

#InternationalWomensDay - Pronto Autonomous Hauling Led by Female CTO Cat Culkin

Lynn Walford - Mar 07 2023



Pronto makes autonomous haulage systems for mining. Chief Technology Officer, Cat Culkin, is one of the women Auto Futures is profiling for International Women's Day. Culkin reveals her background, and how the Pronto autonomous system works. She also gives advice to women who want to become engineers.

Culkin grew up in Michigan. Her father was an engineer for Ford, who retired after 35 years.

"I grew up in the Motor City. Cars are always part of my life. I work on my car for fun. So it has kind of become both a hobby and a job," says Culkin, who likes 1960s Thunderbirds.

She attended the University of Michigan.

"In undergrad, I studied electrical engineering and physics. I always loved breaking problems down and math and physics and solving things. I knew I wanted to do something very applied. So when I took my first controller class at the autonomous vehicles lab in Michigan. I was hooked. I had to stay for grad school," she explains.

Culkin studied control systems, with a focus on autonomous vehicles, earning a Master's Degree in Electrical Engineering.

She then interned at Ford and their autonomous department, and worked at Lucid Motors in their ADAS department, before joining Pronto.ai.



How Does Pronto A2B Work?

99.84.203.116

Pronto A2B is an autonomous hauling system for private mining properties.

"We do autonomous haulage for surface mines for a variety of different materials. We tend to do smaller trucks than existing systems, somewhere in the 50 to the 100-ton range, for the most part. We think that smaller trucks make a lot of sense for autonomy. That is part of why we are doing it," says Culkin.

On a typical route there is a loading area where the trucks will be loaded by a loader excavator. Then they drive it to the dumping area. The load will be dumped in a crusher or in a paddock. It is all handled by the Pronto system.

Pronto provides retrofits on existing trucks.

"We are able to do shifting and throttling and things like that. If we need to install any hardware for steering or braking, we can do it. We design it for each truck platform individually," she says.

The mines are a constrained environment where other vehicles are instrumented. The workers nearby are trained. The area is blocked off to other vehicles, she says.

"Everyone who enters the area has to have a rover on their vehicle. A rover is a GPS device that communicates with the central mine server. The system not only detects them on the camera-- but also everybody is reporting back where they are at all times with GPS. So we have this redundancy. We are able to detect people in more than one way," adds Culkin.

Pronto uses real-time Kinematics. It is like the GPS that is used in surveying precise locations. A GPS base station unit is set up near the site for high-precision GPS within about ten miles enabling centimetre-level precision. Pronto does not use LiDAR because it does not work well in the dust and dirt in mining operations.

On the Pronto website, a video shows a worker looking at his phone in the route of truck. The truck stops.

She explains the truck stopped itself. The system detects a variety of things by cameras, people, vehicles, debris, drivable areas and animals, through different neural nets. Pronto has a lot of data from running trucks, from publicly available data and everything in between. The system is constantly monitoring if there is a person in the frame, if the person is in the path, and how far away he is.

One excavator operator referred the Pronto AB system to, "another tool like an extension of an excavator arm, where instead of radioing drivers where to go, he presses a play button telling the truck where to go," she says.

"We are committed to building something real. And we are working with customers to build more features they need. Our goal is to make a real product that people use and provides benefits, safety and productivity for mines."



Advice for Women in Engineering

Culkin offers this advice to women who want to get into the industry.

"I think the biggest advice I could give is 'ask a lot of questions'. Don't be afraid to be the one that stands out," she says.

She also advises that it is never too late to start.

"I technically did not start my electrical engineering degree until halfway through undergrad, when I realized that was what I wanted to do. It is not too late. If you think that you might want to try engineering, don't feel like you're behind and don't feel like everyone else had a head start. Don't be afraid to take a stab at it."

Her late start has not stopped her from having a career she loves.

"I love working on code that makes things move. Getting to go to work seeing robotic products at work--with people making robot trucks work is my absolute dream. I work with an amazing team of people. Everyone is incredibly smart, hardworking and intimidating sometimes, which is a treat. I am very lucky to work with them," concludes Culkin.

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