

Wednesday, February 16, 2022

3:10 PM – 3:30 PM

***Noblis Orchestrated Autonomy***

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Abstract:

Noblis Pieces of Eight (Po8) Autonomous Vehicle Interoperability Concept

The Noblis Po8 concept orchestrates the motions and actions of unfamiliar, connected, and autonomous machines. With this concept, systems of autonomous machines are safer, more productive, and more equitable. The Noblis Pieces of Eight (Po8) system enables connected machines to share situational awareness of obstacles and threats projected over time. It allows them to collectively plan motion paths and other actions that avoid collisions or conflicts.

This interoperability permits high-speed motion and coordinated actions which are impossible without advance knowledge of all the localized actions. Po8 supports a collective posthoc accountability process to assess the reliability of each individual machine to act faithfully in accordance with collectively optimized motion paths and actions.

An individual machine establishes a track record within the Po8 system (secured using a blockchain) so that the reliability of the machine to faithfully follow collectively assigned motion/action paths in the past may be factored into the representation of the collective uncertainty map and the current set of optimized motion/action paths.

The Po8 System Has Five Fundamental Elements:

1. Collective situational awareness realized in a normalized local obstacle and threat map with uncertain contours. This element normalizes diverse sensor technologies into a single shared local dynamic map that explicitly considers the past reliability (earned trust) of individual machines.
2. Optimization of collective motion/action traversing uncertain contours reconciling potential conflicting motion paths or actions among all machines and cognizant of the reliability (earned trust) of individual machines.
3. A value distribution by contribution method ensures equitable remuneration to/from machines receiving/granting priority and to machines that assist in identifying dynamic obstacles. This element specifically incentivizes machines to contribute to key Po8 ecosystem functions.
4. Post hoc individual accountability assessment where all machines assess the ability of nearby machines to act and move in accordance with collectively determined motion/action paths.
5. Earned trust accounting and reporting for each individual machine in an open consortium blockchain distributed ledger to ensure transparency, accuracy, and security of the Po8 system.

Po8 allows pick-up teams of autonomous machines to perform as if they have trained together extensively. Further, if one machine in the system malfunctions or begins to perform erratically, the team will self-organize to re-assign critical team functions and isolate the compromised machine.