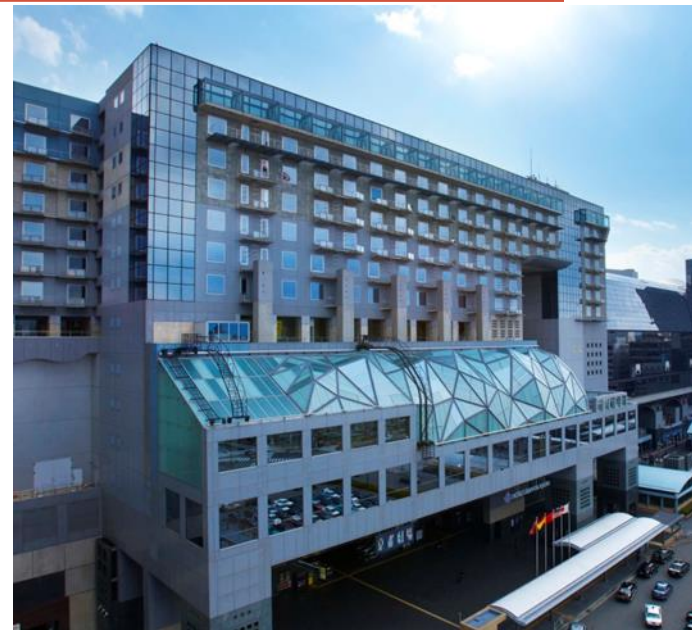


The 50th Anniversary of ISCIE International Symposium on Stochastic Systems
Theory and Its Applications

A HISTORY OF SSS 1968-2018

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Preliminary

JAACE:=The Japan Association of Automatic Control Engineers,1957

ISCIE:=The Institute of Systems, Control and Information Engineers,1988

Year	Name of SSS
1968	The 1 st Symposium on Stochastic Control Theory* 第1回 統計学的制御理論シンポジウム
1975	The 7 th Symposium on Stochastic Systems Theory and Its Applications 第7回 確率システムシンポジウム
1985	The 17 th JAACE Symposium on Stochastic Systems Theory and Its Applications
1988	The 20 th ISCIE Symposium on Stochastic Systems Theory and Its Applications
1995	The 27 th ISCIE International Symposium on Stochastic Systems Theory and Its Applications

* From the English title of Special Issue of the JAACE Journal: Control Engineering, vol.13, no. 8, 1969

PART 1

A prehistory of SSS: 1950s - 1960s

- Conference on Automatic Control, Cranfield, UK, 1951
- Frequency Response Symposium, New York, 1953
- International Conference on Automatic Control, Heidelberg, 1956
- The 1st IFAC World Congress, Moscow, 1960



1956: Heidelberg

- In 1956, the International Conference on Automatic Control was held in Heidelberg, Germany. Prof. Sawaragi presented a paper on the statistical linearization technique to analyze nonlinear control systems*.
- In Heidelberg, a group of people proposed to establish the International Federation of Automatic Control (IFAC).
- The constitution of IFAC was approved next year in Paris, so the IFAC started in 1957; its aim was to promote the science and technology of automatic control.

* Y. Sawaragi and S. Takahashi, Response of control systems containing zero-memory nonlinearity to sinusoidal and Gaussian inputs, *Proc. Int. Conference on Automatic Control*, Heidelberg, 1956, pp. 271–274.

Automatic Control in Japan

- In 1957, the Japan Association of Automatic Control Engineers, JAACE, was established in Kyoto.
- In 1957, the National Committee of Automatic Control was established in the Science Council of Japan (日本学術会議).
- In 1958, the 1st Joint Automatic Control Conference, Japan (自動制御連合講演会) was held in Osaka.
 - 4 plenary papers and over 100 contributed papers were presented in the areas of **control theory, components, and industrial applications.**

IFAC World Congress Moscow 1960

- In 1960, the 1st IFAC World Congress was held in Moscow.
- Many international figures attended the Congress; Wiener, Bellman, Kalman, Trapeznikov, Zypkin, Letov (the IFAC President), etc.
- # papers accepted: 286; # participants: 1200
- From Japan: 18 papers were accepted; but 9 delegates, including Prof. Sawaragi, attended the Congress.
- It was not easy to attend conferences abroad in early 1960s.

