

UWB Sensor Network for Human Being Detection, Localization and Tracking at Emergency Events

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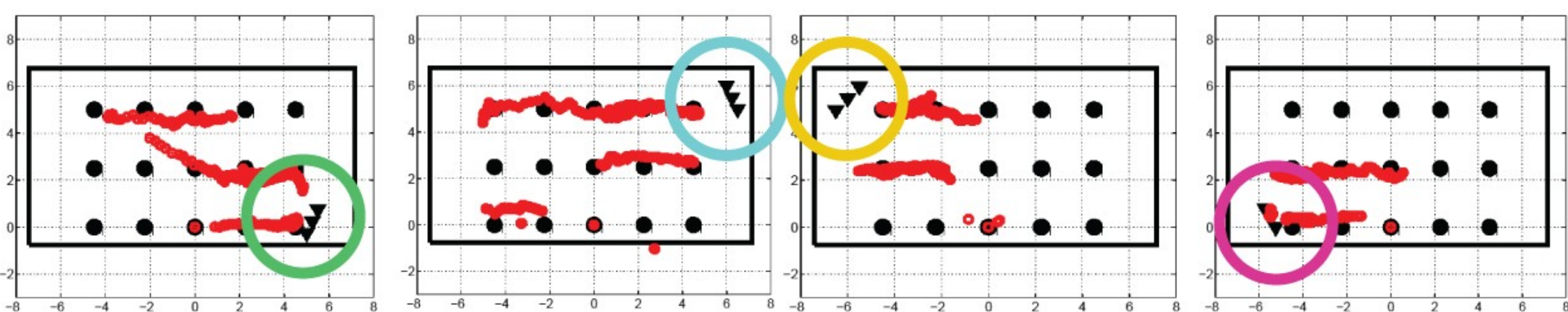
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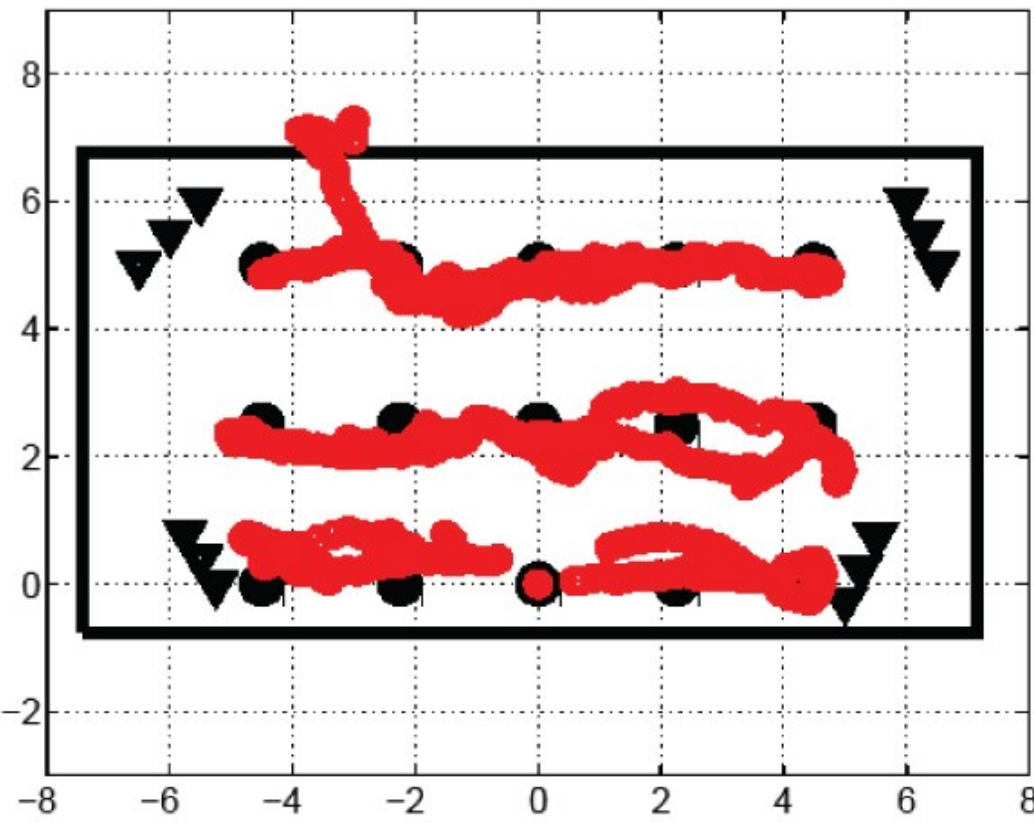
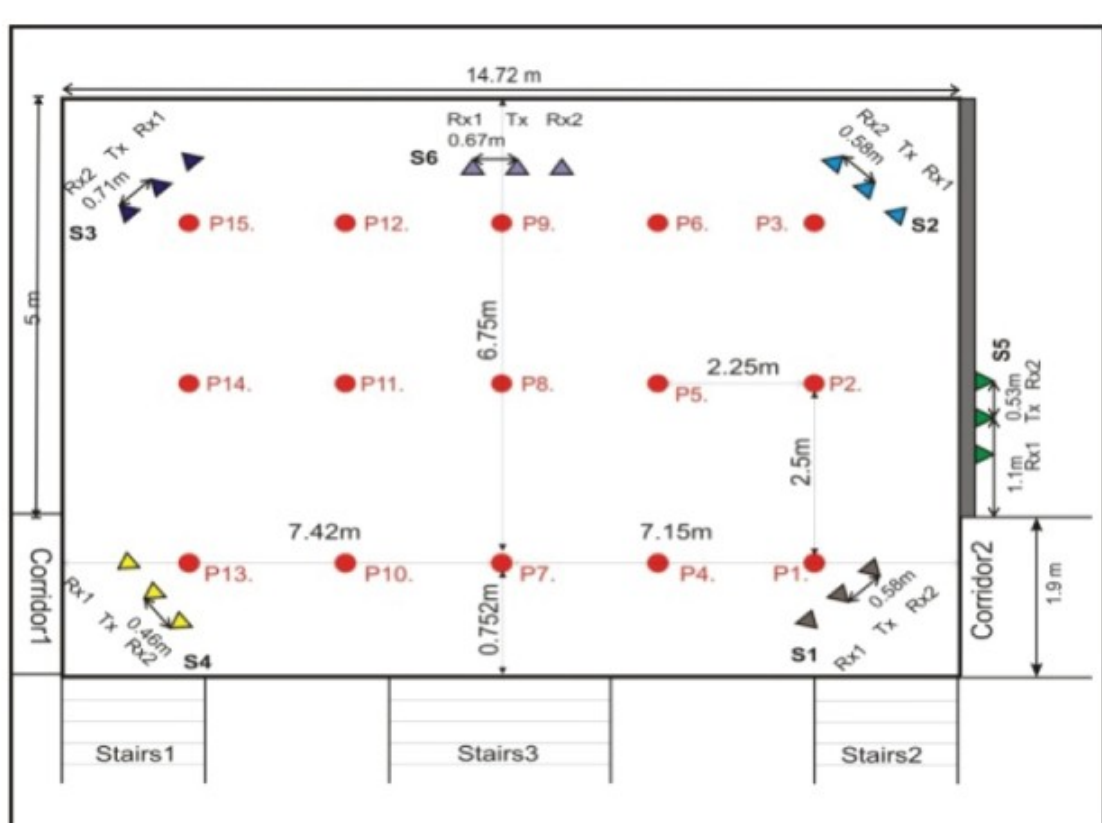
Abstract: Moving person detection, localization and tracking has found a variety of applications such as object monitoring, person detection during security operations and human lives saving at unrestrained disasters. In the law enforcement operations and disaster events, the persons to be detected and localized are often situated behind an obstacle (e.g. wall, rubbles, etc.). That is the reason why conventional acoustic, optical and infrared sensors cannot be applied for human beings localization and tracking. It has been shown, that applications of ultra-wide frequency band (UWB) radars (sensors) using relatively low frequencies (DC-5 GHz) can be used with advantage for that purpose. However, the analyses of their performance for the outlined scenarios have shown that the application of one sensor cannot provide a high probability of multiple target detection. The very efficient solution of that problem can be provided by the application of wireless UWB sensor network (UWB-SN). Within our contribution, we will focus to a concept of a real-time performing wireless UWB-SN to be applied for detection, localization and tracking of moving persons under emergency events. Here, the main stress will be put on the structure of UWS-SN and its nodes on and a radar signal procedure as well.



