



An In-Depth Overview of Questr Automation LLC and the ROOST Initiative: A Model for Rural Agricultural Modernization

Executive Summary

This report provides a comprehensive overview of Questr Automation LLC, a West Virginia-based startup, and its flagship initiative, the Rural Operations Optimization & Systems Trial (ROOST). The ROOST program, developed in partnership with key local and state entities, is a pioneering, farmer-driven farm automation pilot project based in Hardy County, West Virginia. Its primary objective is to demonstrate how the strategic integration of modern automation technologies can address the most pressing challenges facing family farms today: severe labor shortages, rising input costs, and shrinking profit margins.

Questr Automation LLC operates not as a technology developer, but as a crucial integrator, identifying and deploying proven, practical automation solutions tailored to the specific needs of small and medium-sized poultry, cattle, and diversified farms. The company's core mission is to make advanced agricultural technology accessible, affordable, and measurable for the family farms that form the backbone of West Virginia's agricultural economy.

The ROOST initiative is structured as a public-private partnership designed to be low-risk, or no-cost, for participating farmers. All equipment, installation, and training are intended to be fully funded through a carefully layered strategy of federal, state, and regional grants. A key component of the initiative is the ROOST Apprenticeship, a technical training track created with Eastern West Virginia Community & Technical College (E WVCTC) to build a local, skilled workforce capable of installing, operating, and maintaining these new systems.

Together, Questr and the ROOST program aim to create a sustainable, replicable "innovation engine" in Hardy County. The program is designed to produce tangible, measured outcomes, with a goal of saving each participating farm over 500 labor hours annually, reducing input costs by as much as 30%, improving yields, and conserving water, energy and nutrients. By proving the economic and operational viability of automation on working farms, the long-term vision is to enhance the profitability and resilience of West Virginia agriculture, establish Hardy

viewing agriculture as a viable or modern career path, questions of succession loom large. Simultaneously, these farms are caught in an economic squeeze, facing rising input prices for feed, fuel, and fertilizer, which steadily erodes their already thin profit margins.

This landscape of challenge, however, also presents a unique opportunity. The very issues plaguing Hardy County's farms—labor inefficiency, high operational costs, and the need for a next-generation workforce—are precisely the problems that modern automation is designed to solve. Automation technologies, when thoughtfully applied, can help farms overcome labor challenges, fine-tune management decisions, conserve resources, and improve overall sustainability.

Questr Automation LLC was founded to seize this opportunity. Recognizing that Hardy County's producers are open to innovation, the company established the ROOST pilot program to serve as a testbed for practical farm automation. The program is designed to demonstrate a low-risk, farmer-driven model for technology adoption that can enhance the long-term viability of the region's family farms, positioning Hardy County not as a victim of agricultural decline, but as a leader in rural economic resilience and technological adaptation.

Baseline Conditions and Expected Impact

<u>Metric</u>	<u>Current Baseline</u>	<u>Post-Automation Target</u>	<u>Expected Improvement</u>
Poultry labor hours per farm	~1,500 hrs/year	900 hrs/year	40 % reduction
Feed & water system checks	4 hrs/day	1 hr/day	75 % time saved
Average egg collection time	2.5 hrs/day	0.5 hr/day	80 % time saved
Annual electricity use	48,000 kWh	36,000 kWh	25 % energy savings
Average water use	1.2 M gal/year	900 k gal/year	25 % water savings

2.0 Questr Automation LLC: The Company and Its Mission

Questr Automation LLC is a veteran-owned, West Virginia-based startup headquartered in Hardy County. The company was founded with a single, ambitious mission: to help family farms automate manual processes and tasks using smart, practical, and affordable automation. Questr acts as the critical link between global agricultural technology (AgTech) innovation and on-the-ground implementation in rural Appalachia.

2.1 Business Model and Competitive Advantage

Questr's competitive advantage lies in its unique integration model. At this point, the company does not develop its own proprietary hardware or software, although that is on the agenda for the future. Instead, it focuses on identifying, sourcing, and deploying the best field-proven tools from global manufacturers and linking them with local training, financing, and support. This approach minimizes technological risk for farmers, accelerates the adoption of proven solutions, and builds a foundation of trust within the community.

