

Small and medium-scale focused research project “SUCCESS”

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Abstract

EU-STREP Project SUCCESS

Deliverable D7.3 (WP7). This document is the 3rd year version of the Project Dissemination Report, covering the period December 1, 2009 to May 31, 2012. It describes all the activities carried out by the Consortium in order to disseminate the project results and the knowledge gained during their development.

Keywords

Distance, speed, angle measurement, millimeter wave, integrated system, 122GHz

SUCCESS Consortium

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IHP GMBH IHP Im Technologiepark 25 15236 Frankfurt (Oder) Germany	ROBERT BOSCH GMBH RB Robert-Bosch-Platz 1 70839 Gerlingen-Schillerhöhe Germany
STMICROELECTRONICS S.A. ST Boulevard Romain Rolland 29 92120 Montrouge France	KARLSRUHE INSTITUTE OF TECHNOLOGY KIT Kaiserstrasse 12 76131 Karlsruhe Germany
SILICON RADAR GMBH SR Im Technologiepark 25 15236 Frankfurt (Oder) Germany	SELMIC OY SELMIC Veistamotie 15 FI-90550 Oulu Finland
HIGHTEC MC AG HIT Fabrikstrasse 9 5600 Lenzburg Switzerland	EVATRONIX IP EVA Przybyly 2 43-300 Bielsko-Biala Poland
UNIVERSITY OF TORONTO UoT Kings College Circle 27 M5S 1A1 Toronto Canada	

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1. Introduction

The SUCCESS project is driven by the vision of high-resolution millimeter wave sensors for distance, speed and angle measurement as miniaturized, highly integrated systems. The radio frequency will be higher than 100 GHz, in order to achieve small antenna dimensions while maintaining a high antenna directivity.

The measurement distance range shall be up to a few meters with a target ranging accuracy of better than 1 mm. The sensor system shall be available as a single SMD component. It shall integrate the complete millimeter-wave part, together with the analog signal conditioning, the digital control logic, self test, calibration and antenna elements.

The main challenges that limit the penetration of mm-wave sensing technology into high-volume markets so far is the costly mm-wave packaging and the complicated mm-wave production testing. To overcome these problems the three main challenges and objectives of the SUCCESS project are:

- To develop a low-cost mm-wave System-in-Package based on plastic SMD-type packages that integrate a planar antenna together with the SiGe BiCMOS technology.
- To realize the System-on-Chip integration of a digital-controlled mm-wave frontend and asynchronous digital baseband processor design.
- To develop novel methods for mm-wave Built-in-Self-Test and mm-wave sensor System-in-Package test.

In this report, we have devised the projects dissemination plan, which will be updated yearly with regard to the actual results of the project and the current state of other activities. The dissemination plan consists of a roadmap for the dissemination activities to be deployed within the project.

In the first section the necessary dissemination procedures are defined, as well as the available dissemination material and the way to be used by the consortium.

In the second part a thorough record for the dissemination achievements is given



which will be updated yearly.

The last part includes proposals for dissemination activities and plans for future events. Within this section a roadmap for the future activities is defined.

2. Dissemination Means

The following dissemination means are identified to conduct dissemination actions in an efficient way.

2.1. Logo

The logo is an important part of the SUCCESS corporate identity. It is used in all project documents and communications, as well as a main recognition value to the research community and industry.

2.2. Interactive Website

An interactive and frequently updated website is used as one major dissemination channel to the public.

2.3. Press releases

Press releases will be used to disseminate SUCCESS project results to a wide audience. It is planned to publish the press releases on the SUCCESS website, as well as on the individual partners websites. The press releases are also regularly sent to the editors of the following magazines:

- High Frequency Electronics
- Electronic Design Europe
- Microwave Journal
- EETimes
- Elektronik Automotive
- Funkschau – Design & Elektronik

2.4. Newsletters, Brochures and Posters

The newsletter will be used for updating state-of-the-art of the SUCCESS project, thus, helping interesting communities and users keep updated with newly developments within SUCCESS. Brochures, information flyers and posters will be used to improve awareness about SUCCESS results.

