

Smart Integrated Farm Network for Rural Agricultural Communities (SIRAC)

1952045

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Award Type (IRG), Solicitation Year (IRG-2, FY2020)

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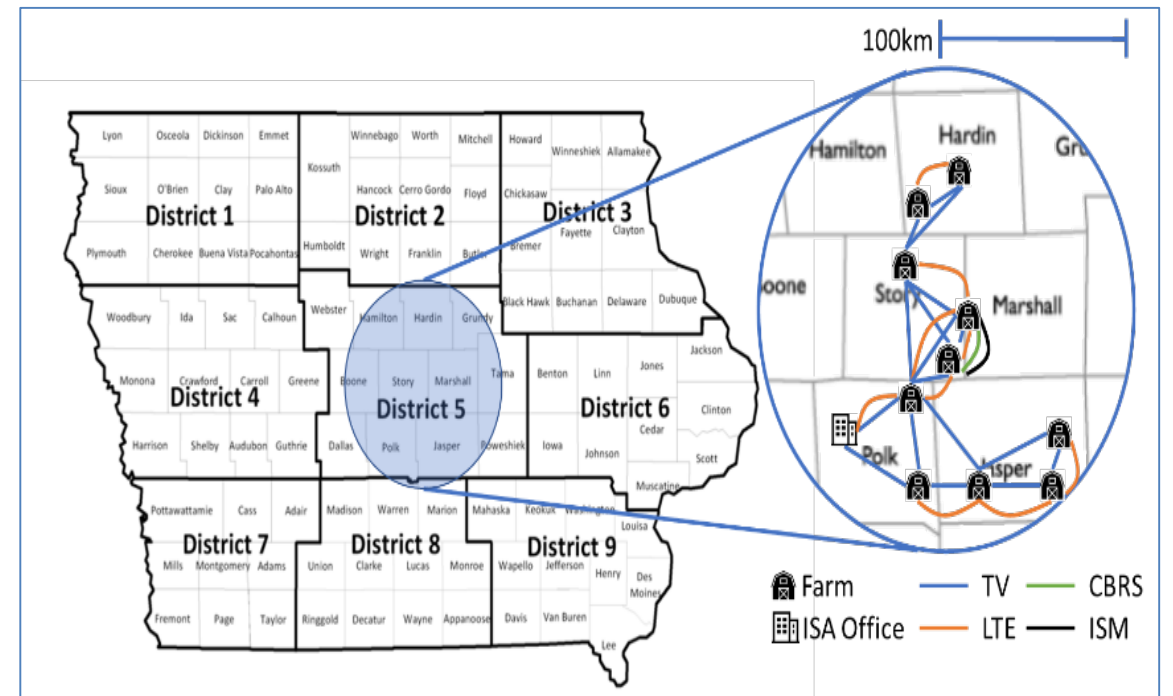
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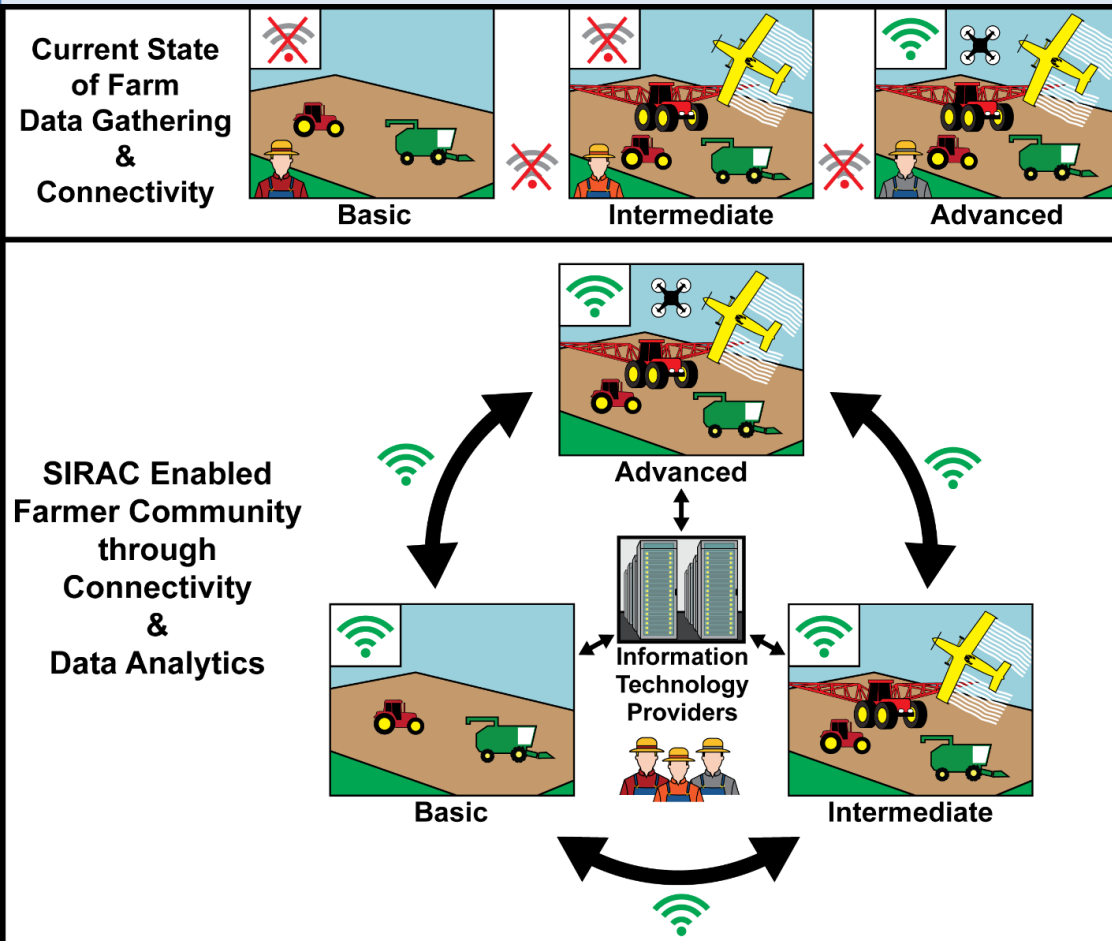
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SIRAC Core Group Farm Locations and Connectivity Technologies



