

## Curriculum Vitae

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#### SUMMARY

- *Research*
  - Contributions to multiple areas of wireless communications (wireless propagation, multi-antenna systems, ultrawideband systems and localization; novel modulation methods, wireless video distribution)
  - Fellow of National Academy of Inventors, Fellow of AAAS, Fellow of the IEEE, Fellow of IET, Member of Austrian Academy of Sciences,
  - Extensive publications: 4 books, 260 journal papers - 49,000 citations, h-index 93
  - 70 patents granted and 20 pending; 70 standards contributions; with major impact on wireless industry
- *Project leadership*
  - Built up and led teams in multiple industrial research labs and academia
- *Teaching* and continuous education contributions:
  - Widely used textbook for wireless communications
  - More than 20 tutorials at international conferences
- *Service/leadership:*
  - Chairman of several international groups (both industrial and academic)
  - Active as editor, conference chairman, etc.

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**1. EMPLOYMENT HISTORY****UNIVERSITY OF SOUTHERN CALIFORNIA**, Viterbi School of Engineering, Los Angeles, CA, USA

<u>Solomon-Golomb – Andrew-and-Erna-Viterbi Chair Professor, Dept. El. Eng.</u>	2016 – current
<u>Full Professor, Department of Electrical Engineering,</u>	2009 – 2016
<u>Head, Wireless DEvices and Systems (WiDES) Group</u>	2009 – current
<u>(Co-)Director, Communication Sciences Institute</u>	2011 – 2016

Research areas: channel measurement/modeling, MIMO systems, UWB systems, cooperative communications, wireless video distribution systems, mm-wave transmission systems

**MITSUBISHI ELECTRIC RESEARCH LAB**, Cambridge, MA, USA

<u>Chief Wireless Standards Architect</u>	2007 – 2008
<u>Distinguished Member of Technical Staff</u>	2006 – 2008
<u>Senior Principal Member of Technical Staff</u>	2002 – 2006

scientific (team) leader for digital communications and networking

Research areas: cooperative communications, UWB systems, MIMO systems, mobile radio channels

**LUND UNIVERSITY**, Lund, Sweden

<u>Professor for Radio Systems, Department of Electrosience</u>	2002 – 2008
(unpaid position in parallel to activities at Mitsubishi Electric Research Labs)	

Research areas: channel measurement and modeling, MIMO systems, UWB systems

**AT&T LABS – RESEARCH CENTER**, Middletown, NJ

<u>Principal Member of Technical Staff;</u>	2001 – 2002
Research areas: MIMO systems, mobile radio channels, wireless wideband systems.	
<u>Guest Researcher;</u>	2000
Research area: MIMO-OFDM.	

**FTW RESEARCH CENTER FOR TELECOMMUNICATIONS**, Vienna, Austria

<u>Key Researcher</u>	1999-2000
(on one-year leave from TU Vienna); primarily responsible for creation of the mobile radio group.	
Research areas: smart antennas at the mobile station, third-generation mobile radio systems.	

**TECHNICAL UNIVERSITY VIENNA**, Vienna, Austria

Institut fuer Nachrichtentechnik und Hochfrequenztechnik (INTHF)	
<u>Head; “Mobile Radio Air Interface” group;</u>	1997-2000
<u>Associate Professor; mobile radio group</u>	1999-2000
<u>Assistant Professor; mobile radio group</u>	1995-1999
<u>Research Assistant; mobile radio group, laser spectroscopy group, applied electronics group</u>	1989-1995

Research areas:

- (i) error probability in TDMA systems, mobile radio channels, OFDM, smart antennas.
- (ii) modeling and simulation of atomic line filters, radiation trapping.
- (iii) applied electronics group: simulation of surface acoustic wave filters.

## **2. EDUCATION**

### **TECHNICAL UNIVERSITY VIENNA, Vienna, Austria**

- Habilitation Degree (~ D.Sc.) in Mobile Communications; 1999  
 Habilitation Thesis: „Bit Error Probability of Cordless Telephones in Time-Dispersive Environments“.
- Dr. techn. (=Ph.D.) in Electrical Engineering with Highest Honors; 1994  
 Doctoral Dissertation: „Modeling and Simulation of Lamp-Pumped Thallium Atomic Line Filters“.
- Dipl. Ing. (~M. Sc.) in Electrical Engineering with Highest Honors 1990  
 Thesis: „Solution of Electromagnetic Boundary Value Problems by the Wiener-Hopf Technique“.