2.5. Events

We consider events as main places where results from SUCCESS can be disseminated. Both scientific and industrial events are equally important. While academic and research organization partners, e.g., IHP, KIT, and UoT, mostly target scientific outcome from SUCCESS to scientific conferences, workshops and research meetings, industrial and end-user partners such as RB, ST, SR, SELMIC, HIT and EVA will focus on presenting SUCCESS results in industrial and commercial events.

2.6. Publications

Publishing SUCCESS results in major conferences, journals, books, workshops, etc., is the key dissemination activity. We identify main scientific forums that can be considered the best place for disseminating SUCCESS scientific results

- IEEE Transactions on Antennas and Propagations
- IEEE Transactions on Microwave Theory and Techniques
- IEEE Transactions on Advanced Packaging
- IEEE Antennas and Wireless Propagation Letters
- IEEE Microwave and Wireless Components Letters
- IMAPS Journal of Microelectronics and Electronic Packaging
- IEEE Sensors Journal
- IEEE Transactions on Electronics Packaging Manufacturing
- International Microwave Symposium (IMS)

- IEEE Radio Frequency Integrated Circuit Symposium (RFIC)
- European Microwave Week (EuMW)
- Antennas and Propagation Symposium (AP-S)
- European Conference on Antennas and Propagation (EuCaP)
- International Workshop on Antenna Technology (IWAT)
- Radio & Wireless Week (RWW)
- IEEE Silicon Monolithic Integrated Circuits in RF Systems (SIRF)
- IMAPS International Symposium on Microelectronics
- Asia Pacific Microwave Conference (APMC)
- IEEE Compound Semiconductor Integrated Circuit Symposium (CSICS)
- International Solid-State Circuit Conference (ISSCC)
- European Solid-State Circuits Conference (ESSCIRC)

The review process of both conferences and journals usually takes at least half a year. Thus publications on the SUCCESS project are not expected before 2011. However, the individual partners will publish project relevant pre-works in 2010 and will be using especially the conferences in 2010 to popularize the SUCCESS project.

2.7. Posters and Presentations

These include industrial and scientific posters, conference/workshop/invited presentations, presentations to companies, forums, etc.

2.8. Courses, Tutorials and Seminars

These include courses, tutorials, and seminars given in university programs or conferences/workshops.

3. Record of Accomplished Dissemination Activities

In the following a thorough record of all dissemination activities is given. All SUCCESS public documents that are generated by the project are collected in a dissemination package that is associated with the periodic reports.

3.1. SUCCESS Logo

To gain an attractive and recognizable project identity, a project logo has been designed that will be used in all the project documents and communications. The logo, besides being important for internal communications, is the projects key identity for all external communications, e.g. press releases, the website, all presentations, events and brochures. It will, together with the project acronym, serve as the main recognition value of the project to the scientific community.

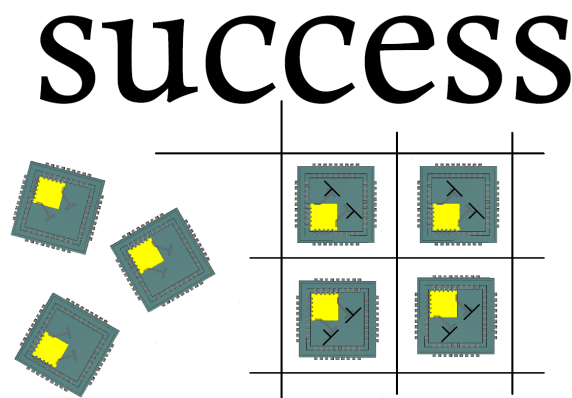


Figure 1

SUCCESS project logo

3.2. Interactive Website

An interactive website is used as one major dissemination channel to the public. The website <http://www.success-project.eu> was set up on Month 3 and is since then used to publish the main idea of the project, to introduce all partners, and to announce news and publications.

The website is giving detailed information on the main idea, the vision and the challenges of the project. All partners are introduced in detail, together with their tasks within the project.

The main purpose of the website however will be to regularly publish news and press releases, and to announce important events. The website will also list all project relevant publications.

