



ATOM in short

The goal of ATOM

Improve the security of the airports:

- avoid the introduction of any dangerous object in the terminal area
- without perturbation of normal operations

The approach of ATOM

Multi-sensor monitoring of the entire terminal area

- early detection of suspect items (materials and people)
- tracking of the suspect persons until the alarm finishes
- use of non-intrusive technologies and devices.

The airports involved

- Targu Mures: a medium-size international airport serving the north-central regions of Romania
- Schipol: the airport of Amsterdam, one of the biggest and more innovative hubs in the world.

Strong technology base

The consortium includes:

- 3 big industrial groups, European leaders in civil and military security
- 3 renowned public and private research centers
- 2 airports and 3 SMEs.

The industrial and research partners own wide competence and experience in the fields of electromagnetism, radar systems, advanced sensors, data fusion and Internet technologies.

ATOM Calendar

The validation day in Targu Mures - June 7

A meeting with the final users will be held on June 7, Thursday, in Targu Mures, Mures County, Romania, in order to validate the project results. To this event are invited the airport security experts from the airports involved in ATOM, the members of the User Group and all people interested in airport security. Contacts: Toni Baceanu - Targu Mures <tonibaceanu@yahoo.com>, Balas Kerulo - Slot Consulting <balazskerulo@slotconsulting.hu>, Petru Stefan Runcan <p_runcan@yahoo.com>

The final workshop in Rome - June 26

The final event of the ATOM project will be a Workshop to be held in Rome on June 26, Tuesday, organized by SESM, the ATOM coordinating partner. To this event are invited in particular all persons in the ATOM Consortium, and possibly in companies and institutions linked with it, being interested to exploit and further develop the project results. Contacts: Roberta Cardinali - SESM <rcardinali@sesm.it>, Enrico Anniballi - SESM <eanniballi@sesm.it>.

Focus of this issue

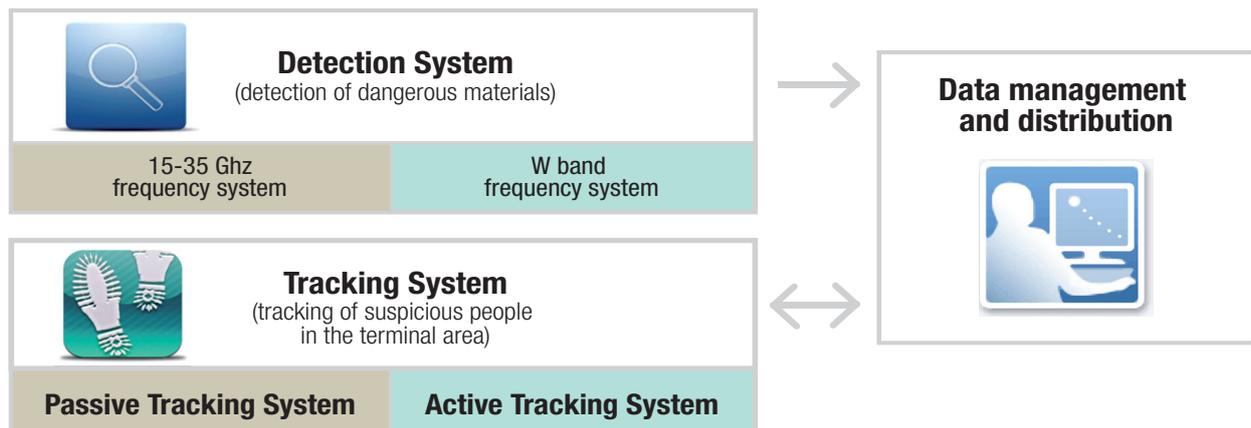
The airport of Transylvania

Targu Mures, the "airport of Transylvania", is an international airport located 14 km southwest of the town of Targu Mures, in central Romania; it provides services for an area of 24,500 square kilometers, with a number of 2.6 million inhabitants. Opened in 1961, in the last decade the airport has undergone extensive renovation; in October 2005 a new international terminal was opened, and Category II instrument landing system was installed, allowing the handling of flights 24 hours a day. This airport was chosen as the reference for requirements definition and validation of a medium-low configuration of the ATOM system.



