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Automation: New Horizon in Agricultural Machinery

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Editorial

Agriculture is the oldest and most important economic activity of humanity, because it provides the food, fiber and the fuel necessary for our survival. With the world population expected to reach 9 billion by 2050, agricultural production must double to meet the growing demand for food and bioenergy. Taking into account the limited resources of land, water and manpower, it is estimated that the efficiency of agricultural productivity should increase by 25% to achieve this goal by limiting the growing pressure exerted by agriculture on the environment. With population growth and rising food demand, the agricultural industry knows how important it is to move quickly to ensure that supply meets demand. The agricultural industry uses robots for a wide range of tasks to meet these needs. Automation is an illumination of the human resources of the labor camp. From last two decades, the concept of industrial automation in agriculture has not developed much.

Automation to agriculture helps create the various advances in the industry and helps farmers to save time and money. Some of the scientific contributions towards the mobile robot, the flying robot and the forest robot are exclusively for agriculture. Even in developing countries, farmers are interested in using robots to take care of the fields, pick the fruit or even maintain the animal, agricultural robots must have human interaction to compensate for the problems of programming complexity. The technological challenges will soon be largely resolved and the industry will be in the process of creating and testing a corporate case, both as a team and as a service.

New developed robots will be able to monitor crops and animals. This would include the control of growth and disease models. Using Wi-Fi technology, the machine can navigate crops without damaging them, even on rough terrain. The device is designed to collect information on soil composition, temperature, humidity and the general conditions of the plants to be sent to the farmer. The mechanical design consists of the end effector, the manipulator and the clamp, the manipulator design includes the task, the economic efficiency and the required movements, the final effectors in the agricultural robot is the device located at the end of the robotic arm and use for various agricultural operations.

Robots and drones have already quietly begun to transform many aspects of agriculture. Thousands of robotic milking parlors have already been installed around the world, creating a $ 1.9 billion sector that is estimated to increase to $ 8 billion by 2023. Mobile robots are also penetrating dairy farms, helping to automate tasks such as pushing or cleaning manure. Also the automatic driving and tractor driving technologies are generalized thanks to the improvements and the cost reduction of the RTK GPS technology. In fact, more than 300k of tractors with automatic transmission or tractor was sold in 2016, reaching over 660k units a year in 2027.

The use of robotics can replace many of the ordinary and often arduous work in various sectors of farming and animal husbandry. Robot platforms can carry workers to pick fruit, and some automation can pick the fruit itself. There are also autonomous robots that can harvest crops in field. They can automate crop spraying and spread fertilizer through driverless tractor. They can even sheer sheep and milk cows. However, these farming tasks are not the only way things are automated in the agricultural field. There are also industrial applications that make life easier for those involved in agriculture.

Agricultural robotics is also quickly developing on the earth. Vision-enabled robotics implements have been in viable use for some years in organic farming. These implements follow the crop rows, identify the weeds, and aid with mechanical hoeing. The next generation of these innovative robotic implements is also in its early phase of commercial deployment.

To make a selective collection effectively, two criteria are required; the ability to detect the quality factor before harvest and the ability to collect the product of interest without damaging the rest of the crop. Most agricultural equipment is becoming larger and therefore is not suitable for this approach. Smaller and more versatile selective collection equipment is needed. Either the crop can be inspected before harvesting so that the necessary information about where the crop of interest is located, or that the harvester can have mounted sensors that can determine crop conditions. The selective harvester can harvest that ready crop, allowing the rest to mature, dry or ripen, etc. Alternatively, small harvesters of stand-alone crops could be used to selectively harvest the entire crop from a selected area and transport it to a stationary processing system that could clean, cut and perhaps pack the product. This is not a new idea, but the updating of a system that used stationary threshers from many years ago. Alternatively, a separator header could be used to collect the heads of the cereals and send them to threshing.

Agricultural automation is a continuous development. The existing research technologies give rise to the possibility of developing a completely new mechanization system to support the cultivation system based on small intelligent machines. This system replaces the complete energy on the application with intelligently targeted inputs thus reducing the cost of inputs while increasing the level of care. This can improve the economics of crop production and harvest less environmental impact.