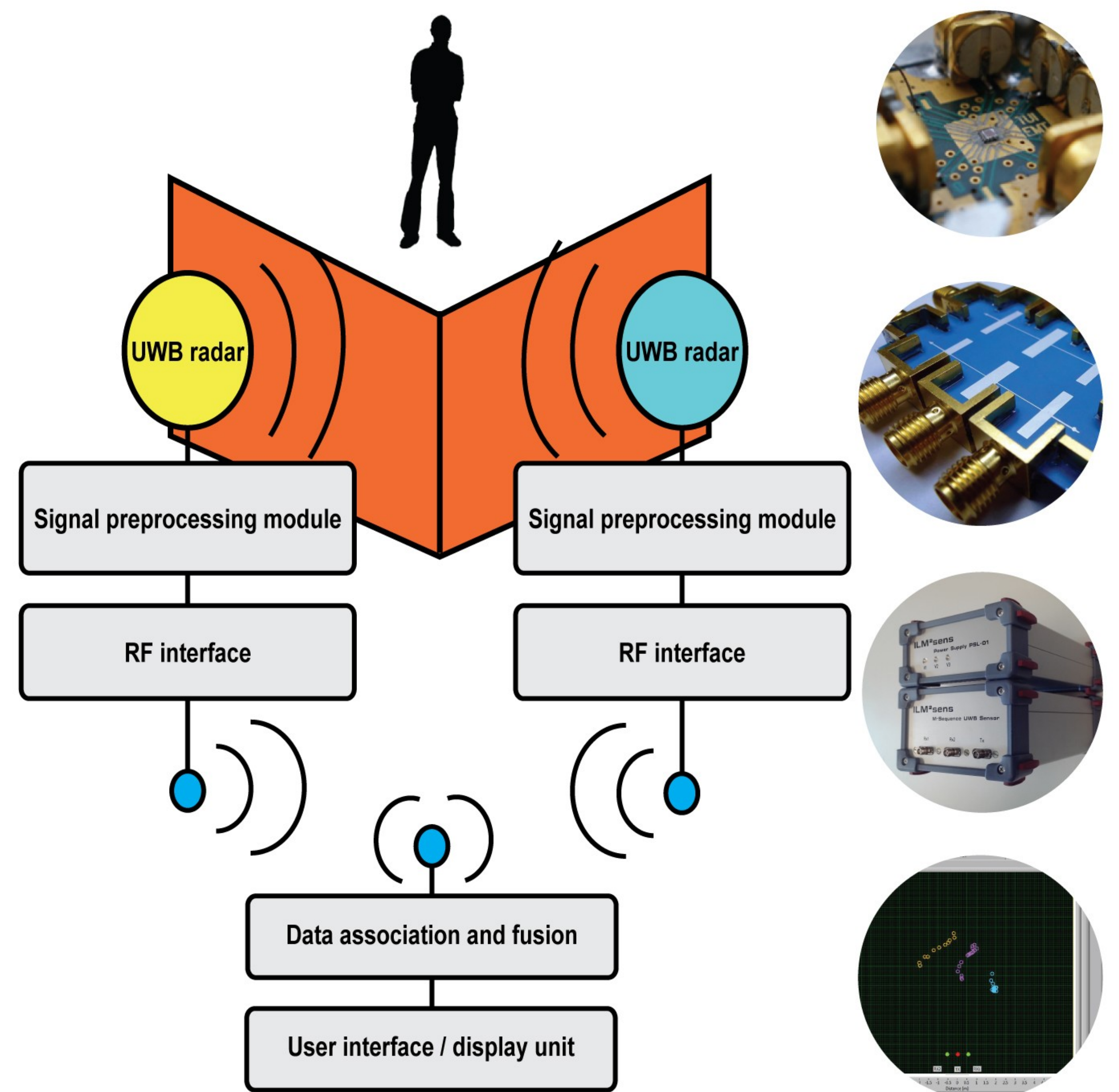
Multiple target localisation by UWB sensor network - measurement setup.



Results of target tracking from separate sensor nodes.



Final tracks of multiple targets obtained by association and fusion of data from multiple sensor nodes.



Proposed architecture of UWB sensor network with hardware and software components developed at TU Kosice and TU Ilmenau.