Artificial Intelligence and Agribusiness

AI and the Farm System: Making the Good Better

A vital task of the next century will be to provide enough sustainable, safe, and nutrient-filled food products to meet the needs of an ever-growing world population. Smarter agricultural growth, according to the World Economic Forum, is the key. Can the technology of artificial intelligence (AI) be applied to our food system to improve farmer processes, crop yields and farm profitability, reduce waste and promote the health of the general population? The answer coming from tech circles is a resounding yes.

Miniaturized sensors, coupled with 5G technology, will combine to compile and assimilate vast amounts of data relative to crop status, hydration, and soil condition, among many other things essential to quality output. Sources estimate that by 2020, 75 million connected devices will be deployed in agricultural applications and the average farm will generate over 4.1M data points per day by 2050.

Challenges still remain in refining applications, overcoming user apprehension in applying advanced technology, understanding reporting, and driving down costs to make the deployment of this technology affordable. However, the benefits to be gleaned in waste reduction, yield improvement, and profitability gains indicate this will be well worth the effort.

Labor Force Takeaway

As with all technologies, the need for robotics management and maintenance is anticipated to grow exponentially in the near term. Robots working in the fields, farms and warehouses will need inventory management, maintenance and updates/patches. TAN recommends the following certifications:

PC Age, as well as many local community colleges, offer CompTIA A+, Network and Security certifications, all aimed at the IT beginner. Certifications cover software installation, maintenance and update, network access, security, and other IT fundamentals. CompTIA A+ educates to the level needed to run a network of endpoints and devices in a farm environment.

The Cisco Certified Entry Network Technician (CCENT) is the first step towards the CCNA (Certified Network Administrator) certification. It covers network fundamentals, basic security and wireless, routing, switching, and configuring, all key components of the agbots platform. CCENT is valued beyond agribusiness.

Key agbot manufacturers, such as Blue River, Abundant, Iron Ox, QUT, Rowbot, and Prospero, have training programs and certifications available on their products. These will be essential to fleet management.

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THE FARMING INDUSTRY HAS ADOPTED AI TECH

From precision weeding and picking to disease recognition, **artificial intelligence** will revolutionize farming. Examples of artificial intelligence applications in farming include:

Automated Irrigation Systems - An automatic plant irrigation system helps farmers water their fields. Automatic irrigation enhances existing watering machines with intelligence to operate irrigation systems, so the deployment can occur without the intervention of an operator. This is a boon considering shortages of help, changing weather patterns or needs. It can be combined with soil and plant sensors to automatically engage the watering process.

Crop Spraying Drones and Automated Detection and Analysis (Farmshots, CAMP 3) -Drones are deployed to **gather real-time information** on crops and assess needs. Water, pesticides and weeding, are all necessary functions to crop maintenance, and drone imagery can determine what is needed and when. Crop-spraying drones can also spray pesticides if it is determined to be needed. Deployment is easy and localized, since unmanned aerial vehicle (UAV) sprayers can take off and land vertically, and therefore require no special facilities or runway. They are also good for uneven or hard to reach terrain and can control and adapt spray heights and amounts.

Swarming Farmbot (Picking/Weeding/Soil Analysis) - The Autonomous Micro Planter (AMP) uses swarm and gaming theory to weed and harvest. Robots can be programmed to examine soil before planting each seed and choosing the best variety for that soil. This allows farm managers to maximize the productivity of each planting area, ensure they remained weed free, and harvest the crop at the end of each growth phase.

Lettuce Thinning Robot - A lettuce-thinning robot, designed by Blue River Technology and currently being used by eight customers across the US, is used for the thinning and weeding of lettuce to increase yield. Plants are evaluated by the vision system and then artificial intelligence algorithms are applied to make plant-by-plant decisions to eliminate unwanted plants, thereby optimizing yield. Precision lettuce-thinning can maximize yield by counting plants and determining plant spacing. Data and statistics are gathered and warehoused for each planting and a plot image library is built that contains all images and plot reconstructions for analysis and future use.

Driverless Tractor - Sensors, radars and GPS are combined to guide the driverless tractor system. The course of a driverless tractor can be set and adjusted as needed, freeing up manpower for other farm needs. These tractors supplant a deficit in the labor during planting and harvesting.

Hortibot – The autonomous horitbot is a weed pulling machine. It can identify and eradicate 25 different kinds of weeds and eliminate them by using its weed-removing attachments or by spraying.

> **Declining numbers of available workers, output volume and crop turn (velocity) suggest the shift to robotics will be essential to keep pace with demand.**

These examples are a few of the many applications currently in use today that employ artificial intelligence and robotics to improve and expand the ability of food. Farmers worldwide can more easily maximize crop yields and profitability. As adoption expands and technology improves, we can expect expanded capabilities. More tasks will be handled by smart agribots and their operators. This will return even greater value to the farming communities they support.

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