Project FAST
New Frontiers in Autonomous Systems Technology

Coordinator: Eindhoven University of Technology
High Tech Systems Center
Industrial Partners: Vanderlande, Lely, Rademaker, ExRobotics, Diversey
Period 1-2018 – 12-2021
Budget: EUR 1.5 Million
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Project Outline
The goal of this project is to develop a methodology to create and maintain a semantic world model, which can be used by robots to assess the state of a semi-open world in the context of its task at hand. Semi-open means that the robot will be able to explicitly account for a limited set of potential events and artifacts in the world that may or may not occur.

Use-cases
• Warehouse logistics – Vanderlande
• Bakery Factory Automation – Rademaker
• Oil & Gas – ExRobotics
• Industrial Cleaning – Diversey
• Farm Automation - Lely

Industry benefits
• Robot paths (motion planning) can be flexibly planned
• Learning of environment and environment history
• Reduced development time as a robot task specification can be programmed on a high (semantic) level.
• Re-usability of existing software by employing task-skill-motion architecture
• Infrastructure-less localization
• Socially aware navigation and interaction

<table>
<thead>
<tr>
<th>State-of-the-Art</th>
<th>Beyond state-of-the-Art</th>
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<tbody>
<tr>
<td>Closed world assumption</td>
<td>Semi-open world assumption</td>
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<tr>
<td>Robot centric approach</td>
<td>Task centric approach</td>
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<tr>
<td>Ad-Hoc (sense-plan-act) architecture</td>
<td>Scalable, maintainable, reusable arch.</td>
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<tr>
<td>No-prior knowledge</td>
<td>Embed prior knowledge</td>
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<tr>
<td>Static world model</td>
<td>Dynamic world model</td>
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<tr>
<td>No learning</td>
<td>Incremental learning from experience</td>
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<tr>
<td>Unimodal passive perception</td>
<td>Multi-modal active perception</td>
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