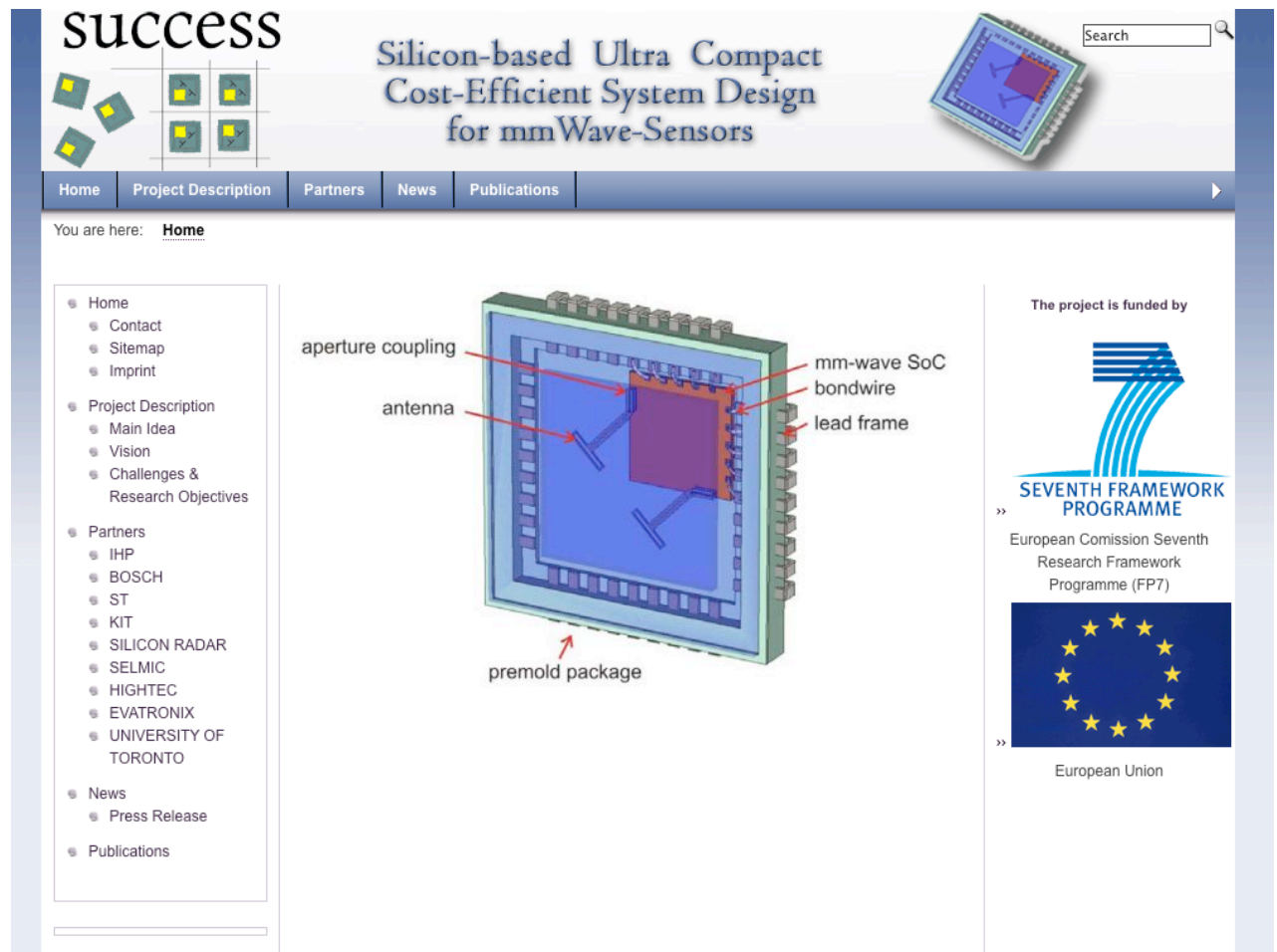


Figure 2 Welcome page of the SUCCESS website

3.3. Press releases

A press release regarding the project kick-off was published on the SUCCESS website, as well as on the websites of KIT and IHP. The press release is attached to the dissemination package. Julien Happich, the Editor-in-Chief of EETimes Europe assured to run this information in his June 2010 print section on components packaging.

