

Smart Farm Innovations and Monnit Modernize Small Farm Operations

Small farms typically run on tighter budgets than their larger commercial counterparts. But they're just as vital to the competitiveness and sustainability of our rural and national economies. For small farms to become and stay profitable, it requires down-to-earth ingenuity and cost-effective innovation.

This is especially true as many small farms are family-owned and operated. They face considerable challenges balancing work and family life. Among those challenges are limited labor and equipment resources, time management, technical know-how, and changing weather patterns.

Internet of Things (IoT) technologies can help farmers mitigate various challenges and modernize processes, equipment, and systems across the farm. Greenhouses, for example, provide a perfect opportunity for the IoT to help automate ventilation systems to control temperature and humidity conditions. Smart irrigation, plant light, and equipment voltage monitoring are only a few other areas where IoT technologies can help farmers.

Read how Smart Farm Innovations—a Monnit® partner—connects small farms to the Internet of Things (IoT) with remote monitoring solutions that automate greenhouse systems, track critical conditions, reduce equipment costs, and boost overall efficiency.

Spoiler alert: The return on investment (ROI) is significant. Using Monnit Remote Monitoring Solutions, Smart Farm Innovations provides farmers with an automated system to control and optimize greenhouse temperatures and humidity and monitor other critical farm operations 24/7. It's all easily managed using a cloud software platform and dashboards on a mobile device or computer. Farmers can also get alerts via email, text, or call from various fast-install, easily configurable IoT sensors.

Challenges

[Smart Farm Innovations](#) is a networking and IoT services firm in South Glen Falls, NY. Robert Arnold, the company's founder and owner, works to connect farms around the country to the Internet with reliable, customized networking, IoT, and automation technologies.

"Automation may sound futuristic and expensive, but we aim to help farms find ways to integrate cost-effective solutions to save on labor costs, improve productivity, simplify operations, and reduce management errors," says Arnold. "Irrigation, ventilation, and electrical equipment can all be economically controlled from your smartphone using the latest technologies."

Arnold knows most commercial greenhouses use automatic environmental controllers to operate vents, fans, and side roll curtains seamlessly to maintain preferred inside temperature, humidity, and airflow. These climate and environmental control systems protect plants from temperature extremes and prevent disease.



For greenhouses with more than one type of equipment and system to manage, Arnold says automatic environmental controllers are often worth the cost and effort to install and configure. Plus, automated environmental controllers can help farmers save on labor costs and optimize climate condition accuracy to increase crop yield.

However, Arnold recognizes that although greenhouse ventilation automation is ideal, there are considerable challenges to making it happen cost-effectively, especially for small farms, and without disrupting ongoing farming operations, including:

- There's a lot of variety in greenhouse design and environmental controllers.
- Some greenhouses can have different climate control systems ranging from ridge vents to large exhaust fans, while others may only have roll-up side curtains and nothing else.
- Greenhouse ventilation control systems can depend on the greenhouse type and size, use case, and what farmers can afford.
- The technology to automate these systems can be expensive to purchase and install—prices range from \$1k to \$10k+, depending on inputs and features.
- The controllers also often require advanced technical knowledge to configure and maintain, which many farmers don't have.

Small and startup farms with simpler greenhouses face a tougher choice when purchasing controllers because of a longer ROI. These farms typically don't have the extra funds to invest in systems and tools, often considered cost-prohibitive and non-essential. This has led to thousands of small greenhouses with single-vent systems being manually operated daily by farmers across the country.

"They often wait years before they can afford automatic \$1k+ controllers," Arnold says. "Additionally, only certain controllers have remote cloud-control features. It's a frequently desired function for busy farm owners and managers who are always on the go but wish to stay in touch with how their greenhouses and farms operate and get alerts about issues. The controllers with these functions aren't on the less expensive end of the spectrum, often costing \$1.5k to \$3k each."



Solution

Arnold built Smart Farm Innovations on decades of successful farming experience and top-notch technical training, so he knows firsthand the needs of small and startup farms. As an authorized Monnit Reseller, Smart Farm Innovations provides full setup, configuration, and support for every Monnit Remote Monitoring Solution he customizes to specific farmer needs.

Before partnering with Monnit, Smart Farm Innovations set out to find monitoring and control solutions that have:

- A much lower price point than other environmental controllers
- Eliminated any requirements for advanced technical knowledge to configure and maintain
- Continuous monitoring, alerting, and cloud-control functionality
- Sensing features that automatically read temperature and humidity conditions and control electrical equipment with built-in timing to stage greenhouse ventilation
- Easily sourced, off-the-shelf components that hold up to greenhouse environmental rigors
- Wireless connectivity rather than Wi-Fi or Ethernet

Monnit ALTA[®] Wireless Sensors and IoT Gateways help Smart Farm Innovations deliver on what Arnold was initially looking for in IoT monitoring and control solutions and more. Arnold says he chooses Monnit IoT Solutions for their functionality, adaptability, and pricing alignment for farm environments. For automated greenhouse ventilation on small and startup farms, Smart Farm Innovations provides its Automated Environmental Controller System with Monnit Integration, featuring:

- Industrial ALTA Wireless Temperature and Humidity Sensors strategically placed inside greenhouses at crop level
- ALTA 10 Amp Wireless Control Unit with two relay switches
- ALTA Wireless IoT or Ethernet Gateway, depending on a farm's Internet connectivity
- Cloud-based iMonnit Monitoring and Sensor Management Software for handling the ALTA Sensor and Gateway settings configuration, automated control logic, and real-time alerts
- Electrical components as needed, including low-voltage power supplies, contactors and override switches for manual motor control, and fuses for overload protection
- Outdoor-rated enclosure mounted on the greenhouse to hold and connect electrical components, manual override switches, and the ALTA 10 Amp Wireless Control Unit

Continuous, reliable monitoring and connectivity highlight the capabilities of the Monnit Solution for small farms. As Monnit ALTA Sensors sense and send data wirelessly to ALTA Gateways, they run on an IoT sensor platform that features long-range data transmission of 1,200+ feet (non-line-of-sight) through more than 12 walls in a building and one mile via a line of sight. In addition, ALTA Sensors and Gateways feature a layered security platform to protect data during generation through its consumption.

The ALTA Gateways send ALTA Sensor data to iMonnit Cloud Software to check for any preset environmental condition threshold changes. Then, if an action is needed, iMonnit automatically commands the ALTA 10 Amp Wireless Control Unit through the ALTA Gateway. If staging is required, where vents only open partway at a time to keep temperatures level, iMonnit relay actions allow for specific run time when condition thresholds are checked.



Results

Its Automated Environmental Controller System with Monnit Integration allows Smart Farm Innovations to offer a greenhouse ventilation control system that is more than half the cost of the least expensive traditional greenhouse controller. The farm IoT company can do this while providing more features and optimized ease of use.

What was a manual, time-consuming process for already overworked small farmers is now fully automated. For example, using simple electronic relays and switches at one farm, Arnold easily integrated ALTA 10 Amp Wireless Control Units to automatically run fans and roll-up sides in eight greenhouses when ALTA Sensors detect climate threshold changes. One 10 Amp Control Unit controls two high-tunnel greenhouses, each with two fan systems, while another unit runs the roll curtain sides that all work to keep the temperature cool in the greenhouses.

The customizable Smart Farm Innovations Environmental Controller System:

- Quickly combats many risks associated with farmers manually controlling greenhouse environmental parameters that can lead to production and energy losses and higher costs.
- Reverses farmer work-life imbalances that negatively impact other farming and family responsibilities.
- Helps farmers monitor growing operations automatically and virtually anywhere on the farm, at home, on vacation, or at the market.
- Reduces the time, money, and effort farmers spend managing their entire operations.

Smart greenhouses with IoT-powered automated features and sensors enable capabilities to sense and control the details of greenhouse crop production and climate changes. The Monnit-integrated technology can seamlessly create an automated microclimate for growing, reducing threats from weather and disease while providing real-time insights to farmers.

ROI: By implementing Smart Farm Innovations Environmental Controller Systems with Monnit integrated monitoring solutions, farmers can save more than half the cost of the least expensive traditional greenhouse controller. Beyond the cost savings, small farms stand to achieve the most ROI with complete automation of their entire greenhouse ventilation control systems. Farmers can also prevent product damage and spoilage, streamline management, and boost efficiency by deploying Monnit Sensors across their farms.

“Sensors and control systems are a must-have for any farm looking to protect produce, livestock, crops, facilities, and equipment from loss, damage, and system failures,” says Arnold. “Remote monitoring can bring you priceless peace of mind, better record-keeping, optimized end-to-end management, and ultimately prevent disasters.”

Monnit Remote Monitoring Solutions Automate Greenhouse Climate & Farm Management



1

Temperature Sensors

Get alerts when the temperature in greenhouses, barns, cold storage, boilers, and more exceeds or falls out of preset preferences. Install an ALTA Wireless Temperature Sensor in nearly any area with sensor leads ranging from three to 100 feet for various placements.

2

Humidity Sensors

Install the scientific-grade ALTA Humidity Sensor near the crop canopy, vents, and other facility locations to remotely monitor relative humidity (RH) between 10–90%, temperature, and dew point in a studio. Get real-time alerts via text, email, or call.

3

10 Amp Wireless Control Units

Use two separate relay switches to control and open and close greenhouse or barn ventilation systems and exhaust fans through iMonnit or automatically from any ALTA Sensor or sensor group using an ALTA 10 Amp Wireless Control Unit.

4

Propane Tank Level Sensors

Eliminate time-consuming manual propane tank checks and know levels on your smartphone. Propane is critical for cold climate greenhouse growers and farmers. Streamline operations by remotely monitoring with the ALTA Propane Tank Level Sensor.

5

Voltage Meters

An ALTA Wireless 0–200 VDC and 0–500 VAC can measure the voltage between two electrical points, such as batteries on any farm equipment. Low voltage can wear out or even destroy equipment silently. Monitor electrical status to keep equipment reliable.

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