Neousys Technology

Autonomous Agriculture Tractors

Neousys Technology Inc.

Published August 2021

www.neousys-tech.com

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Overview

Farming has come a long way since the days of human and animal labor. Improved greatly with the invention and development of heavy equipment to aid farmers in covering more area and doing more in less time. However increasing productivity for farmers today means they require specifically skilled farmworkers while ensuring their safety with modern heavy equipment, collect real-time data while working on hundreds of acres of land.

Not to mention other limitations, such as most of the work needs to be done during the day or under proper lighting conditions and a driver/ operator is needed for every tractor out in the field. And with such a large area to cover, it is hard to keep track of where, when and what crops were planted into the soil.

Human labor farming

Animal aided farming

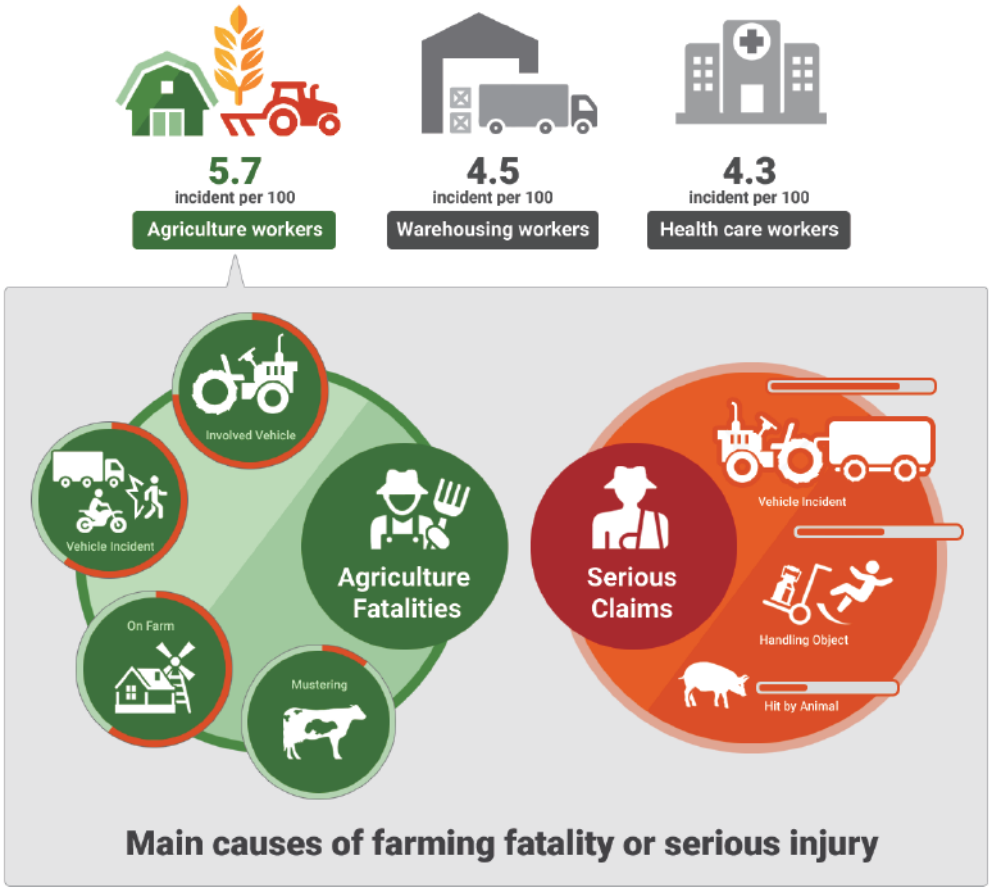
Problem-solving

The need for skilled farmworkers

The need for skilled workers applies to various professions and it is no different in farming. The need for agricultural knowledge and skill to operate heavy equipment is essential to increase productivity.

Farmworker safety

Farming is considered to be heavy labor work and believe it or not, it is ranked amongst one of the highest injuries on the job workforces. According to the National Agricultural Safety Database, approximately 33% of farmworkers suffer non-fatal injuries every year while on the job and of that figure, 3% suffer permanent disability. One of the most predominant causes of farmworker death or serious injury involves a vehicle (tractor, heavy machine, etc.).



Lowering cost and increasing productivity

Output (yield) – input (cost) = productivity
There are two types of inputs, **consumable** and **capital** input.

