
ASI
AUTOMATION
SIMPLIFIED

WHO WE ARE

For more than 13 years, ASI has provided robotic vehicle technologies in the rugged and challenging industries of mining, agriculture, automotive, and military.

ASI's engineering staff is dedicated to providing the highest quality unmanned systems by adhering to the ideals of **safety, quality, innovation,** and **simplicity**.

OUR HISTORY

Beginning in 2000 as a spin off from the Center for Self-Organizing and Intelligent Systems (CSOIS) at Utah State University, ASI worked with a leading agricultural OEM on predecessors of today's precision farming systems.

From this initial project, engineers designed the **NAV** automation kit primarily for the military and farming industries. In 2003, ASI released a powerful command & control software, **Mobius**. ASI expanded into the mining industry in 2008 and to the automotive industry in 2011.

Today, with customers and product implementations in North America, South America, Asia, Europe, and Africa, ASI is a world-leader in unmanned vehicle solutions.

OUR FUTURE

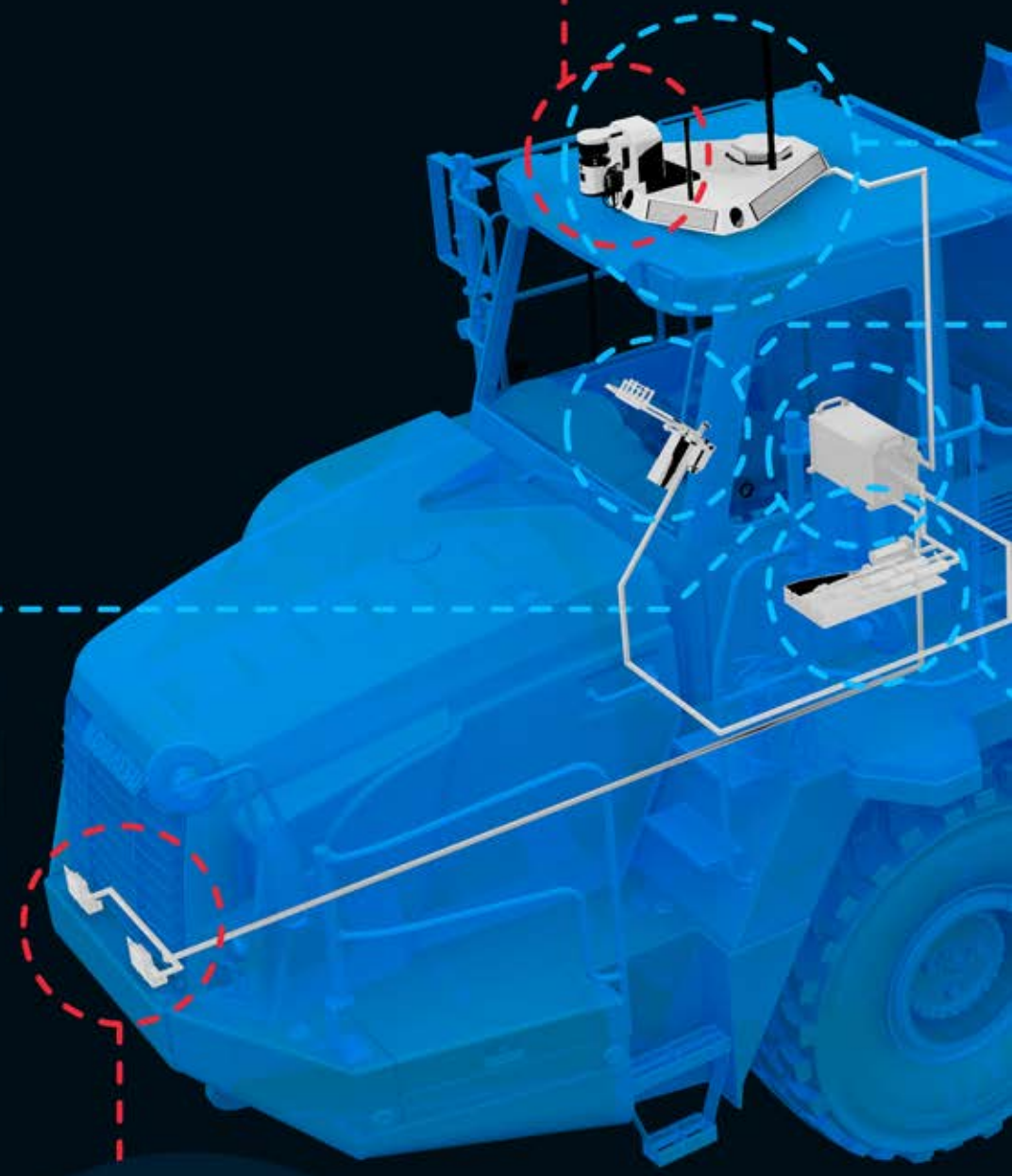
"ASI is challenging the industry status quo by designing solutions that are both simple and safe. We're leading the way in developing industry standards while also researching cutting-edge techniques and processes."