The company's business model is built on three core pillars:

1. **Smart, Practical Automation:** Questr focuses exclusively on equipment that is field-proven and offers a clear return on investment (ROI). The emphasis is on practical, labor-saving tools—such as egg-handling systems, autonomous drones for crop scouting, automated feeding and watering systems, and robotics for biosafety—rather than experimental prototypes.
2. **Farmer-Driven Implementation:** The company operates on the foundational principle that the farmer knows their operation best. Each farm partner retains full control over the pace and priorities of technology adoption. Questr's role is to conduct on-farm assessments, match automation tools to specific needs, and then assist with installation, funding applications, and training.
3. **Collaborative Research and Data:** Questr works in close partnership with academic institutions like West Virginia University - Extension, the WVU Robotics Center, and Eastern West Virginia Community & Technical College. These collaborations allow the ROOST program to generate real-world performance data on the effectiveness of different technologies, which in turn informs broader research, public policy, and future investment decisions. By positioning itself as an expert integrator and project manager, Questr provides the missing link that has historically prevented small and medium-sized farms from accessing the benefits of automation.

Economic Impact

Each ROOST-trained automation technician is projected to earn **\$45,000 – \$55,000 per**

year, well above the county’s current median wage of ≈ \$36 000. With **15–20 technicians** expected in the initial apprenticeship cohort, this translates into roughly **\$750,000 – \$1 million in new annual local payroll**—a significant rural income injection that remains in-county through service and maintenance work.

Environmental Outcomes

Automation will directly reduce inputs and waste across participating farms:

- **Up to 25 % water savings** via precision watering and leak-detection sensors.
- **15–30 % energy reduction** through smart ventilation, LED lighting, and power-cycle automation.
- \$3,000 to \$5,000 in annual utility savings per farm.
- **30–40 % lower ammonia emissions** due to consistent cleaning and improved airflow management.

3.0 The ROOST Initiative: Program Structure and Objectives

The Rural Operations Optimization & Systems Trial (ROOST) is Questr Automation's flagship initiative. It is a pioneering, hands-on demonstration project designed to enhance farm automation in Hardy County by integrating tailored technologies to optimize rural operations, support local farmers, and promote economic growth. The program is designed as a collaborative public-private partnership that empowers farmers to improve efficiency and reduce operational costs without replacing their essential expertise.

3.1 Core Concept and Key Objectives

The core of the ROOST program is its farmer-centric philosophy. It is a collaborative initiative to introduce smart farming technologies on several host farms in Hardy County, with the farmer's input and operational goals guiding every decision. The program is structured in phases, moving from planning and installation to long-term monitoring and evaluation over an 18-month period.

The key objectives of the ROOST program are:

- **Boost Farm Productivity and Profitability:** Deploy automation to reduce labor hours, cut input costs, and improve yields, helping Hardy County’s family farms remain economically viable for generations to come.
- **Demonstrate Innovative Rural Solutions:** Establish Hardy County as a real-world testbed for practical farm automation, creating a successful demonstration project that can be replicated in other rural communities.

- **Ensure Farmer-Driven, Low-Risk Adoption:** Guarantee that every participating farmer retains full control of adoption decisions. The program is structured so that equipment and training are funded at 100% through grants, ensuring that innovation feels safe and is led by the farmer, not imposed upon them.
 - **Customize Solutions to Farm Needs:** Conduct thorough needs assessments to select automation options based on a farm's specific type (e.g., livestock, poultry, crop) and its unique operational challenges, ensuring technologies are relevant and effective.
 - **Measure Benefits and Sustainability Impacts:** Collect and analyze data on labor savings, productivity gains, resource conservation, and economic outcomes to quantify the benefits of automation and build a case for broader adoption.
-

Technology Examples and Case Studies

1. **Prinzen PSPC-30 Egg Handling System** – Automates egg collection and packing; demonstrated **600 + labor-hour savings per year** per poultry house.
2. **DJI Agras T40 Drone System** – Used for precision spraying and seeding; reduces manual application time by **70 %** while improving coverage and safety.
3. **BirdsEye Robotics Barn Cleaner** – Autonomous barn sanitation system that decreases manual cleaning labor by **80 %** and enhances biosecurity.

