

TRAIN INSPECTION MONORAIL (TIM)

AREA OF EXPERTISE

- ICT

The Train Inspection Monorail (TIM) is a mechatronic product initially designed for CERN's specific needs, with the goal to provide unmanned operations in the Large Hadron Collider (LHC) tunnel when there is no active beam, during beam stops and machine shutdowns. The main functionalities that TIM provides are surveying, monitoring, safety and ad-hoc interventions when necessary.

IP STATUS

- CERN Proprietary

The train operates on a monorail that is installed on the ceiling all around a tunnel. Communication is done via 4G but can also be done via WiFi. It consists of five wagons: control, battery, motor, payload and reconnaissance wagon, each one designed for a different purpose. All wagons are featured with different types of cameras, sensors, PCs, controllers and mechatronic systems. The system is extensible and adaptable by varying the sensors, cameras and equipment on board. Moreover, by adding items like robotic arms the versatility of TIM can be further extended. TIM is an autonomous system that can be operated remotely through an advanced human machine interface (HMI), which allows the operator to manage its movement and send it to perform various missions autonomously. In addition, TIM gives a reliable visual feedback using the cameras installed along the train as well as the status feedback of all the important data acquired, in real-time.

TECHNOLOGY READINESS LEVEL

- Production
- Commercially available

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CONTACT

kt@cern.ch

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FEATURES

- Modular extendable architecture allowing for specialised functionality to be added.
- Fully autonomous safe operation. No expert operator is necessary.
- 4G or WiFi communications.
- GUI used to monitor the mission under way.
- Can be operated with human presence in the tunnel.
- Versatile charging modes.
- Fast. Speed up to 10 km/hr.

APPLICATIONS

- Surveying.
- Radiation mapping.
- Temperature and oxygen percentage measurements.
- HD pan-tilt-zoom camera system for visual inspection.
- Photogrammetry.
- Thermal imaging.
- Tunnel infrastructure monitoring with vision.
- Safety – fire prevention & detection. Evacuation monitoring.