Mel Torrie
President/CEO, Autonomous Solutions, Inc.

AUTONOMOUS COMPONENTS

NAV

NAV refers the entire system that converts a vehicle from manual to robotic control. Depending on the type of vehicle, the components included in NAV may be electro-mechanical actuators, electronic relays, a hydraulic valve system, or a combination of these. NAV manages all the critical vehicle functions, including: steering, braking, acceleration, transmission, and communications.



VCU

The Vehicle Control Unit (VCU) is the on-board computer that relays commands from the remote operator and manages the robotic systems in the unmanned vehicle.

The VCU coordinates steering, braking, acceleration, transmission, communications, vehicle health, emergency stops, and more.

RADAR

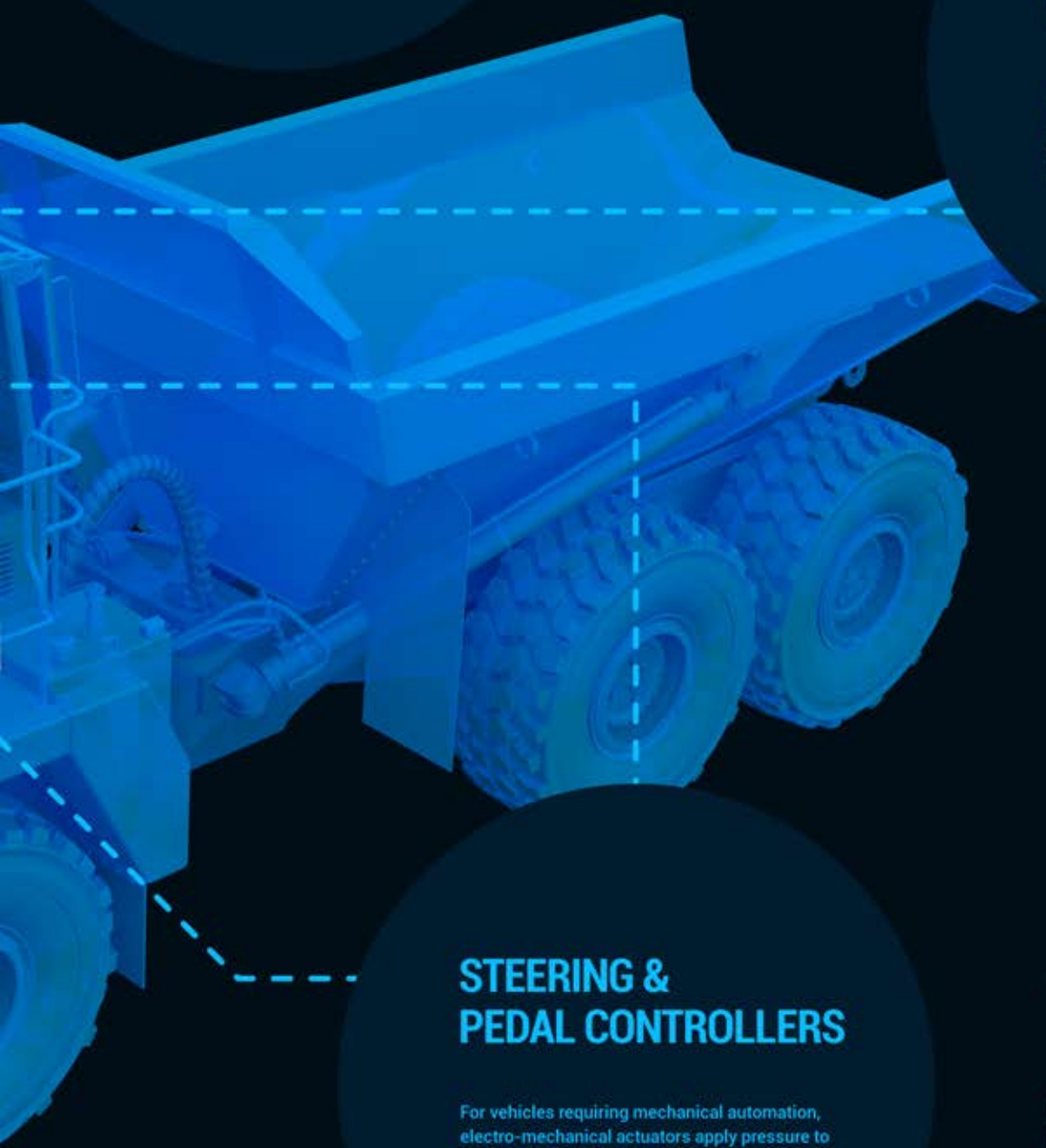
As an upgrade to Vantage, dual radar augments the obstacle detection capabilities of the unmanned vehicle, providing a wide angle, two dimensional scan of the area around the vehicle.

