

	NOW   2024	HORIZON 1   2029	HORIZON 2   2034	
<b>MILESTONE</b>	<b>Prototype</b>	<b>Dynamic spatial perception</b> First physical product	<b>Immersive spatial experience</b> Future vision	
<b>PRODUCT EMBODIMENT</b>	Physical braille screen and camera system mounted on walker	Physical electrovibrational screen with built-in sensor system	Haptic augmented reality system based on (1) haptic hands-worn interface (gloves) and (2) AR glasses (for environment mapping and hand tracking)	
<b>VALUE PROPOSITION</b>	<ul style="list-style-type: none"> <li>Spatial overview</li> <li>Rough spatial perception</li> <li>Delayed movement perception based on the environment with intervals</li> </ul>	<ul style="list-style-type: none"> <li>Detailed spatial overview and increased awareness of environment</li> <li>Recognition of elements in the environment</li> <li>Real-time accurate movement with the map and perception of moving environment</li> <li>Integration of navigation applications, public transportation and other third-party applications</li> <li>Active collaboration partner that participates in mobility and environmental perception</li> </ul>	<ul style="list-style-type: none"> <li>Intuitive awareness and understanding of space and directionality</li> <li>Vivid experience and natural recognition of environmental elements and understanding of the 3D environment (relief)</li> <li>Accurate 360° motion perception with understanding of relative direction</li> <li>Full customizability and personalization</li> <li>Active collaboration partner that participates in mobility and environmental perception</li> </ul>	
<b>PRODUCT INTERACTIONS</b>	<b>ENVIRONMENT MAP</b>	<ul style="list-style-type: none"> <li>2D braille map of environment with rough shapes and movement</li> <li>Auditive textures &amp; audio feedback on tap</li> <li>Perception of self-scale within the environment</li> <li>Availability of external applications</li> </ul>	<ul style="list-style-type: none"> <li>2D map of environment with clear shapes and movement, haptic textures and auditive textures and description on request</li> </ul>	<ul style="list-style-type: none"> <li>360° 3D map perceived through 3D geometry (shape), haptic textures and temperature (material simulation), auditive textures (ambient sounds for enhanced understanding) and audio-descriptions on request</li> </ul>
	<b>MAP INTERACTIONS</b>	<ul style="list-style-type: none"> <li>Zooming through slider</li> <li>Multi-touch input</li> <li>Interactive map</li> <li>Signals leading user's hand to specific elements</li> </ul>	<ul style="list-style-type: none"> <li>Map zooming, moving and tapping through multi-touch input</li> </ul>	<ul style="list-style-type: none"> <li>Map zooming, moving and tapping through physical interaction (e.g. stretching, grabbing, tapping)</li> </ul>
<b>TECHNOLOGY DEVELOPMENTS</b>	<b>PLATFORM</b>	<ul style="list-style-type: none"> <li>Platform design</li> <li>Collaborations with external companies to integrate their software in the system</li> </ul>	<ul style="list-style-type: none"> <li>Platform Development &amp; Preparation for open-source development</li> </ul>	
	<b>HAPTIC INTERFACE TECHNOLOGY</b>	<ul style="list-style-type: none"> <li>Electrovibrational (haptic) screen</li> <li>Touch input</li> <li>Programming interactions</li> <li>Scaling self-marker</li> </ul>	<ul style="list-style-type: none"> <li>Hand-worn haptic augmented reality interface</li> </ul>	
	<b>ENVIRONMENTAL MAPPING TECHNOLOGY</b>	<ul style="list-style-type: none"> <li>Sensor system</li> <li>Develop &amp; optimize dedicated chip for sensor system &amp; SLAM</li> <li>Custom environmental mapping &amp; self-localization algorithm</li> <li>In-house or outsourced AR mapping system</li> </ul>	<ul style="list-style-type: none"> <li>Integration of the headset and haptic interface</li> <li>Outsourced: Environmental mapping application for AR platform</li> <li>In-house: Dedicated head-worn environmental mapping system</li> </ul>	
	<b>AUDITIVE INTERFACE</b>	<ul style="list-style-type: none"> <li>Interface with existing audio devices</li> </ul>		
<b>DESIGN-DRIVEN RESEARCH</b>	<b>MENTAL MAPPING &amp; UNDERSTANDING</b>	<ul style="list-style-type: none"> <li>Representation of 3D environment on 2D screen and audio</li> <li>Experimentation with improved braille prototype</li> <li>Experimentation with electro-vibrational screen prototype</li> </ul>	<ul style="list-style-type: none"> <li>Representation of 3D environment on 3D map</li> <li>Streamlining interaction with the AR map</li> </ul>	
	<b>LEARNING CURVE</b>	<ul style="list-style-type: none"> <li>Definition of intended use</li> <li>Gamified learning experience</li> </ul>		
	<b>PRODUCT EMBODIMENT</b>	<ul style="list-style-type: none"> <li>Combining all components into a portable product</li> </ul>		
	<b>COLLABORATIVE PARTNER</b>	<ul style="list-style-type: none"> <li>Improvement of active safety measures (OWI safety interaction)</li> <li>Other OWI functions as active learning partner</li> </ul>		
<b>TECHNOLOGY TRENDS</b>	<ul style="list-style-type: none"> <li>Solid-State Lidar advancement</li> <li>Advancement of haptic interfaces that enable haptic augmented reality</li> <li>Increased capability of spatial computing systems to obtain a comprehensive 3D real-time map of the environment</li> <li>Advancement of AI/Machine learning</li> </ul>			