Sensor Fusion. Integration of High–End and Low–Cost Systems for Infrastructure Monitoring and Navigation Purposes

Nico Zill and Desislava Staykova (Germany)

Key words: Engineering survey; Laser scanning; Positioning;

SUMMARY

In the recent years the usage of state of the art monitoring systems marks a rapid progress especially in engineering area, for the purposes of the local administration authorities and infrastructure management. For different navigation aims, for monitoring and investigation of big areas the classical geodetic methods are being replaced form a modern mobile and terrestrial scanning systems comprising in itself variety of sensors ensuring continuous and accurate data acquisition. The new age system technologies are symbiosis between hardware and software solutions. The multi sensor integration and the combination of the signals from diverse sensors provide more accurate and reliable information. The usage of multiple sensors ensures higher level of data accuracy and reliability in case of sensor damage or failure. The combination of a scanning instrument, DMI and INS system is easy to set up and provides fast way for acquisition of spatial data in large areas without permanent GNSS availability. Using the advantages of combination of different sensors signals can be solved the navigation problems in areas with low or no GNSS signal. Depending on the manufacturer accuracy characteristics and variety of set up combinations this technology can be used for monitoring of surface settlements, in combination with a developed filter algorithm the accuracy of the trajectory resulted from kinematic differential GNNS measurement can be improved up to 2 or 5 cm. With the usage of appropriate post processing software the accuracy of the end results can be raised up to two times. The understanding of the sensors signals and their combination leads to a substantial improvement in the data accuracy and density and higher the speed of data acquisition.