## **3. MAJOR AWARDS**

- 2019 *IEEE ComSoc Radio Communications Committee Technical Recognition Award*
- 2019 *Fellow of International Union of Radio Science (URSI)*
- 2019 **Highly Cited Researcher** (top 1% in computer science, as determined by Publons –Clarivate- Thomson-Reuter)
- 2019 *Leonard G. Abraham Prize* (award for best paper in IEEE JSAC)
- 2018 **Edwin H Armstrong Award** (highest technical achievement award of IEEE Communications Society)
- 2018-19 *IEEE Distinguished Lecturer* (Communications Society)
- 2017 **IET Achievement Medal** for contributions to wireless communications
- 2015 **Fellow of the National Academy of Inventors**
- 2015 *Viterbi Award for Use-Inspired Research*
- 2015 *Neal Shepherd Memorial Award* of the IEEE Vehicular Technology Society
- 2013 *Puskas Tivadar Award* of the Hungarian Scientific Association for Infocomm (HTE)
- 2013 **Fellow of the AAAS** (American Association for the Advancement of Science)
- 2012 **Eric Sumner Award of the IEEE** (Technical Field Award for communications of IEEE)
- 2011-15 *IEEE Distinguished Lecturer* (IEEE Vehicular Technology Society)
- 2011 Elected **Member of the Austrian Academy of Sciences**
- 2011 *Donald G. Fink Prize Paper Award* of the IEEE
- 2011 *Distinguished Service Award* of the Radio Communications Committee of the IEEE
- 2010 *James Evans Avant-Garde Award* of IEEE Vehicular Technology Society
- 2010 *Okawa Research Grant*, Okawa Foundation
- 2010 *Honorary Guest Professor*, Beihang University, Beijing, China
- 2009 *Wireless Educator of the Year* award from Global Wireless Education Consortium (GWEC)
- 2008 Elected **Fellow of the IET (formerly IEE)**
- 2007-08 *IEEE Distinguished Lecturer* (IEEE Communications Society)
- 2007 *Hatsuhon-Award* of Mitsubishi Electric (for contributions to wireless standards)
- 2006 *Neal Shepherd Memorial Award* of the IEEE Vehicular Technology Society
- 2005 Elected **Fellow of the IEEE**
- 2001 *INGVAR award* of the Swedish Strategic Research Foundation (for work on propagation channels)
- 2000 Appointed *Senior Member of the IEEE*.
- 1999 *Kardinal-Innitzer-Award* (for the work on unequalized mobile radio systems).

#### **4. RESEARCH PUBLICATIONS SUMMARY**

Publications authored, co-authored, or edited (for details, see list of publications, p. P-1 to P-37)

- **4 books**,
- **20 book chapters**,
- **260 journal papers** (in international journals),
- **360 reviewed conference papers** (305 at international, 55 at national/continental conferences), and
- numerous other contributions (invited lectures, research reports, etc.)

**H-index: 93** (scholar.google.com)

**Number of citations: 49,000** (scholar.google.com)

The research contributions cover the following areas

- Multiple Antenna systems (smart antennas and MIMO)
- Wireless propagation channels
- Wireless video transmission
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- Ultrawideband communications and ranging
- Ad-hoc networks and cooperative communications
- Modulation and multiple access formats
- Radiation trapping
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#### **5. PATENTS SUMMARY**

More than 70 **patents** granted (for details, see list of publications, p. P-38 to P-41)

Areas of the inventions:

- Ultrawideband communications, ranging, and localization:
- Smart antennas and MIMO systems :
- Ad-hoc networks and cooperative communications:
- Receivers for unequalized wireless communications systems:

#### **6. INDUSTRIAL CONTRIBUTIONS SUMMARY**

##### **6.1 STANDARDIZATION DOCUMENTS**

**some 70 contributions** to international standardization organizations (for details, see list of publications p. P-42 to P-45)