System architecture

In the following figure the main blocks of the ATOM system are depicted.



The detection system

The detection system detects possible threats such as weapons and sharp objects, explosives, flammable and toxic substances; it integrates two sub-systems:

- a 15-35 GHz radar located in the airport entrance
- a W-band detection radar located in the gate entrance.

The tracking system

The tracking system is activated only when the management block alerts it, that is when the data provided by the detection system suggest the presence of a threat in the terminal area; the tracking block continually updates the track of the suspect person(s) and sends it to the management block until the alarm ends: because the person has been stopped or the threat likelihood has gone below some threshold due to the re-evaluation of the situation.

The communication network

A communication network, based on a mix of cabled and wireless links, supports all exchange of data and control information

- among sensors in the same cluster
- from the detection sub-systems to the management block
- from the management block to the tracking sub-systems (alarm initialization, alarm end) and vice-versa (track updates)
- between the management block and the security operators.

Essential technical glossary

Radar

A radar is a system which uses radio waves to detect and possibly identify objects in the line of sight; usually it tries to determine their range, altitude, direction and speed. Every radar has a receiver antenna that captures and measures the electromagnetic energy bounced by the target objects; as a rule to higher levels of energy correspond a higher precision in the evaluation of the target parameters, the range in particular.

Sensors

A sensor is a device that measures or detects a real-world condition, such as motion, heat or light, and converts the condition into an analog or digital representation. An example of sensor is the receiver antenna of a radar.

Multi-sensor systems

ATOM is a multi-sensor system both because it integrates several radars of different kinds and because some of them include many receiver antennas. A "data fusion" process is performed at various levels, among data collected by similar and different sub-systems.

Data fusion

Data fusion is the combining of data from disparate sources such that the resulting information is in some sense better than would be possible if these sources were used individually. The ATOM system applies different kinds of "data fusion"; at the sensor level, for example, the use of multiple sensors of the same type can allow a more precise estimation of the "range", the distance of a target from the receiving antenna; at the system level it is possible to combine guesses made by individual subsystem to decide whether an alert should be raised.

Active and passive radar

The radars used in most applications, for example in ATC (air traffic control), are "active" ones, in that the targets bounce the radiation emitted by a transmitting antenna belonging to the same radar system. ATOM uses also passive radars, the role of the transmitting antenna is taken by "sources of opportunity", for example by wireless access points (WAPs) already present in the area of interest; the available sources usually emit much less energy than an ad hoc transmitting antenna, and the associated parameters cannot be controlled; to compensate for that, especially for the imprecise range provided by the individual sensors (mainly due to low energy levels), a well-designed multi-sensor network is necessary.

A synopsis of tasks and technologies

TASK / SUB-SYSTEM	LOCATION	TECHNOLOGY	BAND
Detection UWB microwave radar	airport entrance	Ultra-wideband SAR imaging radar, using Vivaldi antennas; provides 3-D pictures.	15-35 GHz
W band radar	gate entrance	W-band radars on rotating platform for moving passengers inspection.	96-99 GHz
Tracking Passive sensors	corridors and transit rooms	Network of WiFi-based passive radars; handles DSSS and OFDM modulation; uses Doppler-rate targets discrimination.	Wi-Fi channels 1-13
Active sensors	corridors and transit rooms	Network of simple, low-cost, broad-beamed, active RF sensors; tracking is based on a model of human locomotion (GAIT)	24 GHz

In next issues

- Planned exploitation of the project results
- W-Band Radar for Moving Passenger Inspection
- The use of passive sensors in ATOM
- The role of simulation in ATOM

THE ATOM Project

Project acronym: ATOM

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Duration: 36 months

Website: atom-project.eu

THE ATOM Consortium



atom

Airport detection and Tracking Of dangerous Materials by passive and active sensors arrays

<http://atom-project.eu/>



THALES



HELLENIC AEROSPACE INDUSTRY S.A.



Transylvania Tirgu-Mures Airport