The German magazine elektroniknet.de published a similar announcement on May 31, 2010. It describes the project ideas and partners, and gives a link to the project website.

3.4. Newsletters, Brochures and Posters

3.5. Events

The project kick-off meeting was held at IHP site, Frankfurt, Oder on December 8 & 9, 2009. All project participants met to discuss the project and the project communications. All work packages were discussed, as well as the administrative work. The BSCW work server was discussed that is used during the project to exchange documents and reports.

We are presenting our intermediate results on a **Workshop on the International Microwave Symposium 2012**. The workshop title is *System, MMIC and Package Design for a Low-Cost, Surface-Mountable Millimeter-Wave Radar Sensor*. This workshop covers the complete design and development process of a low-cost, surface-mountable millimeter-wave Radar sensor, starting from a system perspective, covering the MMIC design including innovative methods for Built-in-Self-Test and System-in-Package-Testing, and treating a low-cost package design with integrated antennas.

Title	Speaker	Time
Motivation for miniaturized millimeter-wave systems	Prof. Zwick	20 min

Title	Speaker	Time
Millimeter wave sensor implementation aspects	Dr. Hasch	40 min
Single-chip 142-152 GHz sensor with self-test features	Prof. Voinigescu	40 min
Break		20 min
122 GHz FMCW radar transceiver and components in 0.13 μm SiGe BiCMOS technology	Dr. Scheytt	40 min
Integration and characterization of millimeter wave antennas	Prof. Zwick	40 min
Panel discussion		40 min

3.6. Publications

3.6.1. Books / Book chapters

3.6.2. Journals / Magazines

Accepted for Publication

- Yaoming Sun; Gerhard G. Fischer, Christoph J. Scheytt; "A Compact Linear 60 GHz PA with 29.2% PAE Operating at Weak Avalanche Area in SiGe," *Micro-wave Theory and Technologies, IEEE Transactions on*

Published

- Schmalz, K.; Winkler, W.; Borngräber, J.; Debski, W.; Heinemann, B.; Scheytt, J.C.; "A Subharmonic Receiver in SiGe Technology for 122 GHz Sensor Applications," *Solid-State Circuits, IEEE Journal of* , vol.45, no.9, pp.1644-1656, Sept. 2010
- Yaoming Sun; Scheytt, C.J.; "A 122 GHz Sub-Harmonic Mixer With a Modified APDP Topology for IC Integration," *Microwave and Wireless Components Letters, IEEE* , vol.21, no.12, pp.679-681, Dec. 2011
- Beer, S.; Gulan, H.; Rusch, C.; Zwick, T., "Coplanar 122-GHz Antenna Array

With Air Cavity Reflector for Integration in Plastic Packages," *Antennas and Wireless Propagation Letters, IEEE* , vol.11, no., pp.160-163, 2012

- Sarkas, I.; Hasch, J.; Balteanu, A.; Voinigescu, S.P.; , "A Fundamental Frequency 120-GHz SiGe BiCMOS Distance Sensor With Integrated Antenna," *Microwave Theory and Techniques, IEEE Transactions on* , vol.60, no.3, pp.795-812, March 2012

3.6.3. Conferences / Workshops

Accepted for Publication

- S. Beer, H. Gulan, M. Pauli, C. Rusch, G. Kunkel and T. Zwick, "122-GHz Chip-to-Antenna Wire Bond Interconnect with High Repeatability," in *IEEE MTT-S International Microwave Symposium Digest (MTT)*, 2012
- Ruoyu Wang, Yaoming Sun, Mehmet Kaynak, Stefan Beer, Johannes Borngräber, and J. Christoph Scheytt, "A Micromachined Double-Dipole Antenna for 122 – 140 GHz Applications Based on a SiGe BiCMOS Technology," *International Microwave Symposium 2012 (IMS2012)*, June 2012, Montreal, Canada.
- Yaoming Sun, Christoph J. Scheytt, "A Low-Phase-Noise 61 GHz Push-Push VCO with Divider Chain and Buffer in SiGe BiCMOS for 122 GHz ISM Applications," *RFIC Symposium 2012*, June 2012, Montreal, Canada.
- S. Beer, L. Pires, C. Rusch, C. Heine, J. Paaso, and T. Zwick, "Microstrip Slot Antenna Array in LTCC Technology for a 122 GHz System-in-Package," *IEEE Antennas and Propagation Symposium 2012*, Chicago, July 2012
- Debski, W.; Winkler, W.; Sun, Y.; Marinkovic, M.; Borngräber, J.; Scheytt, Ch.; „120 GHz Radar Mixed-Signal Transceiver," *European Microwave Integrated Circuits Conference (EuMIC)*, 29-30Oct. 2012

