

From Theory to Practice, From University to Farm

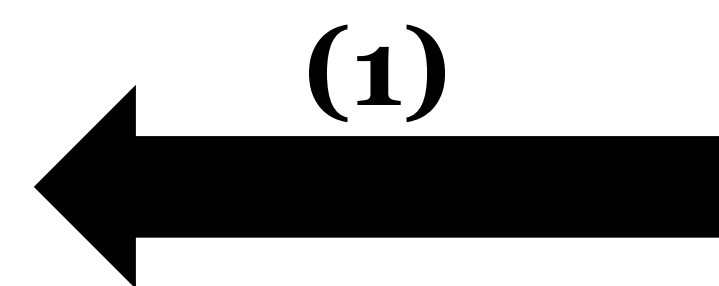
What is LoRaWAN?

- LoRaWAN stands for Long Range Wide Area Network
- While traditional Wi-Fi and cellular connectivity are limited by range (distance covered) and power (batteries can drain fast), LoRaWAN is able to cover hundreds of acres and sensors can preserve battery life for 5-10 years unattended
- This is ideal for agriculture where connectivity has been a historic challenge and servicing devices can be constricting

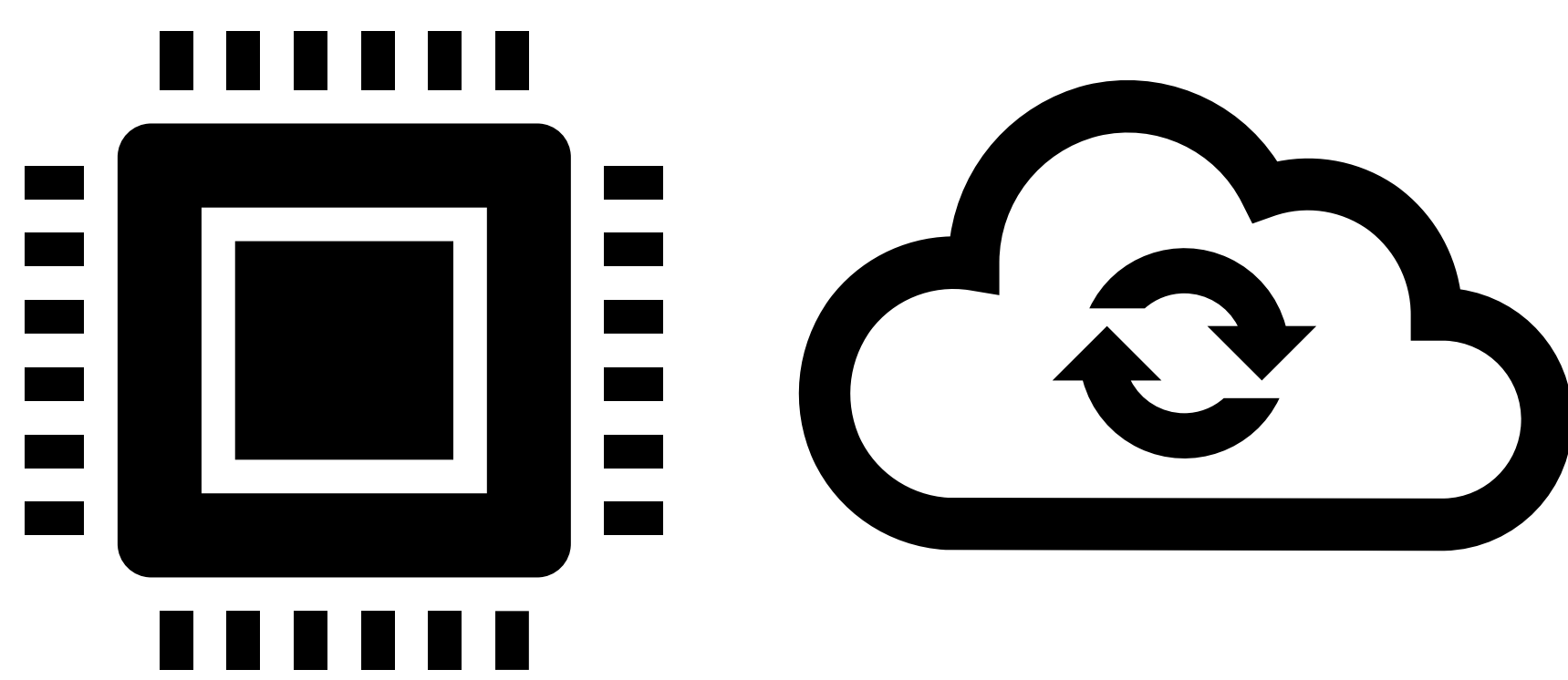
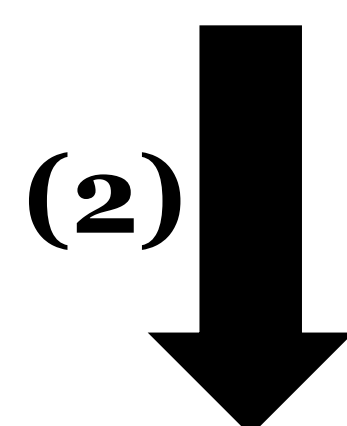
Data Pipeline Overview



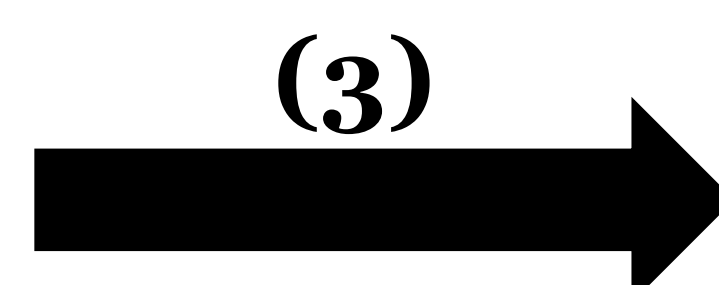
Gateways in fields or on facilities provide LoRaWAN connectivity and pick up LoRaWAN device data



Soil moisture sensors, fuel tank monitors, storage temperature monitors, and many other LoRaWAN devices can transmit data



Data is sent to physical or cloud computing space for processing



Data is viewable in dashboards from any internet-connected device

Experimentation and Outcomes

- Research was conducted at KC Bailey Orchards, Inc. and Purdue University from 2023-2026
- After gateway was installed, testing was conducted to compare connectivity coverage in northeastern apple orchards to midwestern field crops. The gateway was able to reach 1 mile, even though signal strength dropped due to a wooded area.
- Many sensors were tested, and indoor temperature sensors proved to be especially useful for the heavy winter of 2026
- LoRaWAN networks can be technically challenging to manage, and therefore being able to receive local support for adopting new technologies such as sensors is crucial
- Sensor technologies can help monitor multiple facets of farm operations, optimize inputs, and improve farmer livelihoods