FORECAST™ 3D LASER

The vertically spinning Forecast unit is a LiDAR-based obstacle detection component. Forecast provides Vantage with a three dimensional view of the environment, identifying potential hazards by location and size.

GPS, COMMS, CAMERAS & MORE...

Radio and positioning systems represent a large portion of NAV's components. GPS, radio, and camera data feed into Mobius, giving the operator a real-time look at the vehicle's status.



STEERING & PEDAL CONTROLLERS

For vehicles requiring mechanical automation, electro-mechanical actuators apply pressure to the vehicle controls in the same way as a human driver. The VCU directs vehicles with electronic control systems through a CAN interface.

VANTAGE™

Vantage consists of a series of sensors, components, and software that continually process the area surrounding the unmanned vehicle in search of potential hazards.

Depending on the level of safety desired, Vantage may only notify Mobius of hazards or may coordinate with the VCU to plan a dynamic path to avoid the obstacle.

MOBIUS™ COMMAND & CONTROL

MULTI-VEHICLE

Mobius command and control software is the key software system that powers multi-vehicle cooperation in an autonomous mine, farm, warehouse, or testing facility.

Through Mobius, operators define a safe operating perimeter and the level of interaction of all vehicles operating within that boundary.

The **choreographer** component within Mobius plans and manages the interaction of all autonomous vehicles. Intersections, merging traffic, and coordinated multi-vehicle tasks can all be managed by a single operator.

SAFETY

All autonomous vehicles managed by Mobius are monitored for loss of radio or GPS signal, software errors, breach of safety perimeter, and the presence of nearby vehicles. If Mobius detects a critical situation, it initiates an **emergency stop** in the vehicle and notifies the operator of the situation. In addition, Mobius continually monitors vehicle health indicators and integrates fully with **Vantage** sensors.

By identifying priority vehicles, the **proximity monitor** ensures there are no conflicts with converging vehicles, slowing lower priority vehicles to prevent collisions.

MOBIUS TOUCH

The reality for many industries is that work happens **in the field**, and operators want to physically see their equipment performing tasks in their environment. Mobius allows users to step out of the office and manage unmanned vehicles from where the work happens.

Using a wifi-enabled device, Mobius provides the same level of usability as a remote command station with the convenience of a modern touch interface. With a swipe of your finger, dispatch unmanned vehicles, monitor obstacle detection and vehicle health indicators, and control vehicle attachments and tasks.

LEVELS OF AUTOMATION

MEETING YOUR AUTOMATION NEEDS

More than thirteen years of experience developing unmanned vehicle solutions taught us that no one implementation is the same. Factors like labor availability, equipment cost, terrain conditions, budget constraints, and management buy-in, vary between customers.

To help customize our solutions to the unique needs of each of our clients, we offer four **levels of automation**. Each level specializes in meeting specific needs, and each builds on one another to arrive at full autonomy.

FULL AUTONOMY

command & control software

In fully autonomous sites, control software sends commands to robotic vehicles with task assignments, recognizes obstacles, and coordinates with other equipment in the area.

Full autonomy has the most potential for efficiency and productivity gains as software optimizes **vehicle utilization** and **safety**.

SEMI AUTONOMY

autopilot & toggled autonomy

When tasks require repetition or a high level of precision, operators toggle their vehicle to autonomous mode. Command and control software then coordinates task performance.

When the task is complete, the driver simply toggles back to manual mode. **Semi-autonomy** is our most requested level of automation.

R/C & TELEOP

line of sight & video navigation

When unstable terrain or other conditions make manual operation too dangerous, **remote control** technology enables workers to operate equipment from a safe distance.

Using a joystick control and video cameras, **teleoperation** allows operators to control vehicles from a more remote location.

OPERATOR ASSIST

driver augmentation & management

Robotic technology, sensors, and software augment the abilities of vehicle operators, allowing them to improve obstacle detection, vehicle utilization, and driver safety.

Managers can take advantage of site analytics to measure and set benchmarks, identify bottlenecks, and reinforce operational goals.

AUTONOMOUS MINING

AUTOMATION FOR THE MINES OF TODAY

From worker safety to widespread skilled labor shortages to high equipment costs, the mining industry faces a variety of challenges with often costly answers.