Standards to which contributions were made

- 3GPP: Third-generation partnership program: cellular communications
- IEEE 802.15.3a: high-data-rate ultrawideband communications
- IEEE 802.11n: MIMO-based high-data-rate wireless LANs
- IEEE 802.15.4a: low-data-rate ultrawideband-based sensor networks
- IEEE 802.16m: advanced WiMax (large-area data transmission to mobile and fixed terminals)

##### **6.2 INDUSTRIAL RESEARCH REPORTS**

**More than 30 research reports** for companies, both internally for MERL, AT&T, and FTW, as well as reports for industrial partners. Titles and details of those reports are confidential.

## **7. TEACHING**

### **7.1 TEXTBOOK WRITING**

#### **A. F. Molisch, “Wireless Communications”**

*First edition:* Sept. 2005, IEEE Press - Wiley.

*Second edition:* Jan. 2011, IEEE Press –Wiley.

*Chinese translation first edition:* 2008, PHEI (Publishing House of the Electronic Industry)

*Chinese translation second edition:* Jan. 2015 PHEI (Publishing House of the Electronic Industry)

### **7.2 COURSES**

**USC:** “Mobile Communications (EE 535)”, “Communication Theory (EE 564)”, “Advanced Mobile Communications (EE 599/EE635)”, Linear Systems (EE 301L)

**Lund University:** “Radio Systems” (with O. Edfors); “Wireless Propagation Channels” (with F. Tufvesson); “MIMO systems” “Smart antennas for mobile communications”; “Seminar smart antennas” (with O. Edfors and Univ. Ronneby)

**Technical University Vienna:** “Mobile Communications” (with E. Bonek); “Smart antennas for mobile communications”; “Design of microwave circuits” Labs exercise; “Seminar in Mobile communications” (with E. Bonek and H. Weinrichter),

### **7.3 ADVISING OF PH.D. AND MASTER STUDENTS**

#### **Main Advisor:**

8 diploma theses

17 finished doctoral theses: *M. Steinbauer*, TU Vienna, *M. Toeltsch*, TU Vienna; *P. Almers*, Lund Univ; *J. Karedal*, Lund Univ., *S. Wyne*, Lund Univ., *A. Alayon Glazunov*, Lund Univ., *J. Shen*, USC, *J. Kim*, USC, *V. Kristem*, USC, *H. Feng*, USC, *Sundar Aditya*, USC, *Seun Sangodoyin*, USC, *Vishnu Ratnam*, USC, *Umit Bas*, USC, *Zheda Li*, USC, *Rui Wang*, USC, *Daoud Burghal*, USC

5 doctoral theses currently under advisement at USC

#### **Second advisor (opponent, examiner):**

23 doctoral theses (*Zhao*, Helsinki University of Technology, *B. Negash Getu*, Aalborg Univ., *W. Weichselberger*, TU Vienna, *C. M. Tan*, Bristol University, *H. Oeczelik*, TU Vienna, *H. T. Nguyen*, Aalborg University, *S. Wang*, NJIT, *S. Gezici*, Princeton University, *A. Osseiran*, KTH, *R. Yim*, Harvard University, *H. Hofstetter*, TU Vienna, *N. Devroye*, Harvard University, *T. Meng*, Nanyang Techn. Univ., *R. Merz*, EPFL, *G. Atia*, Boston Univ., *S. Fickar*, TU Vienna, *R. Nikjah*, University of Alberta, *X. Mao*, Nanyang Techn. Univ., *S. Kashyap*, Indian Institute of Science, *Antti Roivainen*, Oulu University, *Ghassem Narimani*, University of Canterbury, *Foad Sohrabi*, University of Toronto, *Fawad Sheik*, University of Duisburg-Essen

**Member of Examination Committee:** many theses at USC

### **7.4 TUTORIALS**

28 tutorials, most of them at international IEEE conferences (for details, see list of publications, p.P-25-P.27)

“Measurement and simulation of spatial mobile radio channels”

“Spatial channels (including MIMO)”

