CURRICULUM VITAE ET STUDIORUM

Sergio Bittanti is professor of Model Identification and Data Analysis in the Politecnico di Milano – Italy, where he works in the Department of Electronics and Information.

Research activity - main lines

His research interests focus on the methods and system identification and control. He also enjoys studying the challenging problems posed by real world applications through the cooperation with many societies, institutions and companies.

The main research lines are:

- system identification, prediction and filtering
- data analysis, including data mining
- control of time varying linear systems
- predictive and adaptive digital control
- modelling and control for energy production and distribution
- transportation and aerospace control
- control problems in life sciences

Publications

The outcome of the research activity is summarized in numerous papers published in some of the best international Journals (see publications page) and in the following volumes, of which he was editor or co-editor:

- Identification, adaptation, learning - The science of learning models from data. Springer-Verlag, Berlin, Computer and Systems Science Series, Vol. 153, 552 pages, 1996. This book contains a collection of selected lectures given at the NATO - ASI Workshop "From Identification to Learning", Como - Italy - 1994 (Editor, with Giorgio Picci co-editor)
- The Riccati Equation. Springer-Verlag, Berlin, Communications and Control Engineering Series, 338 pages, 1991 (Editor, with A. J. Laub, J. C. Willems co-editors)
- Software Reliability Modelling and Identification. Springer-Verlag, Berlin, Lecture Notes in Computer Science, Vol. 341, 209 pages, 1988 (Editor)
- Time Series and Linear Systems. Springer Verlag, Berlin, Lecture Notes in Control and Information Sciences, Vol. 86, 243 pages, 1986 (Editor)

Scientific associations

He has been active in various scientific associations, in particular the International Federation of Automatic Control (IFAC), the Institute of Electrical and Electronic Engineering (IEEE) and the European Union Control Association (EUCA).

For IFAC he served in various capacities, in particular as member of the Theory Committee (since 1984), Chairman of the Technical Committee on Adaptive Control and Learning (1999-2001), and then member of the IFAC Council (triennium 2002-2005). It was in this triennium that IFAC decided to assign to Milan the IFAC World Congress of the year 2011. Currently, he his a member of the Technical Board and member of three technical committees, on "Modelling, Identification & Signal Processing"; on "Adaptive and Learning Systems" and on "Stochastic Systems".

As for IEEE, he has been nominated Fellow since 01.01.2001.

Finally, he has been one of the founding members of EUCA (funded 1991). Ever since he takes part in the EUCA governing board meetings. Since 2003 he serves as Editor in Chief of the "European Journal of Control", the EUCA Journal. This Journal started its publication in 1995, and from its foundation up to 2003 I. D. Landau acted as first Editor in chief.

Conferences and meeting organization

He substantially contributed to the organization of various conferences, among which:

- IFAC Symposium on Robust Control Design (Milan, 2003)
- IFAC Workshop on Adaptation and Learning in Control and Signal Processing (Cernobbio-Como, 2001)
- IFAC Workshop on Periodic Control Systems (Cernobbio-Como, 2001)
- 3rd European Control Conference (Rome, 1995)
- IFAC/IEEE/SIAM workshop on The Riccati Equation in Control, Systems, and Signals (Como - Italy - 1989)
- Workshop on New Horizons in System Theory, together with R.E. Kalman (Como - Italy - 1986)

He also contributed to the Program Committees of a very large number of international conferences.

Editorial activity

Professor Bittanti served as associate editor for: Journal of Mathematical Systems, Estimation, and Control; Statistics and Computing; European Journal of Control. Currently he is Editor in Chief of the European Journal of Control and Editor for Annual Reviews of Control.

