

# Computing Unit

The **Computing Unit** is designed to acquire the IMU raw data from the **Sensing Unit** included in the **RESCUE system**, to process them and to send the path data to a remote Control Center via Wi-Fi or Radio-Modem connection.

The Computing Unit **standard release** is a SW application running on a Samsung Galaxy S2 smartphone whereas the **embedded release** is a HW product mainly designed to make the connection with commercial Radio-Modems easier.

## The RESCUE System

**RESCUE** is an inertial-based system designed to remotely localize and track pedestrians in areas where the GPS signal is absent or unreliable.

## Embedded Configuration

During the year 2012 DUNE has developed the embedded configuration of the Computing Unit to:

- Avoid the use of the smartphone for communication which might be unreliable in critical environments.
- Insert a dedicated GPS receiver and the related antenna to exploit and integrate GPS data (if and when available) with inertial data.
- Improve communications by using commercial radio-modems in areas where the Wi-Fi connection with the Control Center is unreliable.
- Promote the adoption of the RESCUE system in areas where only the Radio-Modem connection may be used.



## Standard Configuration

The Standard configuration of this Unit consists of a SW application running on a Samsung Galaxy S2 smartphone.

It receives the raw IMU data from the Sensing Unit by means of a Bluetooth connection. Raw inertial data are processed and integrated with heterogeneous information such as GPS, magnetic and barometric sensor data in order to improve the path estimate.

Processed path data are then recorded and dispatched in real-time to the Control Centre via a Wi-Fi connection or by means of a commercial radio-modem.

### UNIT RELEASES

#### STANDARD RELEASE

SW App on Samsung Galaxy S2 smartphone

#### EMBEDDED RELEASE

Black-box integrating GPS receiver and antenna

### APPLICATIONS

Fire and Police Departments (remote tracking, rescue, training and simulation activities)

Fast Mapping of underground areas (tunnels, caves, mines, speleological and archeological sites)

# The Embedded Computing Unit

This Unit is able to acquire inertial raw data, acceleration and angular velocity, and magnetic information from the Sensing Unit either via a Bluetooth connection or via a wired connection. Including a GPS receiver and the related antenna, it processes inertial data by exploiting and integrating the GPS information (if and when available) to improve the path estimate. It can be smoothly connected with standard radio-modem devices to send in real-time the processed data (position information) to the remote Control Centre.

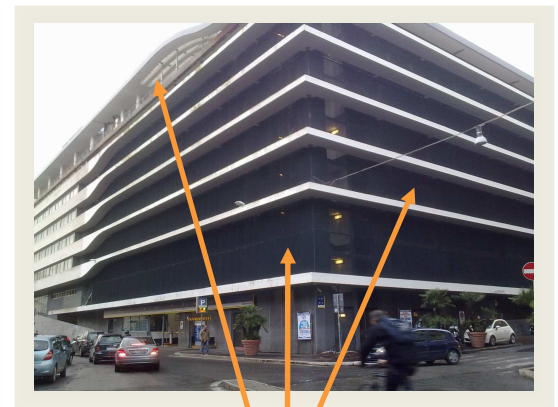
Characteristics	
Physical dimensions	(66 x 47x 28) mm
Power consumption (active state)	340 mA @ 3.7 V (1.2 W)
Bluetooth port with Sensing Unit	115 Kbps
Wired connection with Sensing Unit	RS-242
Connection with Radio-Modem	RS-232 (RTS and CTS enabled)
GPS receiver	Fastrax IT430
Antenna connector	SMA
Additional I/F (future use)	SPI, I <sup>2</sup> C, digital interface (3 bits)

## Multi-level parking - A real trial

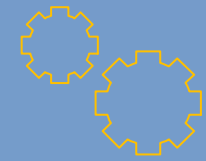
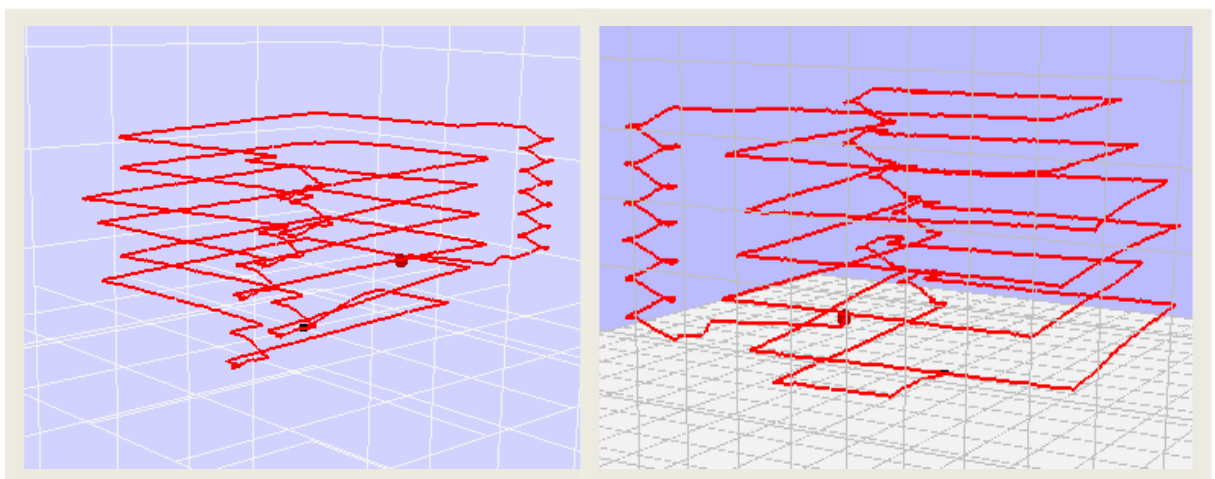
RESCUE performance has been evaluated and assessed in several areas (outdoor, indoor, underground) to check the effectiveness of including the processing of magnetic sensor data processing to improve path heading.

The pictures show the trials carried out inside a multi-level parking in Rome, where GPS signal was totally absent because of the metallic grids covering the building sides and the parking grounds.

The operator wearing RESCUE started at the ground level, went up the left-side stairs to the 6<sup>th</sup> floor and then went down the right-side stairs until the 1<sup>st</sup> floor.



**Metallic grids**



### NEW COMPONENTS

#### EMBEDDED COMPUTING UNIT

Code D00217100

Dimensions:  
(66 x 47 x 28) mm

#### COMPUTING UNIT BOARD

Code D00217-02A

### CHARACTERISTICS

Bluetooth port

Wired RS-242

Wired RS-232

GPS receiver

GPS Antenna connector

Additional I/F  
SPI, I<sup>2</sup>C,  
digital I/F (3 bits)