Indoor Mapping Platform

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TH02010839 - Automated mapping routes and barriers for pedestrians and disabled people
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Abstract – The functional sample was created in cooperation of BUT with CEDA Maps a.s. as part of the TACR project “Automated mapping of routes and barriers for pedestrians and the disabled” (TH02010839). The developed system enables efficient semi-automated creation of maps of internal routes for pedestrians with special regard to the specific needs of the handicapped (barrier detection, difficulty of passage, orientation elements). The goal of the development was the efficiency of the system enabling to acquire data efficiently and thus achieve real benefit for the target groups in an economically meaningful model. Implementation of the project will help to solve the problem of navigation of people with reduced orientation and mobility (wheelchair users, blind people, etc.) in public space.

The RICOH THETA S camera was selected for panoramic imaging. It is a 14 megapixel output camera (image resolution 5376x2688 pixels) for still images. However, in the case of live video streaming via USB, the resolution is 1920x1080 pixels (approx. 2 megapixels) with a frame rate of 30 fps. The camera has quality lenses with aperture f / 2.0.

2 LIDARs Slamtec RPLIDAR A1 were chosen as the concept for interior mapping. It is a very affordable device with the ability to measure up to 12m, 1 degree angular resolution and error less than 0.5 cm (error depends on distance). The selected LIDARs are rotated 90 degrees to each other for maximum detail capture.

NVIDIA Jetson is a family of terminal equipment products for a variety of artificial intelligence deployment scenarios. These are basically mini-computers with an integrated graphic accelerator, where the algorithms of neural network application (so called inference) are accelerated. Obviously, a trade-off between power and consumption has to be chosen. The Jetson Nano platform, which has 128 Maxwell graphics cores and a quad-core ARM CPU, was chosen for the backpack application. However, of all devices, this platform has the lowest power consumption.

Figure 1. Point clouds (left), panoramic image (right)