CGI IndoorExplorer

Building Shared Situational Awareness through real-time mapping and tracking during indoor operations

CGI

Overview

CGI IndoorExplorer enables organizations to quickly map an indoor environment in 3D while simultaneously tracking personnel within that environment. This enables rapid collaboration by means of Geo-ICT. A digital overlay over the real world is created and the scanned data can be fed into a holistic 3D common operational picture of the indoor situation (map and people in one model). The core of the solution is a multi-purpose visual positioning system.

Hybrid networks, consisting out of a local private 5G bubble which is internet enabled through satellite internet, can be used to further increase reliability of the system.

Situational awareness in indoor environments

CGI IndoorExplorer builds on years of CGI research revolving around mapping and tracking within indoor spaces. Whereas outdoor areas are easily mapped through aerial imagery and where positioning is made possible by GNSS solutions like GPS, one cannot rely on the same methods for mapping and tracking within indoor environments.

CGI IndoorExplorer combines three components to create one shared, holistic view on the situation to be used for the creation of situational awareness both at the indoor environment itself and at remote command centers.

Explorer component

The explorer component enables people within the indoor environment to map their surroundings in 3D, while simultaneously tracking exploring personnel within the scanned environment. Instead of sending over descriptions of their environment, the explorer 3D sensors collect sensor data enabling CGI IndoorExplorer to build up a 3D geospatial model of the scanned environment, including the positions of the wearers of the explorer sensors in real-time.

Additionally, the explorer component can utilize Augmented Reality to visualize objectives (like points of interests and routes) and 3D maps in the world around the users within the building.

Observer component

The observer component facilitates commanders with a 3D common operational picture of the situation to build Shared Situational Awareness. Commanders can be at the indoor environment itself, or they can participate

CGI IndoorExplorer helps you to make the right decision at the right time, at the right place

By sharing geospatial information to create a common operational picture

By creating Shared Situational Awareness to help organizations make better decisions, faster

By facilitating one holistic geospatial model as a basis for shared decisions in emergency situations

By using edge computing and hybrid satellite and 5G connections for getting the right information at the right person, at the right time

By offering flexibility in sensory devices and data insights

remotely from a command center. Commanders view the common operational picture by looking at and manipulating the 3D model a windows computer or tablet.

In the 3D overview of the situation, commanders can assess what the indoor environment looks like, what the positions of personnel within the environment are, and what navigation paths there are.

Edge component and hybrid networks

On-site, multiple explorers exchange a lot of sensor data with an edge computer. At this edge computer, a holistic 3D Geospatial model is built and distributed that integrates mapping and tracking data from multiple explorers in real-time.

For reliability and flexibility, it is advised to use hybrid networks for data communication: a private 5G connection can be used to rapidly exchange data within a 'local bubble' of both explorers and observers who are on-site, and a lower bandwidth (satellite) connection can be used to communicate a simplified version of the 3D model to remote observers. This set-up is currently being demoed by the European Space Agency at ECSAT, Harwell UK.
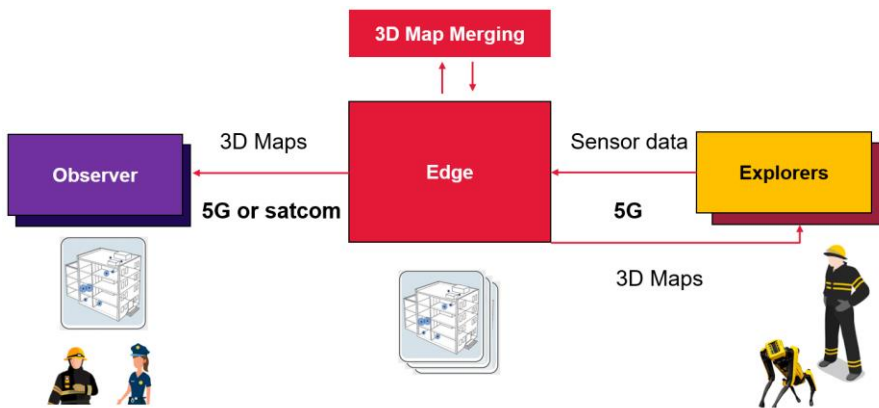
Use cases and user involvement

CGI IndoorExplorer utilizes a novel way of creating insight in indoor environments such as complex buildings and potentially tunnels. These insights can be used within defense scenario's, emergency situations, and search and rescue operations. Currently, European Space Agency, Dutch National Police, Erasmus Medical Centre, and a Dutch Fire Brigade have been involved in creating the solution.

The core of CGI IndoorExplorer is a real-time collaborative mapping and tracking engine that runs on an edge computer. This core has been extended by the observer and explorer components, which can be customized towards specific clients. For integration of the 3D spatial model, the model itself can be published for external used, or the observer component can be customized to address specific user needs. For the explorer, continuous attention is addressed to expanding sensory scanning devices. Currently, a Microsoft HoloLens 2 is used for both scanning and user interaction. However, we know this device is not suitable for all use cases, which is why we also tested the use of a Boston Dynamics SPOT Robot dog as an autonomous sensory device. The iPhone Pro with LiDAR is next on our list.

"CGI IndoorExplorer creates one, shared model as a basis for emergency decisions, both locally and remotely"

Insights you can act on

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We are insights-driven and outcomes-based to help accelerate returns on your investments. Across hundreds of locations worldwide, we provide comprehensive, scalable and sustainable IT and business consulting services that are informed globally and delivered locally.

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