NRI: INT: COLLAB: Robotic Sense Identify and Manage platform (SIMPL) for Site-Specific Pest Management
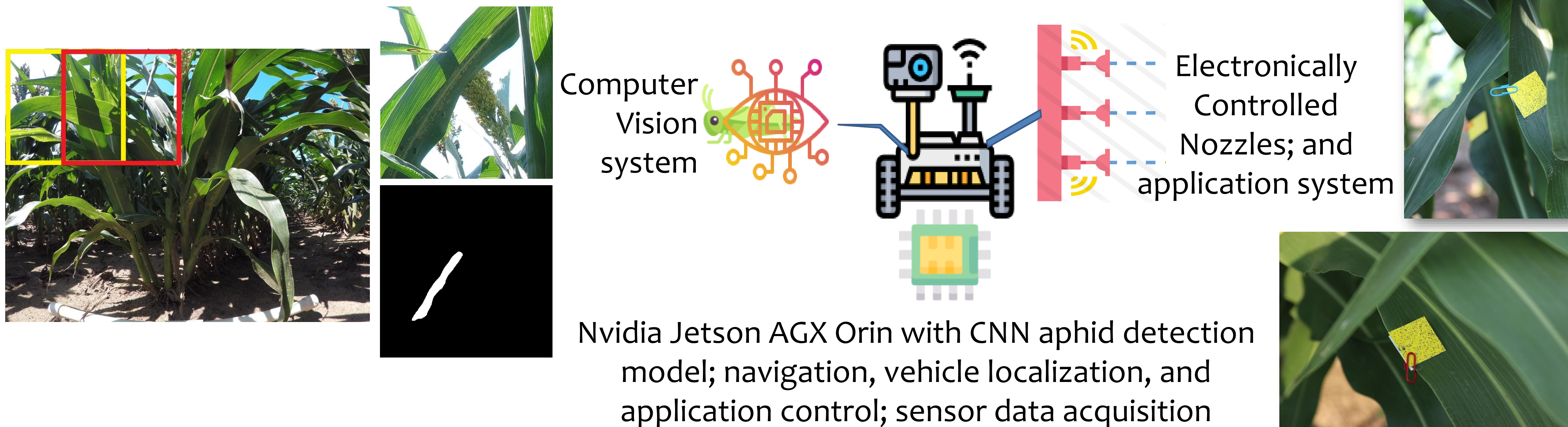
Ajay Sharda, Daniel Flippo, Brian McCornack, Kansas State University

Guanghui Wang, Toronto Metropolitan University

https://farmslab.k-state.edu/

Challenges and Significance: Intelligent systems to real-time sense, identify, and manage spatial pest sites with critical severity through site-specific liquid application systems are lacking. Current whole-field applications and untimely control lead to excessive pesticide use and loss of crop yields.

Scientific Impact: Novel concepts of integrating controls, mechatronics, and computer vision to develop Sense Identify and Manage Platform (SIMPL), can spot the pest incidence and severity to conduct site-specific pesticide application to precisely control pests while minimizing chemical use

Computer Vision system

Electronically Controlled Nozzles; and application system

Nvidia Jetson AGX Orin with CNN aphid detection model; navigation, vehicle localization, and application control; sensor data acquisition

Who cares: The resultant system is a multipurpose spraying solution for different agricultural environments such as open fields, row crops, greenhouses, poly-tunnel, and urban Ag. The system will provide an alternative to scout and need-based site-specific application

Education and Outreach: A team of engineers and entomologists collaboratively developing agricultural automation research and education. The outcomes will have a major impact on enhancing the engineering programs, specifically in computer vision, controls, mechatronics, and robotics.

Impact on Agriculture and Rural Economies: Annually $13 billion in pesticides is used for pest control. A projected 20-30% decrease in application area will significantly reduce overall chemical use (saving input costs) while timely and site-specific detection and control can boost crop yields.

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