Published

- Winkler, W.; Debski, W.; Heinemann, B.; Korndorfer, F.; Rucker, H.; Schmalz, K.; Scheytt, C.; Tillack, B., "122 GHz low-noise-amplifier in SiGe technology," *ESSCIRC, 2009. ESSCIRC '09. Proceedings of*, vol., no., pp.316-319, 14-18

Sept. 2009

- S. Beer and T. Zwick, "Probe Based Radiation Pattern Measurements for Highly Integrated Millimeter-Wave Antennas," in Proc. of the European Conference on Antennas and Propagation EuCAP 2010, Barcelona, Spain, Apr. 2010.
- K. Schmalz, W. Winkler, J. Borngräber, W. Debski, B. Heinemann, J. C. Scheytt, "122 GHz ISM-Band Transceiver Concept and Silicon ICs for Low-Cost Receiver in SiGe BiCMOS", IEEE MTT-S Int. Microwave Symposium (IMS) 2010, Anaheim CA, USA, May 2010
- I. Sarkas, E. Laskin, J. Hasch, P. Chevalier, and S. P. Voinigescu, "Second Generation Transceivers for D-Band Radar and Data Communication Applications", IEEE MTT-S Int. Microwave Symposium (IMS) 2010, Anaheim CA, USA, May 2010
- C. Scheytt, M. Kaynak, "MM-Wave System-On-Chip and System-in-Package Design for 122 GHz Radar Sensors in the EU-FP7 Project SUCCESS", RF-MST Cluster Workshop on MEMSWAVE 2010, Otranto, Italy, 28 June to 1st July 2010
- Winkler, W.; Debski, W.; Schmalz, K.; Borngraber, J.; Scheytt, Ch.; "LNA and mixer for 122 GHz receiver in SiGe technology," *Microwave Conference (EuMC), 2010 European*, vol., no., pp.529-532, 28-30 Sept. 2010
- Sarmah, N.; Schmalz, K.; Winkler, W.; Scheytt, C.J.; Glisic, S.; , "122 GHz transmitter using frequency doublers," *Silicon Monolithic Integrated Circuits in RF Systems (SiRF), 2011 IEEE 11th Topical Meeting on* , vol., no., pp.157-160, 17-19 Jan. 2011
- S. Beer, H. Gulan, C. Rusch, G. Adamiuk and T. Zwick, "A Double-Dipole Antenna with Parasitic Elements for 122 GHz System-in-Package Radar Sensors," in Proc. of the European Conference on Antennas and Propagation EuCAP 2011, Rome, Italy, Apr. 2011.
- Fan, Xin; Krstic, Milos; Wolf, Christoph; Grass, Eckhard; , "GALS Design for On-chip Ground Bounce Suppression," *Asynchronous Circuits and Systems (ASYNC), 2011 17th IEEE International Symposium on* , vol., no., pp.43-52, 27-