Consumable inputs can also be considered as essential inputs as they are usually MUST items. Such as labor, seeds, soil, fertilizers, insecticides, pesticides, insect traps, straw, hay, water, etc. but only so much cost can be saved in this area.

Capital inputs are inputs that are usually mechanical and technologically advanced. Such as a machine that lives on-site and is central to the farm's daily operations. This holds the most potential for overall productivity gain.

Problem-solving

By implementing autonomy to agriculture tractors, our customer's solution killed a flock of birds with one stone. It solved the need for a high number of skilled laborers, farmworker safety, increase in productivity and brought other benefits to the table such as customization to suit field type, tractor fleet management (orchestrate), the already mentioned autonomy technology and the solution's overall scalability.

Customize, orchestrate, automate and scale

Farming requires skilled laborers, they are not easy to find and expensive to hire. But what if you can have one skilled farmer controlling multiple tractors to do the work? With modern technology advancement, our customer chose to fit their tractors with Neousys computers connected to cameras, sensors and Lidars to achieve autonomy where one worker can control multiple tractor deployments to the field and best of all, they can be customized to suit your farming type. The autonomy technology can be implemented onto tractors or smaller farming vehicles, depending on your needs.

Control multiple tractors

Complimentary farming

Industrial farming

Multiple farming

The ability to control and monitor **(orchestrate)** your farming vehicle fleet in real-time is a bonus. Even though you're not in the field with the tractor, the installed cameras, sensors, Lidars offer you a 360° view of the tractor's surroundings. And where farmers would have to wait until the vehicle breaks down, a predictive maintenance solution can help warn of the small things, before it becomes a big problem. This means minimum tractor operation downtime and thus more production time.

The mentioned autonomy technology solves the need for skilled laborers and it inadvertently brings one other benefit, **safety**. At the palm of their hands, farmers can control and deploy multiple tractors to the field. The minimized physical contact between the farmer and vehicle, and the farmer being off the field, greatly reduces the odds of accidents happening involving a farmer and a vehicle.

Another advantage of autonomous tractors is the ability to cover hundreds of acres of work, where it used to require a team of ten or twenty, can be **scaled** down to a team of five skilled farmers that can simultaneously deploy and operate 20 plus tractors onto the field. This represents a saving in skilled worker payout annually (reduced input) while retaining the same or more working tractors on the field (same or increased output), which means a plus in productivity.

In short, applying autonomy technology to farming tractors brings several benefits to modern farming. One, it solves the need for a high number of skilled farmers and therefore, saves cost. Two, it reduces injuries by minimizing farmworkers from direct contact with heavy equipment/ tractors. Three, the autonomous tractor technology allows for the same if not more work to be done, with less skilled farmworkers on the job.

Our customer's choice to utilize Neousys computers on their autonomous tractors is based on the selection of rugged industrial computers with a variety of connectivity and flexibility to meet tractor autonomy implementation needs. Furthermore, the selection extends to extreme-rugged systems that feature dust and IP67 waterproof capability which is perfect for deployments in the field and working under the weather.

Benefits of Neousys Embedded Computers

Neousys rugged embedded platforms offer the following advantages:

Environmental

- IP67 water/ dustproof GPU computer
- Extreme rugged computers for extra volatile environmental conditions
- True -25°C up to 70°C wide-temperature operations for harsh, volatile environments
- Patented Cassette design for segregating thermal/ electrical interference
- Tri-axis tested patented damping bracket to withstand shock and vibration conditions for in-vehicle use
- Ultra-compact VTC systems to fit into tight spaces

Connectivity/ expandability

- PoE+ connectivity for GigE cameras
- USB3.1 Gen1/ Gen2 connectivity for USB cameras
- Connection ports with screw-lock for rugged connectivity
- WiFi 6/ WiFi 5/ 5G/ 4G wireless communication, expansion via mini-PCIe module

Inference processing power

- Support up to dual NVIDIA RTX 30/ 20 series graphics cards
- Support up to NVIDIA® RTX 30/ 20 series graphics cards
- Support up to NVIDIA® Tesla/ Quadro inference accelerators

Electrical

- Patented SuperCAP UPS to counteract unforeseen power interruptions
- Wide-range DC input
- Configurable intelligent ignition power control

Some features may be model-specific, please refer to the Neousys website for details.

NOTE

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