2021 NSF CYBER-PHYSICAL SYSTEMS PRINCIPAL INVESTIGATORS' MEETING

CPS: Medium: Collaborative Research: Field-scale, single plant-resolution agricultural management using coupled molecular and macro sensing and multi-scale data fusion and modeling

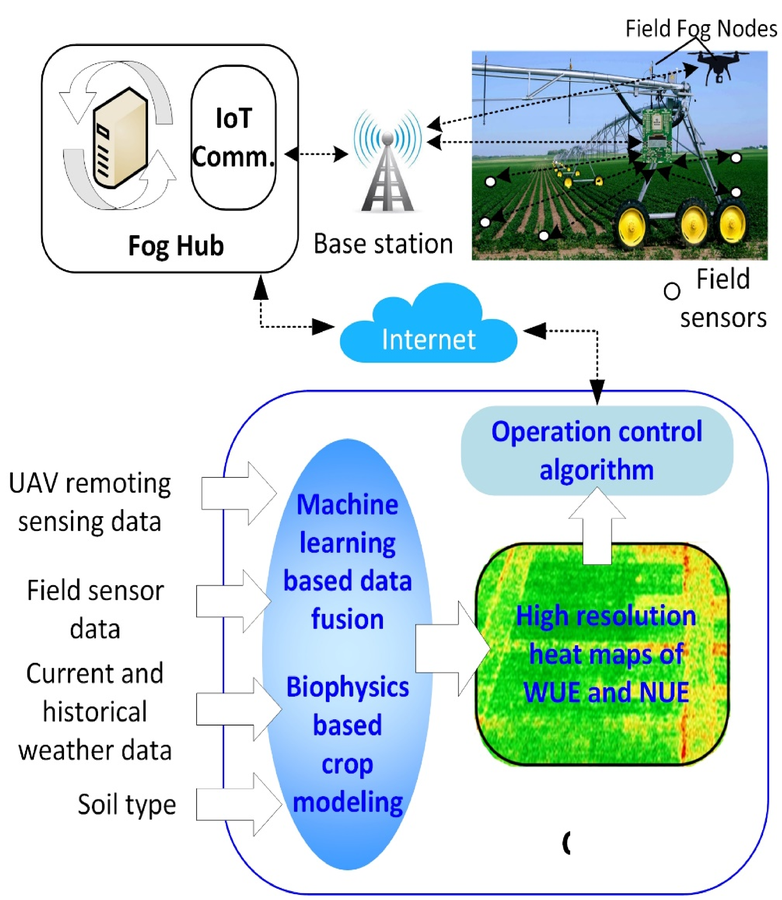
USDA-NIFA # 2020-67021-31528 / June 1, 2020 / Liang Dong, Baskar Ganapathysubramanian, Michael Castellano, Sotirios Archontoulis, Patrick Schnable (Iowa State University)
James Schnable, Yeyin Shi (University of Nebraska Lincoln)

Challenge:

- Lack a platform that can perceive and respond to varying conditions and crop responses across agricultural fields, and can decide agricultural responses to optimize trade-offs between overall yield, water use efficiency, and nitrogen use efficiency.

Solution:

- Fuse UAV-based multiple-time and -space scale data of the geographically mapped spectral images and the point sensor outputs to infer the nitrogen and water dynamics
- Extract actionable information for decision-making of fertilization and irritation scheduling.



Scientific Impact:

- A toolkit for field measurement of nitrogen, transpiration, and soil water potential.
- A data-driven decision support platform to provide actionable information on optimal agricultural management.

Broader Impact:

- Decrease the environmental impact of agriculture (from N run off);
- Reduce water use.
- Increase farmer profitability, improving the economic viability of rural economies.
- Train the next generation of scientists through existing STEM programs.

Contact: Liang Dong, Iowa State University, ldong@iastate.edu