29 April 2011

- S. Beer, B. Ripka, S. Diebold, H. Gulan, C. Rusch, P. Pahl and T. Zwick, "Design and Measurement of Matched Wire Bond and Flip Chip Interconnects for D-Band System-in-Package Applications," in IEEE MTT-S International Microwave Symposium Digest (MTT), 2011, p. 1, June 2011
- H. Gulan, S. Beer, C. Rusch, S. Diebold, P. Pahl, and T. Zwick, "Coplanar Waveguide fed Antenna Arrays on Alumina for D-Band Sensing Applications," IEEE Antennas and Propagation Symposium 2011, Spokane, Washington, July 2011
- J. C. Scheytt, Y. Sun, S. Beer, T. Zwick, M. Kaynak, "mm-Wave System-On-Chip & System-in-Package Design for 122 GHz Radar Sensors", 12th International Symposium on RF MEMS and RF Microsystems, Athens, Greece, Aug. 2011
- Yaoming Sun and Christoph J. Scheytt, 'An Integrated Harmonic Transmitter Front-End for 122 GHz FMCW/CW Radar Sensor', in Proceedings of the *Microwave Conference (EuMC), 2011 European*, vol., Sept. 2011
- S. Beer and T. Zwick, "122 GHz Antenna-Integration in a Plastic Package based on a Flip Chip Interconnect," IEEE International Microwave Workshop Series on Millimeter Wave Integration Technologies (IMWS 2011), Sitges, Barcelona, Spain, Sept. 2011
- S. Beer, H. Gulan, B. Ripka, P. Pahl, T. Zwick; "Packaging and interconnect solutions for a low cost surface-mountable millimeter-wave radar sensor, " IEEE Semiconductor Conference, Dresden, Germany, Sept. 2011
- Zwick, T.; Beer, S.; "QFN based packaging concepts for millimeter-wave transceivers," *Antenna Technology (iWAT), 2012 IEEE International Workshop on* , vol., no., pp.335-338, 5-7 March 2012
- Gulan, H.; Beer, S.; Diebold, S.; Pahl, P.; Goettel, B.; Zwick, T.; "CPW fed 2×2 patch array for D-band System-in-Package applications," *Antenna Technology (iWAT), 2012 IEEE International Workshop on* , vol., no., pp.64-67, 5-7 March 2012

- S. Beer, L. Pires, C. Rusch, J. Paaso and T. Zwick, " A 122 GHz microstrip slot antenna with via-fence resonator in LTCC-technology," in Proc. of the European Conference on Antennas and Propagation EuCAP 2012, Prague, Czech Republic, Apr. 2012.

3.7. Posters and Presentations

3.8. Other Activities

4. Future Dissemination Activities

Proposals for dissemination activities and plans for future events are defined. Within this section a roadmap for future activities is given and updated periodically.

4.1. SUCCESS Consortium as a whole

At the end of the SUCCESS project an open workshop on fully integrated mm-wave radar sensors (antennas, packaging, circuits, and systems) will be organized at the Karlsruhe Institute of Technology. In this way a large audience has the opportunity to get informed of the outcome of the project in detail. Also contributions from other projects will be organized. On this workshop also the demonstrator together with the prototypes will be presented.

4.2. Individual Dissemination Plans

4.2.1. IHP GMBH

IHP is planning to publish project results preferably on the following conferences

- IEEE RFIC / IMS Symposium
- IEEE SiRF
- EuMW
- ISSCC, ESSCIRC

Journal publications on major achievements – depending on the project results – are intended.

IHP sustains booths on the following trade-fairs and will show demonstrators from the SUCCESS project when they are available:

- IMS trade fair

- EuMW trade fair
- Elektronika

The trade fairs are held annually.

4.2.2. Robert Bosch GmbH

4.2.3. STMICROELECTRONICS

4.2.4. Karlsruhe Institute of Technology

KIT is planning to publish project relevant work or pre-work on the following conferences:

- International Workshop on Antenna Technology 2013
- European Conference on Antennas and Propagation 2013
- International Microwave Symposium 2013
- European Microwave Week 2013

Other conferences listed in section 2.6, as well as journal publications, are planned, but depend on the project progress and results.

4.2.5. Silicon Radar GmbH

4.2.6. SELMIC

4.2.7. Hightec MC AG

4.2.8. Evatronix

4.2.9. University of Toronto

UoT is planning to attend the following conferences:

- Asia Pacific Microwave Conference 2012
- IEEE CSICS 2012
- RFIC Symposium 2013

Other conferences listed in section 2.6, as well as journal publications, are planned, but depend on the project progress and results.

5. Conclusion

In this report, we have described dissemination actions performed by SUCCESS. We have defined the dissemination means to be used by the project consortium. The SUCCESS consortium has conducted dissemination activities to advertise the project, as shown in the list of accomplished activities in this report. Furthermore, future actions have been determined.