IFAC World Congress Moscow 1960



First International Congress of IFAC for Automatic Control Moscow 1960
первый международный конгресс ИФАК по автоматическому управлению Москва 1960

(Gyroscope & Navigation,
Stepanov,
2011)

Statistical studies at Kyoto Univ

- In 1950s, a big project in the Laboratory of Prof. Sawaragi was the statistical studies on nonlinear control systems based on the equivalent linearization technique. In 1962, research results were published as a book*.
- After this publication, Prof. Sawaragi organized the US-Japan Joint Seminars on Stochastic Systems.
 - 1st US-Japan Joint Seminar, Tokyo, 1966
 - 2nd US-Japan Joint Seminar, Washington, D.C., 1968
 - 3rd US-Japan Joint Seminar, Kyoto, 1971

* Y. Sawaragi, N. Sugai and Y. Sunahara, *Statistical Studies on Nonlinear Control Systems*, Nippon Printing & Publishing Co., Osaka, 1962.



1966-1968

- In January 1966, Prof. Sunahara visited the US and stayed at the Lefschetz control group, Brown University.
- He met Kushner, Wonham, etc., and probably witnessed many new trends in control theory, including Lyapunov theory and the Ito stochastic differential equation, etc.
- He returned to Kyoto in August 1967 from the US, and became full Professor of Kyoto Institute of Technology, April 1968.

Start of SSS

- The SSS was proposed by Prof. Sawaragi, the chair of the planning committee of JAACE*.
- The committee asked Prof. Sunahara to organize the Symposium; the SSS was launched in 1968.
- Prof. Sunahara was Chair of the Organizing Committee of SSS until 1994. He made a great contribution to the SSS. In fact, he decided the format of Symposium: Abstracts, Proceedings, Presentation in English, etc.
- The leadership of Prof. Sawaragi and the hard work of Prof. Sunahara brought the success of SSS today.

* JAACE Journal: Control Engineering, vol.13, no.8, pp.501-502,1969

PART 2

- 1968-1978: the 1st decade
- 1979-1988: the 2nd decade
- 1989-1998: the 3rd decade
- 1999-2008: the 4th decade
- 2009-2018: the 5th decade

1968-1978: The 1st decade

	Year	City, Place	Papers	Special Lectures	
1	1968	Kyoto, Rakuyu Kaikan	28/85	Y. Sunahara	2-day
2	1970	Kyoto	30/83		3-day
3	1971	Kyoto	23/90		
4	1972	Kyoto	26/91		
5	1973	Kyoto	33/123		
6	1974	Kyoto	24/88	T. Nishimura	
7	1975	Kyoto	41/105	- Name change	
8	1976	Kyoto	29/79		
9	1977	Kyoto	38/93		
10	1978	Kyoto, Holiday Inn	50/96	F. Kozin, K. Ito	

1968-1978

- In 1968, at the first SSS, Prof. Sunahara gave an overview of the 2nd US-Japan Joint Seminar in Applied Stochastics, Washington, DC, 1968.
- In 1974, Prof. Nishimura gave a special lecture on Kalman filtering in space science at JPL.
- In 1975, the name of SSS was changed to the Symposium on Stochastic Systems Theory and Its Applications.
- **In 1978, the 10th Anniversary** was held at Holiday-Inn.
 - Special lectures:
 1. F. Kozin, Stochastic differential equations: Present knowledge and future problems
 2. K. Ito, On the Stratonovich integral

1979-1988: The 2nd decade

	Year	City, Place	Papers	Special Lectures	
11	1979	Tokyo, Fujitsu	48/95	T. Kitagawa, Y. Takahashi	3-day
12	1980	Kanazawa Inst Tech	51/82	S. Ueno	
13	1981	Kyoto Inst Tech	34/79	F. Kozin	
14	1982	Kobe, KICC	37/75		
15	1983	Kyoto Seminar House	44/76		
16	1984	Hamamatsu, Murakushi-so	40/64		
17	1985	Kansai Seminar House	53/75	- International symposium	
18	1986	Tokyo, Mita Press	68/()	- 2 parallel tracks, Posters	
19	1987	Fukuoka, Kyushu Univ	38/71		
20	1988	Osaka, Mita Press	56/86	J. Balas, F. Kozin	