Research networks within Italy

He has been involved in various research networks. For the period 1983 – 1995 he coordinated one of the main systems and control network of Italy via the project "Model Identification, System Control and Signal Processing", funded by the Ministry of University and Research. This network connected about 70 Italian professor and researchers distributed in different universities. The activity has been reported, jointly with another Italian research network mainly devoted to nonlinear control, initially coordinated by A. Isidori and subsequently coordinated by S. Monaco (both of the University of Rome, Italy), in the following three volumes:

- S. Bittanti and A. Isidori eds., Identification, Control and Optimization of Dynamical Systems, 1989, Pitagora Editrice Bologna (231 pages), Progress report for the period 1983-87;
- Bittanti S. and S. Monaco eds., Identification, Control and Optimization of Dynamical Systems, 1992, Città Studi Milano (206 pages), Progress report for the period 1988-91;
- Bittanti and S. Monaco eds., Identification, Control and Optimization of Dynamical Systems, 1995, Christengraf Roma (220 pages), Progress report for the period 1992-94.

Since 1996 the follow up of this national project has been coordinated by Giorgio Picci, Padua University. Sergio Bittanti acted and acts as local coordinator for the research team of the Politecnico di Milano. In its last edition (2007, 2008) the project has taken the denomination "Identification and Adaptive Control of Industrial Systems".

He has been very active in the organization of the annual national scientific meetings of the Italian professors and researchers in systems and control. These meetings, originally denominated "Identificazione, Controllo e Ottimizzazione dei Sistemi Dinamici", were held at Villa Olmo - Como, Italy, in the years 1984, 1985, 1986, 1987, 1988, 1991 and at the Politecnico di Milano in 2006. This last national meeting was a 50 years celebration event. Indeed, the international conference named "Convegno Internazionale sui Problemi dell'Automatismo", held in Milano in 1957 with more than 1000 participants, can be seen as the big-bang of automatic control as and independent discipline in Italy.

International research networks

He had responsibilities in various European projects, and in particular:

- NACO (Non-linear and Adaptive Control) European TMR network
- SIMONET network (System Identification and MOdelling NETwork), 1994 - 1997, coordinated by Bart De Moor, involving Katholieke Universiteit Leuven, Ecole Supérieure d'Electricité , Ruhr-Universität Bochum , University of Athens , Università di Bologna , Politecnico di Milano , Politecnico di Torino , Technische Universiteit Delft , Eindhoven University of Technology , Universidade Tecnica de Lisboa , Uppsala University , University of Birmingham;
- EUROPOLY network

Lecturer and thesis advisor

At the Politecnico di Milano he enjoyed lecturing various courses, among them Automatic Control, Model Identification and Data Analysis, System Theory. In particular, he had the privilege of being the first lecturer in system identification in that University, beginning in 1977. He had then only 17 students in his class, but the course gained more and more popularity, reaching 600 students in the academic year 1999/2000. Then, with the reform of the Italian University that articulated the 5 years of Engineering in two levels - 3 years undergraduate followed by 2 years master, his huge class was split into a number of classes for different areas of specialization (aerospace, automation, bioengineering, computer engineering, electronic engineering, mathematical engineering). Today one can count a dozen of system identification courses for a total of about 900 students.

The System Identification lecture notes are published in Italian, in two volumes :

- Identificazione di Modelli e Sistemi Adattativi, Pitagora Editrice, Bologna (first edition 1990, last edition 2004, 304 pages); this volume is mainly devoted to prediction error identification methods and minimum variance predictive control.
- Teoria della Predizione e del Filtraggio, Pitagora Editrice, Bologna (first edition 1990, last edition 2004, 260 pages); this volume is mainly devoted to Kalman filtering and prediction, and to Wiener-Kolmogorov prediction theory; the two theories are compared (when comparable).

In his long teaching activity, Professor Bittanti had the privilege of supervising many outstanding scholars during their master or PhD thesis; many of them are now renowned scientists and successful engineers working in Italy and around the world.

From 1993 to 1998 he acted as supervisor of the PhD Program in "Informatica and Automatica" in the Politecnico di Milano. In this role, he started the series of Colloquia, during which the new PhD graduates had the possibility of presenting their research results to the general public.

