



# AIRIN: REINVENTING FARMING USING SMART AGRICULTURE

*A team of student-agripreneurs develops an automated irrigation and nutrient management system to cater to the Filipino farming community*

Growing up in a household of farmers in Nueva Vizcaya, Philippines, Myka Fragata, a university student, recalled how her family spent a typical day working tirelessly on the farm. Even with dedication and hard work, her family still struggled to put food on the table. Also hailed from a farming family, Daniel Labaddan, a student engineer, shared the same sentiment. He witnessed the farmers' challenges in resource management and limited access to farming inputs and services.

With their eagerness to support their families and their passion for solving long-standing, deep-rooted agricultural issues, Ms. Fragata and Engr. Labaddan created a dynamic team driven to simplify farm work and to give back to farmers the time and resources they genuinely deserve.

Ms. Fragata and Engr. Labaddan envisioned a team of talented individuals who share the same passion and similar interests in agriculture and technology. This team of student founders comprises the sons and daughters of Filipino farmers from the Nueva Vizcaya State University (NVSU). They pitched in their expertise in engineering and education to create a technology that could change the lives of their farming community. As of writing, the team has grown to include Engr. William Tabdol, Engr. Bryan Visaya, Engr. Foster Talwag, Mr. Jaime Hapicio Jr., and Ms. Maricel Farro.

"Since the members of our team have come from small-scale farming families, we feel the importance of having access to these farming technologies to improve the lives of our families and the farming community," said Engr. Labaddan.

They banked on reinventing farmers' hard work into smart work through irrigation and nutrient management innovation. This innovation aims to help farmers maximize their time and energy, optimize the use of resources, and improve overall crop health to achieve higher productivity and profitability without sacrificing sustainability. Their ultimate goal is to solve the Filipino farming community's greatest pain points.



## JOINING THE INNOVATION OLYMPICS 2.0

To bring their idea to fruition, the team participated in the **Innovation Olympics 2.0** hackathon supported by East-West Seeds, the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), and the University of the Philippines Los Baños (UPLB).

They initially proposed to integrate a solar-powered irrigation system with pest control. However, the results of their interviews showed that maximizing time and yield were the main production concerns of the local farmers in their community. The farmers also seldom employ labor to minimize input costs. Despite institutional efforts, it was also revealed that the farmers had limited access to farming technologies. With this, the team had to figure out how to incorporate these essential findings and the farmers' needs in their proposed technology.

Critical farm operations that can be made smarter were identified. Controlling irrigation systems is intense on time and labor. On the other hand, optimizing farm inputs for soil fertility and proper conditioning is perceived as value-adding to the yield and quality of produce. Thus, the team proposed to build a prototype of an automated system for managing these operations.

"We thought that the combination of irrigation and nutrient management would greatly help our local farmers," stated Ms. Fragata.

The team considered some factors in choosing their adopted farming community to test their prototype. Physical and environmental conditions such as terrain, land area, and cropping seasons were assessed. Most importantly, to give the farmers a sense of ownership, the team had to gain their trust and willingness to collaborate with the project and capture their interest in the technology.

"After attending the design thinking training and workshop on 28 November 2020, we saw it fitting to focus on the target customers and their needs," recalled Ms. Fragata. "From there, we were able to refine our original idea. The mentors taught us to balance our idea from the perspective of a future business and to prioritize the needs of the farmers," she added.

True enough, all their efforts paid off when the team took in these ideas and improvements. They bagged the **Innovation Olympics 2.0's** grand prize for demonstrating precision agriculture power in meeting the needs of the farming community.



Team AIRIN bags the grand prize of the Innovation Olympics 2.0 supported by the East-West, SEARCA, and UPLB.



From college theses to passion projects, the student founders developed the Automated Irrigation and Nutrient Management System or *AIRIN*. *AIRIN* is now a startup under research and development, with Ms. Fragata appointed as the chief executive officer and Engr. Labaddan as the chief technology officer.

## ENHANCING AIRIN AND ITS MARKETABILITY

The **SEARCA Grants for Research towards Agricultural Innovative Solutions (GRAINS)** enabled team *AIRIN* to enhance their technology and assess its marketability. The extended project intends to: (1) increase the awareness of sustainable agricultural practices of local farmers; (2) improve the livelihood of rural agri-communities; (3) promote precision agriculture technologies to smallholder farmers; (4) increase productivity and profitability of farming families; and (5) scale up farm demonstration to target beneficiaries, which are smallholder farmers and farming families.

Based on the initial users' feedback, the design of *AIRIN* will be improved and minimized into commercially-marketed farming equipment. Team *AIRIN* is currently applying for intellectual property rights for their technology. Lastly, the extended project's culminating activity is to demonstrate *AIRIN*'s impact on crop production and the livelihood of its end users.

## SYNERGISTIC SYSTEM WITH MAXIMUM BENEFITS

*AIRIN* minimizes labor costs by automating irrigation through a mobile application and lessens input costs by applying the right amount of fertilizer based on actual farm conditions.