These technologies exemplify Questr Automation LLC's commitment to **practical, ROI-driven automation** that fits small- and mid-scale Appalachian farms.

4.0 The ROOST Approach: A Farmer-Centric Model

The defining feature of the ROOST program is its deeply ingrained farmer-driven approach. This philosophy shapes every stage of the process, from initial conversations to the final selection and implementation of technology, ensuring that solutions are practical, acceptable, and beneficial from the farmer's perspective.

4.1 Farmer Leadership and Collaborative Planning

Questr Automation makes it clear from the outset that the host farmer will have full and final authority to decide which automation technologies are implemented on their farm. Questr's role is that of a facilitator and expert advisor; the team presents options, provides technical analysis, and handles installation, but the farmer has the final say.

This principle is put into practice through a systematic and collaborative technology selection

process:

1. **Farm Assessment and Needs Profiling:** Questr begins with a comprehensive on-site assessment, observing workflows and interviewing the farmer to understand daily routines, operational pain points, and goals for improvement.
2. **Financial and Risk Analysis:** The team performs a capital budgeting and cash flow analysis to evaluate the potential return on investment (ROI) and risks associated with various automation options.
3. **Technology Scouting:** Leveraging its industry connections, Questr creates a curated list of suitable automation technologies that align with the farm's identified goals and challenges. This includes a range of solutions, such as robotic milking systems, solar-powered irrigation, precision soil monitoring sensors, automated greenhouse climate controls, and drone-based crop scouting.
4. **Funding Alignment and Feasibility:** A critical step is aligning each potential technology with an available funding mechanism, such as a USDA grant or a state-level loan program. This ensures that only financially viable options are presented to the farmer.
5. **Recommendation and Farmer Input:** Questr presents a "menu" of 6-10 prioritized automation options to the farmer, complete with explanations, cost breakdowns, and identified funding sources. This is a collaborative dialogue where the farmer's feedback and preferences guide the final decision.
6. **Final Selection and Implementation:** The farmer selects the technology they are most comfortable implementing. Questr then assists with funding applications, coordinates installation, and establishes a continuous feedback loop to monitor performance and make adjustments based on the farmer's real-world experience.

Risk and Mitigation

<u>Risk Type</u>	<u>Description</u>	<u>Mitigation</u>
Technology Performance	Equipment fails to deliver projected savings	Pilot testing on 3 farms before full deployment; vendor QA verification
Supply Chain Delays	Hardware or parts shortages	Multi-vendor sourcing, U.S. and EU manufacturers
Adoption Resistance	Farmer hesitation to adopt new systems	Hands-on demos, cost-share incentives, peer-farm testimonials
Data Security & Continuity	Loss of data or connectivity	Cloud-synced backups, redundant local storage

**Maintenance
Capacity**

Insufficient local service
expertise

ROOST Apprenticeship produces
certified automation technicians

5.0 The ROOST Apprenticeship: Building a Future Workforce

A central pillar of the ROOST initiative, and a key to its long-term sustainability, is the creation of a parallel workforce development track: the ROOST Apprenticeship. This program component directly addresses the need to cultivate a local talent pool with the skills required to support a technologically advanced agricultural sector. Without a trained local workforce, the benefits of automation could not be sustained.

5.1 Partnership with Eastern West Virginia Community & Technical College

The apprenticeship program is managed and led by Eastern West Virginia Community & Technical College (EWVCTC), with Questr Automation serving as the primary implementation partner. This partnership leverages the strengths of both organizations: EWVCTC's expertise in curriculum development, credentialing, and student support, and Questr's direct connection to on-farm technology and industry needs.

5.2 Program Structure and Objectives

The primary purpose of the apprenticeship is to train and place residents from Hardy and surrounding counties into high-demand, high-tech jobs related to agricultural automation. The program is designed to create clear career pathways for roles such as:

- Automation Maintenance Technicians
- Certified Drone Pilots for Agricultural Scouting
- Precision Agriculture Operators
- Smart Farm Systems Managers

The curriculum follows a "learn-and-earn" model, combining traditional classroom instruction at EWVCTC with paid, on-the-job training through apprenticeships hosted at the ROOST pilot farms. This structure ensures that students, or "apprentices," gain both the theoretical knowledge and the practical, hands-on experience needed to succeed.