“Ultrawideband propagation channels”

“Smart antennas in mobile communications”

“MIMO systems”

“Ultrawideband systems”

“IMT-Advanced Systems”

“Measurement and modeling of mm-wave propagation channels”

## **8. PROFESSIONAL ACTIVITIES AND AFFILIATIONS**

### **8.1 MAJOR INDUSTRIAL AND ACADEMIC BODIES**

#### Chairman:

- Special Interest group on Channel Modeling, IEEE ComSoc RCC 2019-current
- Channel modeling group of 5G mmWave Channel Model Alliance 2016-current
- Awards Committee, Communications Society of the IEEE 2012 -2013
- Radio Communications Committee, Communications Society of the IEEE 2009 -2010
- IEEE 802.16m ad-hoc group on channel modeling 2007
- International Union of Radio Scientists, Commission C (Signals and Systems) 2005-2008
- Eureka (Enhanced Ultrawideband Ranging and Extended Communications Alliance) 2005
- MBOA (Multiband-OFDM Alliance) scalability group 2003-2005
- IEEE 802.15.4a subgroup on channel modeling 2002-2004
- COST 273 working group on MIMO channels 2001-2005

#### Vice Chairman

- Radio Communications Committee, Communications Society of the IEEE 2007-2008
- International Union of Radio Scientists, Commission C (Signals and Systems) 2002-2005

#### Member of Professional Society Bodies

- \* IEEE Vehicular Technology Society Fellows Committee 2020
- \* IEEE Press editorial board 2017 - current
- \* IEEE Vehicular Technology Society Fellows Committee 2010 - 2015

#### Member of Standardization Bodies

- 3GPP:: spatial channel modeling group
- IEEE 802.15.3a: high data rate Personal Area Networks
- IEEE 802.15.4a: low-data rate Personal Area Networks
- IEEE 802.11.n: high throughput wireless LANs
- Mm-wave 5G Special Interest Group

### **8.2 RESEARCH FUNDING ORGANIZATIONS:**

#### Reviewer and panel member

- National Science Foundation (USA)
- European Union
- Canadian Research Council
- German Research Foundation (DFG)
- Norwegian Research Council
- Swedish Research Foundation
- Austrian Science Foundation
- Chilean Research Foundation

### 8.3 JOURNALS

#### Editor

- Journal of Communications and Networking: *Division Editor* for Wireless Comm. 2012-current
- IEEE Trans. Wireless Communications: *Area Editor* for Antennas and Propagation 2009-2014
- IEEE Trans. Wireless Communications: *Associate Editor* 2000-2009

#### Guest Editor

- Guest co-editor of Special Issue of ChinaComm on 5G 2019
- Guest co-editor on Focus Topic of IEEE Comm Mag on 5G channels 2018
- Guest co-editor of special issue of IEEE JSAC on 5G Deployment and testbeds 2017
- Guest co-editor of special issue of IEEE Vehicular Techn. Mag. On propagation channels 2011
- Guest co-editor of special issue of Proceedings of the IEEE on Ultrawideband 2009
- Guest co-editor of special issue of IEEE JSAC on Ultrawideband 2006
- Guest co-editor of a special issue of Int. J. WCMC on smart antennas and MIMO systems 2003

#### Member of editorial board

- IEEE Signal Processing E-letter 2005-2006

Reviewer: about 20 reviews per year for the following journals

IEEE Trans. Vehicular Techn; IEEE Trans. Comm.; IEEE J. Selected Areas Comm.; IEEE Trans. Antennas Prop.; Proc. IEE - Radar, Sonar, and Navigation; IEE Electronics Letters.; IEEE Communication Letters.; IEEE Trans. Signal Processing.; IEEE Signal Processing Letters; IEEE Trans. Information Theory; Kluwer Journal on Personal Wireless Communications.; Proc. IEICE (Japan); European Transactions on Telecommunications; International Journal of Modeling and Simulation; Research Letters in Signal Processing, IEEE Communications Magazine; IEEE Antennas and Propagation Letters; IEEE Transactions on Broadcasting; IEEE Trans. Microwave Theory and Techn., Int. J. Comm. Systems, IEEE Transactions on Aerospace and Electronic Systems, IET Signal Processing, Journal of Electrical and Computer Engineering