1979-1988

- In 1985, by the effort of Prof. Sunahara, the SSS became an International Symposium, so presentation in English was recommended. This fact was also stimulated by the Kyoto IFAC World Congress in 1981.
- In 1986, the SSS became a 3-day meeting with 2 parallel tracks. Posters session also started this year; it continued until 1992.
- **SSS1988 - the 20th Anniversary** was held in, Osaka.
 - Special lectures
 1. J. Balas, Nonlinear filtering, asymptotics, large deviations and observer for nonlinear systems
 2. F. Kozin, Statistical linearization and parameter estimation

1989-1998: The 3rd decade

	Year	City, Place	Papers	Special Lectures	
21	1989	Tokyo, Fujitsu	49/65		3-day
22	1990	Hiroshima, Information Plaza	40/71	J. Weizenbaum	
23	1991	Osaka, Mita Press	48/64		
24	1992	Kyoto, Suekawa Memorial Hall Ritsumeikan Univ	56/67		
25	1993	Osaka, Mita Press	41/47/73	G. P. Rao - Proceedings	
26	1994	Osaka, Mita Press	32/36/61		S
27	1995	Beppu, B-Con Plaza	42		A
28	1996	Kyoto, Suekawa Memorial Hall	27		
29	1997	Tokyo, Waseda Univ	50	G. Kitagawa	N
30	1998	Kyoto, Kyodai Kaikan	44/48/78	K. Nishiguchi G. Giannakis, P.Stoica	

1993 Proceedings

- **The 1993 Proceedings was published in 1994.**

(Preface by Prof. Sunahara) - Organization of the Symposium was motivated by the fact that there has been a great upsurge in research activities in the field of Stochastic Control Theory – both among mathematicians and engineers. Since the first Symposium, a quarter century has passed and the SSS in 1993 constitutes the 25th International Symposium. For this occasion, publication of the proceedings of the symposium has been inaugurated.

- It goes without saying that the principal objective of the SSS is to bring together groups of the researchers and provide a forum for presentations and discussions on the recent advances in stochastic control theory and application in various fields of estimation, control, identification, stochastic system analysis, etc. with particular emphasis on the coupling of theory and application techniques.

1994

- Prof. Sunahara passed away August 1994, after returning from the IFAC SYSID 94, Denmark, July 4-6, 1994. He was supposed to be Chair of SYSID 1997 in Fukuoka.
- The future organization and steering of the SSS were discussed; and Profs. Sagara, Akizuki and Nakamizo should take over the role of late Prof. Sunahara.
 - Chair is not fixed, and the local organizer will be nominated for each future Symposium.
- The 26th SSS1994 was held at the Mita Press, Osaka.
 - Chair of organizing committee: Prof. Sagara
 - Chair of local organizing committee: Prof. Sugimoto

1998 The 30th Anniversary

- **The 30th Anniversary** was held at Kyodai Kaikan.
- We set up **Sunahara Memorial Lecture** to commemorate the contribution of Prof. Sunahara. The memorial lecture continued until 2009.
- **Special Lecture**
 - K. Nishiguchi, Large deviation theory and its application to nonlinear filtering
- **Memorial Lectures**
 - P. Stoica, Spectral estimation and radar imaging
 - G. Giannakis, Cyclostationary signal analysis

1999-2008: The 4th decade

	Year	City, Place	Papers	Special Lectures	
31	1999	Yokohama, Keio Univ	58	A. Nehorai	2-day
32	2000	Tottori, Hotel Monarque	50/59/84	S. Bittanti	
33	2001	Ashikaga Inst Tech	48	M. Bremer	K
34	2002	Fukuoka, Papillon-24	44	A. H. Sayed	
35	2003	Ube, Yamaguchi Univ	52/56	T. Katayama	
36	2004	Hatoyama, Tokyo Denki Univ	61	C. F. Martin, G. Picci	
37	2005	Ibaraki, Otemon Gakuin Univ	45/47/98	H. Takayasu, G. Peskir	
38	2006	Suwa, Hananoi Hotel	33/40/67	S. Kondo	
39	2007	Saga, Saga Univ	40/51/80	O. Bai, Y. Ikegami	
40	2008	Kyoto, Kyodai Kaikan	62/66/119	J. Oommen, B. K. Ghosh	

1999-2008

- In 1999, the 3-day meeting was changed to 2-day meeting.
- In May 2006, the SSS organized a special session for the 50th Anniversary of the ISCIE at SCI-06. The memorial documents were compiled by Prof. Sugimoto.
- In 2008, the 40th Anniversary was held at Kyodai Kaikan.
- Sunahara Memorial Lectures
 - J. Oommen, On the differences between discretized and continuous stochastic systems as demonstrated by learning automata
 - B. K. Ghosh, Modeling problems in animal vision and gaze control
- Some of the senior members were invited for the 40th Anniversary. See Photo.