*AIRIN*'s value proposition is its centralized irrigation and fertigation solution with data-driven decision support. Through text messages, subscribed farmers are informed of real-time farm status regarding soil moisture, temperature, humidity, electrical conductivity, pH level, nitrogen, phosphorus, and potassium (NPK) content, and irrigation source water level. Furthermore, through real-time farm data monitoring, the farmers know when and where to irrigate and how much irrigation and fertilizer to apply.



Prototype of AIRIN stationed in the adopted farming community

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*AIRIN* also offers to help resource-limited farmers who want to improve their productivity and profitability by optimizing their time and energy through more efficient crop production. This is unlike the guesswork linked with laborious, time-consuming approaches, such as flooding and backpack battery spraying. Moreover, *AIRIN* creates crop-specific recommendations and farm operations.

## BECOMING FARMERS' COMPANION TO SUCCESS

"The biggest lesson we can take from our farmers is the value of hard work, but what if we can empower them not just to work harder, but also smarter?" a tagline delivered by Ms. Fragata during one of their pitch videos.

In the same video, Mr. Bryce Fragata, a vegetable farmer and a DOST magsasakang siyentista, which translates to “farmer scientist,” was introduced. The video narrated Mr. Fragata's frustration with crop irrigation during the dry season. Although he uses fuel-fed water pumps to flood-irrigate, Mr. Fragata still needed to hire farm workers and wait long hours for their turn at the irrigation canal. The yearly soil health and fertility manual testing was also added to the flood irrigation labor cost, and even though the service is expensive, it is essential to producing high crop yields.

With *AIRIN*, Mr. Fragata can gather real-time farm data through accurate weather, water, and soil sensors helping him make informed farm decisions on irrigation and fertigation. He can remotely initiate and monitor farm operations using SMS or the *AIRIN* offline mobile app. Moreover, he can optimize water and fertilizer usage by applying the right amount at the right time and place. The solar-powered practical and user-friendly design of *AIRIN* is intended explicitly for local farmers to easily maintain the technology, understand their farm conditions, and respond accordingly to their farm needs.





To use *AIRIN*, Mr. Fragata can select a crop in the *AIRIN* mobile app dashboard to receive customized farming recommendations based on the crop's specific requirements. These recommendations are supplemented with real-time farm weather reports, soil parameters, and water levels. If pH, NPK, and other soil parameter levels are out-of-range, *AIRIN* can initiate fertigation by injecting water-soluble fertilizers into its irrigation system. *AIRIN*'s central system can operate continuously in the field using solar energy. Its system also provides lightning protection and can withstand extreme weather conditions. *AIRIN* can also self-diagnose system malfunctions and notify farmers of the detections as part of its innovation.

For its initial test, results showed that the adopted farming community had 45 percent less application of fertilizer and 300 percent less water consumption. There was no significant crop loss during the dry season, which also indicated a higher yield with higher quality produce.

At this rate, farmers can spend more time on other farm tasks such as marketing and, most importantly, with their families. The success story of *AIRIN* initiated a booming interest among local farmers who have reached out to the team to learn more about the technology.

## TIPS FOR ASPIRING STARTUPS

Team *AIRIN* advocates inspiring young minds to embark on a transformative journey of building their startups. They offer startup tips for budding innovators who dream of starting their businesses.

**Choose the right co-founders.** Team *AIRIN* was able to source their co-founders within the NVSU. They advised fellow university students to look around the campus for potential co-founders—from their pool of friends, classmates, or schoolmates who have the same passion, curiosity, and knack for solving real-world problems

**Connect with the right mentor.** Innovators can move their ideas forward with the help of the right mentors. Mentors can be teachers, researchers, or experts keen to help innovators envision their ideas, spot gaps, and recommend possible solutions. Team *AIRIN* believed that standing on the shoulder of giants can aid in spotting better problems and gaining better perspectives.



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**Access university resources.** Team AIRIN encouraged students to explore opportunities and resources inside the university. Through this, they can access various resources and state-of-the-art laboratory facilities.

**Join mentorship programs and competitions.** Mentorship and incubation programs are ideal hubs for ideas and dreams to come together. Such programs concretize proposals and give proper exposure to startup teams to showcase their skills and technologies. Innovation hubs, sectoral institutions, and government agencies provide the avenue for startup technologies to flourish and secure funding opportunities. For Team AIRIN, **Innovation Olympics 2.0** has taught them how to interview potential customers, has guided them in developing their first prototype, and has helped them gain valuable user feedback.

"Starting AIRIN was the best decision for our team, both for personal and professional growth and, more importantly, in helping farming families," shared Ms. Fragata. "Because, at the heart of team AIRIN, our love for the farming communities comes from the love of family," she added.

Team AIRIN is continually encouraging everyone to participate in the agricultural revolution to bridge the gap between Filipino farmers and technological innovations so no one gets left behind.

