Autonomous Vehicle Interoperability Concept

The Noblis autonomy 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 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. **Optimized 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 system 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 system.
The robot derby demonstration is an early physical realization of the concept and prototype system. In this demonstration, multiple autonomous robots are given repeating (and naturally conflicting) paths to navigate simultaneously in a constrained physical environment. Myopic motion path planning (no orchestration) results in slow collective progress as the individual robots attempt to avoid each other using passive detection. Connecting the autonomous robots to the system allows collective obstacle detection and motion path planning, so faster movement is possible. As the machines interact and learn, earned trust in the system rises, allowing progressively faster speeds. A monitor to the side of the demonstration shows how the blockchain builds earned trust scores for each machine and measures the speed of robot circuit completion.

Award-Winning Concept

Nobilis’ Orchestrated Autonomy Concept won the Highest Potential Impact Award and the Most Creative Award at the MOBI Grand Challenge Phase I in Munich, Germany (February 2019).

Nobilis’ Orchestrated Autonomy Concept ranked first for “Most Creative” and “Highest Potential Impact” - and second in the “Overall Category” at the MOBI Grand Challenge Phase II in Los Angeles, California. (November 2019).

Nobilis’ orchestrated autonomy concept was chosen as an Industry Innovation Winner by Washington Technology / 1105 Media as part of the Government Innovation Awards showcase which recognizes the best examples of discovery and innovation in government IT (September 2019).

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Sustainable Autonomy Concept

Orchestrated Autonomy Concept

For more than 25 years, Noblis has been an innovator within the federal government, committed to enriching lives and making our nation safer while investing in the mission of tomorrow. As a nonprofit, Noblis works for the public good, bringing together the best possible combination of science, technology and engineering expertise and solutions, in an environment of independence and objectivity to deliver enduring impact on federal missions. Together with our subsidiaries, we work with a wide range of government clients in the defense, homeland security, intelligence, law enforcement and federal civil sectors.