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Highlight:

Towards better solutions for controlling heavy air traffic: Photonics for faster and safer departures and arrivals

11 July 2013

Dr Antonella Bogoni announces a new series of tests on the photonic radar, developed by her research group, in the course of July. These tests are a first step towards a better control of heavy air traffic, just in time for the holiday period.

Thanks to the grant from the European Research Council (ERC), Dr Antonella Bogoni, researcher at CNIT (Consorzio Nazionale Interuniversitario per le Telecomunicazioni - Pisa), and Area Leader of Digital & Microwave Photonics at the Institute of Communication, Information and Perception Technologies (TeCIP), is developing a new generation of digital radars based on photonics. The research team led by Antonella Bogoni will also identify their properties and design. By exploiting the light to generate and detect radio frequency signals, she has developed digital radars with a much higher performance than the existing ones.

In a few days, the research team will place the photonic radar on the roof of the Institute of Communication, Information and Perception Technologies in order to verify its performance in a real scenario. The prototype, developed with the support of EU funding, will monitor for some weeks the air traffic of the neighbouring "Galileo Galilei" Airport. The detected data will be re-elaborated by the photonic radar developed by the Pisa research group, and compared with the data simultaneously communicated during the flight, in order to verify the level of precision of the device.

A laser producing ultra-short light pulses (10 billion times shorter than one second) will be used for the test, i.e. showing a higher stability with respect to electronic devices. The laser will allow to generate very high-quality radar signals at higher and more flexible frequencies, even under bad weather conditions. The device will not generate any interference; it will use signals with lower frequency than a common mobile; it will not produce electromagnetic pollution and will be able to accomplish its task with accuracy.

Dr Bogoni declares: *"After having spent almost 4 years on this project, which has been possible thanks to the ERC grant, I am happy to say that the first photonic radar now exists. Its performances are in line with what we all expected."* She adds: *"The radar offers further benefits, which we discovered during the research. We are now ready for field tests, and hope that our results can be the basis for a new generation of multifunctional and safer radar"*.

The photonic radar can also detect targets with better resolution using smaller antennas, making it easier to develop portable devices. This single radar can also carry out different operations simultaneously; it can monitor the environment by controlling the air and the land traffic while enabling communication between the airport workers.



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The researcher believes that accidents due to congested air traffic will significantly decrease in the near future.

Dr Bogoni and her team will use their additional 'Proof of concept' ERC grant to design the prototype of this photonic radar and to explore collaborations with local airports, radar system vendors and photonic components suppliers. She will also investigate how to insert the radar system in chips measuring less than 1 cm.

The research team plans a new series of tests on the photonic radar in the next few days.

A video clip illustrating her research on better control of heavy air traffic, is available on: <http://vimeo.com/68036081>.

Pictures and biography of Dr Antonella Bogoni as well as facts and figures about Italy and the ERC are attached.

For further information and interview requests with Dr Bogoni (including audiovisual), please contact:

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Links:

<http://erc.europa.eu>

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Information about the project:

Research Coordinator: Dr Antonella Bogoni

Host Institution: CNIT, Pisa, Italy

Projects titles:

PHOtonic-based full DIgital Radar (ERC Starting grant 2009: PHOtonicbased full DIgital Radar ([PHODIR](#)))

PRE-industrial Photonic-based Radar dEsign (ERC Proof of Concept grant 2012 ([PREPARE](#)))

Links:

<http://www.ircphonet.it/staff/members/bogoni/curriculum.pdf>

<http://www.cnit.it/node/100>

<http://www.sssup.it>

<http://tecip.sssup.it>