Service to the CNR (National Research Council)

Professor Bittanti is a long term associate fellow of the Italian Research Council (CNR, Consiglio Nazionale delle Ricerche), serving various Institutes. Currently, he is associated with CNR – IEIIT (Institute of Electronics, Informatics and Telecommunication).

He served as the member of Scientific Councils of the following CNR Institutes and Centres :

- IMATI, Institute of Applied Mathematics and Information Technologies, in Pavia, since its foundation, when a reform of CNR required the re-organization of research units (April 2002) up to 2005, . IAMI has been directed since the foundation by Franco Brezzi (professor of mathematical analysis in the University of Pavia) and was incorporated into the IMATI as Milano branch in March 2003;
- IAMI, Institute for the Applications of Mathematics and Informatics ()in Milano, in 1995-2001.In that period IAMI was directed by Eugenio Regazzini (then professor of statistics in the Bocconi University in Milan, now professor of probability and statistics at University of Pavia), following the first director and founder of IAMI Marco Cugiani (professor of numerical mathematics in the State University of Milan).
- CESTIA, Centre for the Study of the Information and Automation Technologies, Milano,(1997-2002). The CESTIA, located in the Department of Electronics and Information of the Politecnico di Milano, directed by Arturo Locatelli (professor of optimal control in the Politecnico di Milano) englobed the former CST. It lasted till 2002, when CNR Centers were again reorganized on a new basis.
- CST, Centre of System Theory, Milano (1990-1996). CST was founded in 1971 and located in the Department of Electronics and Information of the Politecnido di Milano.Since its foundation in 1971 until 1991, it was directed by Emanuele Biondi (former professor in the Politecnico di Milano), and then by Arturo Locatelli up to 1997, when CST became the core of CESTIA.

Contributions to Program Committees

- 15th IFAC Symposium on System Identification France, 2009
- 17th IFAC World Congress, Seoul, Korea, July 6-11, 2008
- 7th World Congress on Intelligent Control and Automation (WCICA), Chongqing, P.R. China June 25-27, 2008
- IFAC Workshop on Information Technologies and Control Methods with Power Plants and Power Systems (ICPS07), Cluj-Napoca, Romania, July 9-11, 2007
- Foundations of Systems Biology in Engineering Conference (FOSBE 2007), Conference offered by the CACHE organization to address the emerging challenges in the fields of Systems Biology, University of Stuttgart, Germany, September 9-12, 2007
- 3rd IFAC Workshop on Periodic Control Systems St Petersburg, Russia, August 29-31 2007
- IFAC Workshop on Adaptation and Learning in Control and Signal Processing (ALCOSP) St Petersburg, Russia, August 29-31 2007
- 7th ECC European Control Conference, Kos, Greece, July 2-5 2007
- IFAC Symposium on Automatic Control on Aerospace 2007 Toulouse, France, June 25-29, 2007
- 14th IFAC Symposium on System Identification, Newcastle, Australia - March 29-31, 2006
- IEEE Conference on Control Applications Munich, Germany, October 4-6, 2006
- IFAC Workshop DECOM-TT 2004 Bulgaria, 2004
- 2nd IFAC Workshop on Periodic Control Systems Yokohama, Japan, August 30-September 2 2004
- IFAC Workshop on Adaptation and Learning in Control and Signal Processing (ALCOSP) Yokohama, Japan, August 30-September 2 2004
- IFAC Workshop on Advanced Fuzzy/Neural Control (AFNC'04) Oulu, Finland, September 16-17, 2004
- IFAC International Conference on Intelligent Control and Signal Processing (ICONS 2003) Faro, Portugal, April 8-11 2003.
- 13th IFAC Symposium on System Identification, Rotterdam, The Netherlands, August 27-29, 2003
- 5th IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes Washington DC, USA, June 9-11, 2003
- 6th European Control Conference, Cambridge, UK 2003
- IFAC Workshop on Neuro-Fuzzy Control Valencia, Spain, 2002
- IEEE Conference on Control Applications Glasgow, UK, 2002
- The 33rd ISCIE International Symposium on Stochastic Systems Theory and its Applications (Advisory Committee) Ashikaga-City, Japan, 29, 30 October 2001
- The 2nd Kansas Workshop on Stochastic Theory-Adaptive Control University Of Kansas, Mathematics Department Lawrence, Kansas, US, 18-20 October 2001
- 5th European Control Conference, Porto, Portugal, September 2001
- IFAC Workshop on Automatic systems for building infrastructure developing countries (Knowledge and Technology Transfer) Ohrid, Republic of Macedonia, May 21-23, 2001
- Process Control '01 High Tatras, Slovak Republic
- 1st IFAC Workshop on Periodic Control Systems Cernobbio-Como, Italy, August 27, 28 2001

