Driverless & Autonomous Vehicle Developer
*Uses EAO for Emergency Stop System*

The NFB Blind Driver Challenge® is an initiative to develop and demonstrate the first ever full size, blind-drivable vehicle. *Because of the nature of this challenge, a proven emergency-stop safety system was critical throughout testing and demonstration.*
The NFB Blind Driver Challenge vehicle was successfully demonstrated at top speeds of 27 mph. **EAO’s emergency-stops are an important part of the SafeStop system.**

“The SafeStop™, one of TORC’s off-the-shelf products, provides an independent, fail-safe wireless emergency stop system that allows safety operators to immediately pause or disable robotic systems at the push of a button.”

**Company Profile**

**Customer**
TORC Robotics

**Market**
Robotics/Unmanned Vehicles

**Application**
SafeStop™ Wireless Emergency Stop System for Unmanned Vehicles

**EAO Series**
Series 84 emergency-stops

**Business Challenge**

TORC recently worked with Virginia Tech and the National Federation of the Blind (NFB) as part of the NFB Blind Driver Challenge®, an initiative to develop and demonstrate the first ever full size, blind-drivable vehicle. The team integrated advanced perception technologies and navigation software developed by TORC with its ByWire XGV™ robotics research platform, a drive-by-wire controlled Ford Escape Hybrid.

In a typical autonomous vehicle from TORC, driving decisions would be fed back into the vehicle’s control systems to carry out the actual driving behaviours. In this unique application, data derived from the system was re-purposed and used to provide inputs for special tactile devices developed by researchers at Virginia Tech. These non-visual interfaces, which included a set of gloves and a seat pad that sends vibrations across the fingers and along the driver’s back and legs, provided instructional cues to the blind driver, for maintaining full control over the vehicle.

Because of the nature of this challenge, a proven emergency stop safety system was critical throughout testing and demonstration.

**Solution**

The SafeStop™, one of TORC’s off-the-shelf products, provides an independent, fail-safe wireless emergency stop system that allows safety operators to immediately pause or disable robotic systems at the push of a button.

The SafeStop transmitter features a hand-held design, audible and visual operator feedback, an internal rechargeable battery, and a line of sight operation of up to 6 miles. The receiver unit is integrated into the robotic vehicle and is capable of pausing or disabling the vehicle with hardware contacts or software messages passed over Ethernet or serial interfaces.

The Emergency Stop (E-Stop) switches used on the SafeStop transmitter unit are EAO’s Series 84. The Series 84 E-Stop offers a unique low back-of-panel depth at just 18mm maximum, optional illumination, single mono-block construction, and a twist-to-release actuator.

These products allow for great flexibility in many applications including, machinery, medical equipment, rail applications, and...
It’s important to work with an HMI expert who can address all the human factors, technical and commercial considerations of a complex HMI project. EAO is here to make the interaction innovative, intuitive and reliable.

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The SafeStop provides an independent, fail-safe wireless emergency stop system.

The Series 84 E-Stops are rated at 3A 120VAC and 1.5A 240 VAC, and are protected against oil and water to IP 65 standards. Series 84 E-Stops meet international safety specification ISO 13850 and comply with EN IEC 60947-5-1 and EN IEC 60947-5-5 requirements.

Results
The NFB Blind Driver Challenge vehicle was successfully demonstrated when a blind driver navigated 1.5 miles of the Daytona International Speedway, navigating hairpin turns, avoiding obstacles, passing a moving vehicle and reaching top speeds of 27 mph. The blind driver maintained full control of the vehicle throughout the course. EAO’s E-Stops were an important part of the SafeStop system implementation that allowed for safe stopping of the vehicle when necessary.

The E-Stops provide:
• Ergonomic design for ease-of-use
• Fingertip control with good tactile feedback
• Rugged construction and reliability
• Easy integration into the SafeStop pendant

It’s important to work with an HMI expert who can address all the human factors, technical and commercial considerations of a complex HMI development project.

EAO is a global partner and manufacturer of HMI Systems and HMI Components to a range of markets including machinery and automation, public transport, automotive design, special purpose and heavy-duty vehicles, as well as many others that involve an interaction between humans and machines. EAO is here to make this interaction innovative, intuitive and reliable.

EAO’s components and systems undergo rigorous testing to assure reliability, repeatability, and long service life. EAO is ISO 9001, ISO 14001, IRIS, and ISO/TS 16949 certified for automotive and other industry requirements.