., Salazar-Gutierrez, M.R., 2020. *IEEE Xplore* 2020. 273-277. doi: [10.1109/MetroAgriFor50201.2020.9277581](https://doi.org/10.1109/MetroAgriFor50201.2020.9277581)
- Shi, G*., Ranjan, R*., **Khot, L.R.**, 2019. *Information Processing in Agriculture*. 7(2), 212-222. doi: <https://doi.org/10.1016/j.inpa.2019.09.007>
- Wang, B*., Ranjan, R*., **Khot, L.R.**, Peters, R.T., 2020. *Sensors*. 20, 608.

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