### 8.4 INTERNATIONAL CONFERENCES

#### General chair

- Chinacom 2008
- IEEE International Conference on Ultrawideband , 2006

#### Chair of the Technical Program Committee

- Global Symposium on Millimeter Waves (GSMM) 2018
- IEEE Int. Conf. Comm. (ICC) 2013
- IEEE Int. Conf. Comm. China (ICCC) 2012
- International Workshop On Wireless Network Measurement (WinMee) 2011
- IEEE Workshops Int. Conf. Comm. (ICC) 2010
- Communication Theory Workshop 2009
- Chinacom 2007

Vice-chair of the Technical Program Committee

- IEEE VTC 2010 spring **2010**
- IEEE VTC 2005 spring **2005**

Symposium (Co)-Chair

- 5G Networks at *IEEE ICC* 2014
- Wireless Communications Symposium at *IEEE Globecom* 2007
- MIMO Symposium at *Int. Wireless Communications & Mobile Computing Conference* 2006
- Wireless Communications and Networking Symposium at *ChinaCom* 2006

Steering Committee of Conference Series:

- IEEE Int. Conf. Comm. China 2013-current
- IEEE Int. Conf. Ultrawideband 2006-current

Member of the Technical Program Committee

EPMCC 2001; IEEE ICC 2002; IEEE VTC fall 2002; IEEE ICC 2003; IEEE PACRIM 2003; IEEE Workshop on Ultrawideband Systems and Technologies 2003; IEEE VTC fall 2003; IEEE Globecom 2003; IEEE VTC spring 2004; IEEE ICC 2004; Int. Workshop on Wireless Ad-hoc Networks 2004; IEEE WCNC 2004; IEEE Workshop on Ultrawideband Systems and Technologies 2004; IEEE ICC 2005; IEEE Globecom 2005; IEEE WCNC 2005; IEEE RWS 2006, IEEE PIMRC 2006, Crowncomm 2006, IWWAN 2006, IEEE WCNC 2007 (Tutorial and Panels Chair), IEEE ICUWB 2007, IEEE VTC fall 2007, IEEE PIMRC 2007, IEEE ICC 2008, IEEE VTC 2008 fall, Workshop on Positioning, Navigation and Communication (WPNC) 2008, IEEE ICUWB 2011, SIEPCPC 2011

Session organizer and session chairman for the following 15 international conferences:

IEEE Globecom 2000, EPMCC 2001, IEEE VTC spring 2001, IEEE VTC fall 2001, IEEE Globecom 2001, IEEE VTC spring 2002, IEEE ICC 2002, IEEE PIMRC 2002, IEEE Globecom 2002, IEEE VTC spring 2003, IEEE ICC 2003, IEEE VTC fall 2003, IEEE ICC 2004, IEEE Globecom 2004; IEEE Globecom 2005, IEEE Int. Conf. UWB 2005, CISS 2006, Globecom 2010, European Wireless Conf. 2011,

International Advisory Committee

Int. Symp. Signals, Systems, and Electronics 2007  
International Conference on Computers, Communication, Control and IT [C3IT-2009] (2011)

Reviewer: about 30 reviews per year for conferences like

IEEE Globecom; IEEE ICC; IEEE VTC; IEEE PIMRC; IEEE WCNC, IEEE ISIT, and many others.

**8.5 MEMBERSHIP IN PROFESSIONAL SOCIETIES**

- National Academy of Inventors: Fellow since 2015
- AAAS (American Association for the Advancement of Science): Member since 2011, Fellow since 2013
- Austrian Academy of Sciences: Member since 2011
- IET (Institute of Engineering and Technology): Member since 2008, Fellow since 2008
- URSI (International Union of Radio Science: Member since 2002, Fellow since 2019
- DFG (German Society of Electric Engineers): Member since 1998
- ÖVE (Austrian Society of Electrical Engineers): Member since 1990
- IEEE: Student Member since 1987, Member since 1994, Senior Member since 2000, Fellow since 2005