Upon completion, graduates emerge with industry-recognized certifications, making them immediately employable and valuable to local farms, equipment vendors, and other regional employers. The apprenticeship program transforms the ROOST initiative from a simple equipment trial into a comprehensive local innovation engine—one program equips farms with modern tools, while the other equips local people with the skills to operate and maintain them, creating a virtuous cycle of economic and workforce development.

6.0 Funding the Future: A Strategic, Multi-Layered Approach

A foundational principle of the ROOST program is that participating farmers should bear no direct financial risk for adopting new technologies. To achieve this, Questr Automation has developed a sophisticated, multi-pronged funding strategy that "braids and sequences" investments from a diverse portfolio of federal, state, regional, and philanthropic sources. This approach allows the program to leverage different grant opportunities to fund distinct components of the initiative, from capital equipment purchases to workforce training and research.

6.1 Primary Federal and State Funding Streams

The funding strategy targets programs specifically designed to support agricultural innovation, rural economic development, and conservation. Questr actively aligns proposed automation solutions with eligible grant and loan programs, including :

- **U.S. Department of Agriculture (USDA):**
 - **Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP):** Cost-share funding for technologies that improve water conservation and nutrient management, such as precision irrigation systems.
 - **Rural Energy for America Program (REAP):** Grants for renewable energy and energy efficiency upgrades, such as solar-powered irrigation pumps.
 - **Farm Service Agency (FSA) Operating Loans:** Financing for capital equipment purchases like robotic milking systems.
 - **Value-Added Producer Grants (VAPG):** Funding for on-farm processing equipment that increases product value.
 - **National Institute of Food and Agriculture (NIFA):** The AFRI-EWD program is ideal for funding the apprenticeship's curriculum and training, while the AFRI-FAS program can support the acquisition of automation equipment for research and demonstration.
- **Economic Development Administration (EDA):** The **Economic Adjustment Assistance (EAA)** program, particularly its **Assistance to Coal Communities (ACC)** funding, is a primary target. This program is designed to support economic diversification in regions impacted by the coal industry's decline, a narrative that perfectly fits the ROOST project.
- **Appalachian Regional Commission (ARC):** The **POWER Initiative** specifically directs resources to coal-impacted communities to foster new economic opportunities, with agriculture and technology being priority investment areas.
- **West Virginia State Programs:**
 - **WV Department of Agriculture (WVDA):** Programs like the Rural Rehabilitation Loan Fund and Specialty Crop Block Grants can support equipment purchases and technology integration.
 - **WV Conservation Agency (WVCA):** The Agricultural Enhancement Program (AgEP) provides cost-share assistance for conservation practices that can be enhanced with

automation.

6.2 Strategic Sequencing and Matching Funds

The strategy involves using smaller, more accessible grants as "seed funding" to build a more competitive application for larger federal awards. For example, a grant from the **Sustainable Agriculture Research and Education (SARE)** program could fund an initial needs assessment with local farmers. The data from this assessment would then strengthen a major proposal to the EDA or USDA. Similarly, a grant from a regional philanthropy like the **Claude Worthington Benedum Foundation** can provide the critical non-federal matching funds required by many federal programs, demonstrating broad local support and institutional commitment. Questr is currently preparing joint submissions under USDA and WVDA grant/cost-share programs for Q1 2026.

7.0 Partnerships, Timeline, and Long-Term Vision

The success of the ROOST initiative is predicated on a robust network of strategic partnerships that bring together expertise from the private sector, government, academia, and the local community. This collaborative framework ensures the program is well-managed, technically sound, and deeply integrated into the fabric of Hardy County's agricultural economy.