- IFAC Workshop on Adaptation and Learning in Control and Signal Processing (ALCOSP) Cernobbio-Como, Italy, August 29-31 2001 (this workshop is the 7th in a series originated in San Francisco - USA - in 1983, then continued in Lund - Sweden - 1986, Glasgow -UK - 1989, Grenoble - France - 1992, Budapest - Hungary - 1995, and again Glasgow - UK - 1998; in these 6 conferences the workshop name was workshop on Adaptive Control and Signal Processing - ACASP)
- Mathematical Theory of Networks and Systems, 2000 Perpignan, France, 2000
- Process Control and Instrumentation 2000, Glasgow, UK, 2000
- 6th St.Petersburg Symposium on Adaptive Systems Theory (SPAS'99) dedicated to the memory of Ya. Z. Tsypkin Saint Petersburg, Russia, 7-9September 1999
- 4th European Control Conference, Karlsruhe, Germany, September 1999
- 11th IFAC Symposium on System Identification, Fukuoka, Japan, July 1997
- 3rd European Control Conference Roma, Italy, September 1995
- 1st International Conference on Marine Transportation (International Scientific Advisory Committee) Plymouth, September 1995
- 3rd International Workshop on Nonsmooth and Discontinuous Problems of Control and Optimization St. Petersburg, Russia, June 26 - July 2 1995
- 5th International Symposium on Software Reliability Engineering Monterey, California, USA, November 1994
- 10th IFAC Symposium on System Identification Copenhagen, Denmark, July 1994
- 2nd European Control Conference Groningen, The Netherlands, July 1993
- IEEE International Symposium on Software Reliability Engineering Austin, Texas, USA, 1991
- 1st European Control Conference Grenoble, France, July, 1991
- Mathematical Theory of Networks and Systems Kobe, Japan, June 1991

Application studies

Professor Bittanti was responsible or co-responsible of the collaborations between the Politecnico di Milano and the following Companies:

- SAME DEUTZ FAHR - Treviglio, Analysis and development of the control system for Power-Split continuous variation transmission systems (2005, duration 5 months);
- CEFRIEL - Milano, Analysis and development of automation and control systems for vehicles and industrial plants (2005, duration 1 year);
- CESI - Milano, Modelling and control of innovative processes for distributed generation (2005, duration 8 months);
- CESI - Milano, Modelling and identification of the scattering parameters for signal transmission along electric lines (2005, duration 7 months);
- ST Microelectronics – Milano, Estimating position and velocity from signals generated by MEMS located inside a PC mouse (2004, duration 8 months);
- CESI - Milano, Modelling and control of innovative processes for distributed generation (2004, duration 8 months);
- CESI - Milano, Modelling a DENOX plant (3D with chemical reactions) (2003, duration 3 months);
- CESI - Milano, Control of low voltage network with distributed generation (2003, duration 3 months);
- ASI, Agenzia Spaziale Italiana (contract ASI I/R/261/02, n. 48 9 July 2002), Periodic and LPV control methods, with space applications (2003, duration 1 year);