SSS 2008 40th Anniversary

2009-2018: The 5th decade

	Year	City, Place	Papers	Special Lectures	
41	2009	Kobe, Konan Univ	52/61/111	A. Isaksson	2-day
42	2010	Okayama Univ of Science	44/48/82	H. Kunita	
43	2011	Biwa Lake & Ritsumeikan Univ	61/69/101	H. T. Banks, F. Kappel	
44	2012	Tokyo, Kokushikan Univ	51/61/84	T. Katayama, S. Sugimoto	S
45	2013	Okinawa, Ryukyus Univ	63/78/128	M. Yamazato	
46	2014	Kyoto Inst Tech	39/53	A. Ohsumi	
47	2015	Honolulu, Waikiki Marriott	53/86	B. K. Ghosh	
48	2016	Fukuoka Inst Tech	34/52/72	M. Nagahara	
49	2017	Hiroshima Inst Tech	32/47/70	T. Moriya	
50	2018	Kyoto, Hotel Granvia			

**THE 45TH ISCIE INTERNATIONAL SYMPOSIUM
ON
STOCHASTIC SYSTEMS THEORY AND ITS APPLICATIONS**



PART 3

Scope of IFAC TC on Stochastic Systems

Concluding Remarks

IFAC TC1.4 Stochastic Systems

- (Scope of Stochastic Systems, 2018) TC focuses on **statistical** and **probabilistic** methods in modelling, analysis, estimation, identification, decision, control, etc.
- **Stochastic systems arise in various disciplines within engineering and science, such as control, communications and networks, signal processing, biology and finance.**
- Some key applications include communication system design for both wired and wireless systems, gene sequencing and analysis, and biological system modelling, financial data modelling and forecasting, econometrics, environmental modelling and forecasting, and many others.
(IFAC webpage)

Probabilistic/Statistical Methods

Probabilistic methods	Statistical methods
Forward problems	Inverse problems
Model \oplus Probability space \rightarrow Theorems	Model \oplus Data \rightarrow Model estimation or validation
Deductive reasoning	Inductive reasoning
Premise is true \rightarrow Conclusion is always true	Premise is true \rightarrow Conclusion is not always true
Information does not increase	Information increases

The statistical method solves inverse problems, while the probabilistic method deals with forward problems, starting with a model together with a probability space, and derives useful theorems. Both probabilistic and statistical methods are needed for analyzing, modeling, and designing stochastic systems. It is important to recognize “stochastic” includes both “probabilistic” and “statistical”.

Conclusions

- For the past 50 years, we have got together to discuss new problems and exchange information about stochastic systems theory and applications. I believe that to meet new colleagues and to exchange ideas will promote future research activities and the cooperation between researchers in our areas.
- In the coming age, our life will heavily be influenced by new technologies, including big data sciences and AI. So is our SSS. I hope that the future of the SSS is successful, especially by the intelligence and efforts of young people.

Sources of Information

1	JAACE Journal: Control Engineering (1957-1970), Activity Reports
2	JAACE Journal: Systems and Control (1971-1987)
3	ISCIE Journal: Control/Systems/Information (1988 -)
4	Memorial Documents for the SSS Special Session at SCI-06 (2006)
5	Ambitious ISCIE: 50-Year History for 1957-2006, Booklet for the ISCIE 50 th Anniversary (2006)
6	SSS webpage - http://sci-sss.org/
7	IFAC webpage - https://www.ifac-control.org/about/history https://tc.ifac-control.org/1/4
8	R. Oldenburger, American Automatic Control Council, IRE Trans. Vol. AC-4, No. 1, pp. 5-7 (1959)

Note: A related article will appear in the ISCIE Journal, January 2020.



Kiyomizu-dera



Lake Biwa & Mt Hiei

Enjoy your stay
Thank you



Rakuyu Kaikan

Enryaku-ji

Ginkaku-ji