7.1 A Network of Key Partners

The ROOST program operates as a formal public-private partnership with clearly defined roles:

- **Questr Automation LLC:** Serves as the overall program manager and technology integrator, responsible for farm assessments, installation, training, and data collection.
- **Eastern West Virginia Community & Technical College (E WVCTC):** Manages the apprenticeship program, including curriculum development and credentialing.
- **Hardy County Commission & Rural Development Authority (RDA):** Provide local coordination, outreach support, and serve as fiscal agents or co-applicants for public funding, if necessary.
- **WVU Extension, USDA, and WVDA:** Collect and analyze program data, deliver critical technical assistance, conservation planning support, and help align the project with available grant programs.
- **WVU Robotics Center:** Acts as the academic lead for research, data validation, and reporting on technology performance.
- **Industry Collaborators:** Technology partners, such as French robotics firm Octopus Biosafety, provide advanced equipment and technical support for field trials.

7.2 Implementation Timeline

The pilot program is designed to run on a structured 18-month timeline, broken into distinct

phases :

- **Months 0-2 (Outreach and Assessment):** Recruit participating farms and apprentices; conduct on-farm needs assessments.
- **Months 3-6 (Deployment and Training):** Finalize technology selection, secure funding, install automation systems, and launch classroom and on-farm training.
- **Months 6-18 (Monitoring and Support):** Continuously monitor system performance, collect data on key metrics (labor hours, costs, yields), and provide ongoing technical support to farmers and apprentices.
- **Month 18+ (Evaluation and Expansion):** Analyze the collected data, publish case studies and final reports, and develop a strategic plan for expanding the program to additional farms.

7.3 Long-Term Vision

The long-term vision for Questr and the ROOST initiative extends beyond a single pilot project. The ultimate goal is to create a lasting and scalable model for farmer-driven innovation that can ensure the future of sustainable agriculture in West Virginia and beyond.

If successful, the pilot will provide a proven roadmap for modernizing family farms, making them more profitable, resilient, and attractive to the next generation. The core message is that automation is not about replacing farmers; it is about empowering them with tools that reduce drudgery, provide better data for decision-making, and free up their time for higher-level management. By proving this model in Hardy County, Questr Automation aims to solidify the region's role as a leader in applied agricultural technology, paving the way for a new era of technology-enhanced, sustainable, and prosperous farming in Appalachia. Questr Automation LLC invites public, academic, and private partners to participate in expanding the ROOST framework across West Virginia. Questr Automation LLC stands ready to partner with West Virginia's farmers, educators, and policymakers to prove that smart automation can preserve the traditions — and secure the future — of rural America.

8.0 Next Steps

- Finalize partner MOUs (WVU & EWVCTC)
- Submit pilot funding proposals
- Begin Phase 1 installations Q2 2025
- Launch ROOST Apprenticeship training cohort
- Begin data collection and reporting

Key Outcomes by Partner Group

<u>Stakeholder</u>	<u>Key Outcomes</u>
Farmers	<ul style="list-style-type: none">• 500+ labor hours saved per farm annually through automation (egg handling, irrigation, cleaning, feeding).• Up to 30% reduction in operating costs.• Access to USDA/WVDA-backed farm automation equipment and services, as well as tech support via Questr.• Stronger biosecurity, efficiency, and profitability with farmer-driven control over adoption.
Apprentices (ROOST Workforce Program)	<ul style="list-style-type: none">• 15–20 trained automation technicians earning \$45K–\$55K/year.• Hands-on experience with robotics, sensors, and precision ag tools.• Career pathways in advanced manufacturing, agtech, and rural service industries.• Certification through EVWCTC.
Eastern WV Community & Technical College (EWVCTC)	<ul style="list-style-type: none">• Anchor role in the region’s first ag-automation training program.• Strengthened reputation as a rural innovation and workforce hub.• Integration of Questr-led fieldwork into existing CTE and apprenticeship tracks.• Pipeline for student employment with Questr and

partner farms.

Hardy County

- Establishment of the state's first on-farm automation demonstration hub.
- Creation of high-wage, non-extractive local jobs.
- Increased county visibility with state and federal agencies as a model of rural modernization.
- Long-term boost to agricultural productivity and local spending.

Questr Automation LLC

- Proof-of-concept validation for scalable rural automation models.
- Expanded vendor and academic partnerships (Octopus Biosafety, WVU Robotics, EWWCTC).
- Data and impact metrics for USDA/ARC funding leverage.
- Establishment of Questr as West Virginia's leader in applied farm automation.