- LGL Electronics SpA, Study of the actuator and sensor devices for the set up of an active control system for the certain types of looms (2003, duration 4 months);
- CESI - Milano, Analysis of advanced control techniques (2002, duration 1 year)
- WHIRLPOOL - Varese, Simulation for electrical oven and model for refrigerator/freezer in static/no frost configuration (2002, duration 1 year);
- SAME DEUTZ FAHR - Treviglio, Modelling, simulation, and implementation of control strategies in a CVT (Continuously Variable Transmission) tractor (2001, duration 9 months);
- ST Microelectronics - Milano, Adaptation and Optimization of an equalizer FIR for the read- and-write channel of a hard disk drive (2001, duration 8 months);
- CESI - Milano, Models and methods for the analysis of problems rising from the diffusion of distributed generation of power in the low voltage electrical grid (2001, 5 months);
- GAYMARINE - Como, Modelling and control of under-actuated ships (2001, duration 2 months);
- CESI - Milano, Modelling of NOx, CO and unburned particles emissions with validation against plant data and 3D simulations (2001, duration 4 months);
- CESI - Milano, Development of a methodology for the design of a combustion active control system (2000, duration 5 months);
- ENEL – Ricerca, Area Generazione - Milano, Development of models oriented to the study of thermo - acustic instabilities in combustion systems (1999, duration 5 months);
- FERRARI Car Company - Maranello, Integrated control of electronic on-board devices (1999-2001);
- ST Microelectronics – Agrate - Milano, Servocontrol algorithms for high performing CD/DVD-ROM applications (2000, duration 6 months);
- ST Microelectronics Agrate - Milano, Modelling and control of digital controllers for voice coil motors (VCM) (1999, duration 1 year);
- PIRELLI Coordinamento Pneumatici - Milano, Identification of the parameters of the system tire-car by means of on-road experimental data (1999, duration 10 months);
- ENEL Polo Elettrico e di Automazione - Milano, Image processing for fault detection in energy generation plants (1998, duration 1 year);
- ST Microelectronics – Agrate Milano, Servocontrol algorithms for high performing CD/DVD-ROM applications (1998, duration 9 months);
- PIRELLI Coordinamento Pneumatici - Milano, Identification of the parameters of the system tire-car with nonlinear models (1997, duration 10 months);
- ENEL Centro Ricerca Termica di Pisa, Identification of a model for the combustion chamber in a thermo-electric power plant (1996, duration 1 year);
- ENEL - Milano, Multivariable control of non conventional thermoelectric systems (1996, duration 1 year);
- PIRELLI Coordinamento Pneumatici - Milano, Studing the possibility of adopting identification techniques for handling problems in vehicles (1996, duration 1 month);
- MEMC Electronics Materials - Novara, Quality process assessment in the wafer production industry (1996);
- RIVA CALZONI - Milano, Stabilization of a Surface Effect Ship (1995, duration 1 year);
- GPS STANDARD - Aosta, Analysis of GPS sensor data for recognition of human intrusion (1995, duration 1 year);

- ENEL Centro di Ricerca in Automatica - Milano, Estimation of the char mass in fluidized bed reactors via Kalman filtering techniques (1994, duration 1 year);
- ENEL CRA (Centro di Ricerca in Automatica) - Milano, Estimation of latent variables in thermo-power plants (1993-1995);
- AGUSTA S.p.A. Varese, Modelling and identification for active control of vibration in helicopter A129 (1986-1994);
- PIRELLI Coordinamento Pneumatici - Milano, Identification of models for the dynamic behavior of cars (1989, duration 11 months);
- PIRELLI Coordinamento Pneumatici - Milano, Identification of black-box models for the analysis of vibrational dynamics of cars (1987, duration 1 year);
- IBM - Milano, Use of advanced software tools for the teaching and research in Systems and Control at the Politecnico di Milano (1985-1987);
- ENEL CRA (Centro Ricerca in Automatica) - Milano, Identification and control of pressurized plants (1986, duration 1 year);
- ENEL CRA (Centro Ricerca in Automatica) - Milano, Algorithms of parametric identification, time series analysis and stochastic simulation (1986, duration 6 months);
- PIRELLI Coordinamento Pneumatici - Milano, Identification of models for the description of vehicles dynamics (1984, duration 10 months);