SIRAC Project Overview

SIRAC Project Schematics



SIRAC Vision

To improve community-wide data sharing between farmers, we are developing **SIRAC**, a novel socio-technical platform to:

- Create a *smart and connected farm (SCF) network* that facilitates data sharing, knowledge exchange, and coordinated responses to production threats.
- **Goal 1:** Efficiently and cost-effectively improve management practices and crop yield.
- **Goal 2:** Contribute to community-led decisions on biological pest spread and mitigation and nutrient and water stresses.

SIRAC Project Overview

Use-Inspired Research

- ❖ SIRAC was formed with the active involvement of Iowa Soybean Association, an organization with 10,000 farmers, to tackle their need for farm connectivity.
- ❖ SIRAC involves eight farmers in the core group where research will be conducted, but the community of practice will actively involve more than 200 farmers, and knowledge dissemination will be done to the entire 10,000 IA farmers.

Fundamental Research Contributions

- ❖ Enable real-time monitoring of threats to farm production, which is critical for dealing with pests, diseases, weather, and management issues.
- ❖ Develop smart sensing and IoT based flexible, scalable and efficient communication infrastructure for SCFs by interconnecting farmers and equipment.
- ❖ Exploit mobile crowdsensing and multiband dynamic spectrum access technology for rural connectivity; privacy-preserving data analytics for community-level decision-making across farms and monitoring real-time threats.
- ❖ Test translational research processes to create a feedback loop between researchers and decision makers in the farming community, informed by behavioral economics.

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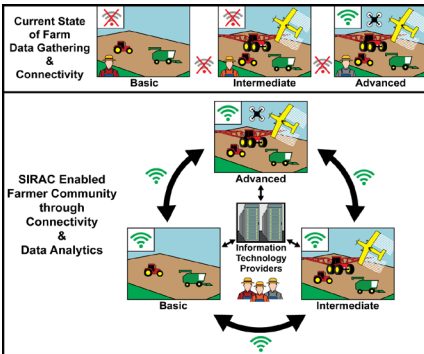
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Visual Schematic

Community: Agricultural Farmers in Rural Midwest. **Goal:** Build **Community of Smart and Connect Farms** to (1) Improve timely data sharing and knowledge exchange for coordinated responses to production threats, (2) Increase crop yield and profitability, (3) Improve farmer's overall wellbeing and quality of life.



Project Vision

- Create a *smart and connected farm (SCF) network* that facilitates privacy-preserving data sharing, knowledge exchange, and coordinated responses to production threats.
- **Goal 1:** Efficiently and cost-effectively improve management practices and crop yield.
- **Goal 2:** Contribute to community-led decisions on biological pest spread and mitigation and nutrient and water stresses.

Use-Inspired Research

- ❖ SIRAC involves IA farmers through ISA (Iowa Soybean Association) to tackle their need for farm connectivity.
- ❖ Project involved eight farmers in the core group. Research will be conducted using their farms fields, but the community of practice will actively involve more than 200 farmers, and knowledge dissemination will be done to the entire 10,000 IA farmers.

Fundamental Research Contributions

- ❖ Develop smart sensing and IoT based flexible, scalable, efficient communication infrastructure for SCFs by interconnecting farmers and equipment.
- ❖ Mobile crowdsensing, rural connectivity, privacy-preserving analytics for community-level decision-making on real-time threat monitoring.
- ❖ Innovative translational research process informed by behavioral sciences that addresses the characteristics of SIRAC (trust, data sharing and privacy preserving).