Robotic mining technology, however, provides operators with an affordable way to improve site **safety**, combat rising **labor costs**, and improve **vehicle utilization** and overall **productivity**.

HOW AUTONOMOUS MINING WORKS

Levels of Autonomy: From remote control to a mine with multiple, coordinated robotic vehicles, ASI provides the level of automation that fits the needs of your mine.

Automation Components: ASI's autonomous mining technology is based on a system of key robotic components: the **NAV** automotion kit, **Mobius** command and control software, and **Vantage** obstacle detection sensors.

Mining Applications: ASI robotic solutions are useful for a variety of mining applications, including: leach pad ripping, slot dozing, excavating, long haul, unstable terrain operation, blast site exploration, and more.


Go online to learn more...
asirobots.com/mining

AUTONOMOUS FARMING

THE FUTURE OF FARMING

In order to stay competitive in today's challenging agriculture industry, farmers must find ways to cut costs and improve productivity without compromising safety.

ASI's robotic farming technology enables farm operations of all sizes to enhance productivity, combat lower selling prices, and improve overall farm safety.

HOW AUTONOMOUS FARMING WORKS

Levels of Autonomy: From driver assistance to a farm with multiple, coordinated autonomous vehicles, ASI provides a level of automation that fits your needs.

Automation Components: ASI's autonomous farming technology is based on a system of key robotic components: the **NAV** automotion kit, **Mobius** command and control software, and **Vantage** obstacle detection sensors.

Farming Applications: ASI robotic solutions are useful for a variety of farming applications, including: ripping/plowing, cutting, land reclamation, spraying, harvesting, and more.


Go online to learn more...
asirobots.com/farming

PROVING GROUND AUTOMATION

AUTOMOTIVE TESTING

Due to the punishing nature of proving ground test tracks, automotive OEMs take protective measures like limiting driver shifts, excluding test scenarios, or simulating crash conditions.

Ford Motor Company and other OEMs turned to ASI's robotic technology as an alternative to these costly and undesireable solutions. Vehicle automation improves **driver safety**, increases **efficiency**, and boosts **data accuracy**.

HOW ROBOTIC TESTING WORKS

Levels of Autonomy: From driver assistance features to testing events that coordinate multiple unmanned vehicles, ASI provides a level of automation that fits your testing needs.

Automation Components: ASI's autonomous testing technology is based on a system of key robotic components: the **NAV** automotion kit, **Mobius** command and control software, and **Vantage** obstacle detection sensors.

Testing Applications: ASI robotic solutions are useful for a variety of automotive testing applications, including: durability, rollover, endurance, twist ditch, and more.


Go online to learn more...
asirobots.com/automotive

ROBOTIC RESEARCH & DEVELOPMENT

RESEARCH & DEVELOPMENT

ASI is dedicated to advancing the field of robotics, which is primarily funded through military research and development contracts. ASI is actively involved in the SBIR and STTR programs and is designing navigation and manipulation technologies that will replace Soldiers in dangerous circumstances.

ASI is constantly looking for ways to promote **safety** and improve the **effectiveness** of Soldiers around the world.

MILITARY/RESEARCH APPLICATIONS

Chaos: The Chaos high mobility robot uses four independently rotating tracks to propel itself over rocks, drop offs, and other rough terrain, making it ideal for troop support, surveillance, bomb disposal, and reconnaissance.

Robotic Convoy: ASI's Guideline system uses a tether-based sensor to relay the position of a lead vehicle to unmanned vehicles following behind. Guideline convoys operate with greater safety and productivity in GPS-denied settings.

Military Targeting: ASI actively works with squadrons at Nellis and Luke Air Force Bases to support live-fire robotic targeting vehicles. Unmanned vehicles pull skids or act as targets themselves for pilot combat training.


Go online to learn more...
asirobots.com/rd

PARTNER

PARTNERING WITH ASI

Is your organization ready to explore the benefits of vehicle automation? Now is the time to connect with our business development team to discuss your project or a strategic partnership.

When it comes to partnering, we recognize that there more ways than one to achieve a mutually beneficial agreement. Our business development team will work with you to identify the partnership model that makes the most sense for your needs.

PARTNERSHIP OPPORTUNITIES

As ASI continues to grow, we are expanding our partnership opportunities in several new and exciting directions. Ask us how you can get invovled in the fast-paced vehicle automation industry:

Original vehicle manufacturers
ASI incubator
ASI accelerator

Go online to learn more...

asirobots.com/partner

asirobots.com

866.881.2171

Autonomous Solutions, Inc.
990 North 8000 West
Mendon, UT 84325