

Message from the Interim President - John Burchell

Dear valued members,

I sincerely hope that you and your families are healthy and remain so. As I'm writing this, cases of new Covid-19 infections in South-Africa remain worryingly high. Allow me to appeal to you all to remain vigilant, apply social distancing, to wear a mask in public, and to wash your hands regularly. These measures have proven crucial in quelling the curves in many other countries.

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Cont...

I would like to draw your attention to the contributions made by our control systems community towards fighting this pandemic. A number of studies are hosted on IFAC's hub for control system related research on Covid-19: the Corona Control Community Project (C3P) website. There you will find resources for modelling and predicting the development of the pandemic, and a number of simulation studies that compare the effectiveness of different lockdown strategies.

Groups contributing to this hub are developing and sharing valuable insights that assist governments in their response to the pandemic. Is it not remarkable how far reaching the contributions of control systems theory can be? It must be noted, that domain knowledge is always of key import and that these groups are of course collaborating with infectious disease specialists.

It is my first time addressing you in our newsletter, and you may well ask what happened to Alfred Schroder? Well, Alfred and his family have recently relocated to the Netherlands, and is unfortunately unable to continue in his role as president of the SACAC. The executive committee has co-opted me into the acting president role for the remainder of the year. I thank the executive committee for placing their trust in me, and would also like to thank Alfred for his contributions and leadership over the past one and a half years, and wish him all the best with the new chapter.

Alfred was very hands-on, personally championing a number of initiatives, and also encouraging participation from all. During his term the SACAC has initiated workshops on Functional Design Specification and Alarm Management, and has pursued programs to expose high school students to automation and control. Alfred also led the organisation during our hosting of the 18th IFAC Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing (MMM2019), which on all accounts was a great success.

Our efforts have been somewhat hampered by the pandemic and we had to review our workshop programme for the remainder of the year. We are still committed to delivering the majority of our planned workshops via remote conferencing. So, keep an eye on our website, and LinkedIn page for more information on upcoming events. I'm sure that you may have some ideas of your own on how we as an organisation can better serve our members and impact the automation and control community in South Africa. Please don't hesitate to contact me directly in this regard.

May I once more wish you good health, and thank you for your continued support and interest in our organisation.

John Burchell

SACAC Interim President

Past SACAC events

SACAC AGM and Annual Luncheon - February 2020

On 21 February 2020 SACAC welcomed its members to its 59th Annual General Meeting. The meeting was hosted for the fifth time in a row at the exquisite Forum Homini Hotel in the Cradle of Humankind. The AGM confirmed SACAC's strong position to pursue the promotion of automation and control for the benefit of the people of South Africa.

The President at that time, Alfred Schroder, highlighted in his report the dire state industry finds itself. Because of the growing economic uncertainty and continued lack of reliable energy supply, users and suppliers of automation products face hard times. He reminded the members that in difficult times when engineers are called upon to innovate, they should never hesitate to automate! SACAC aims to play an active role to re-ignite growth in the economy of South Africa through control and automation. The Treasurer's report showed that SACAC is fortunate to be in a very healthy financial position. There is sufficient capital available for SACAC to pursue its mandate by hosting international conferences, presenting workshops, and sponsoring members to attend local and global events.

SACAC presented numerous successful events in 2019, of which the international Symposium on Control, Optimization and Automation in Mining, Minerals and Metal Processing in Stellenbosch was a highlight. Researchers and practitioners from across the globe attended this prestigious and highly successful event. The papers presented at the symposium can be viewed free of charge at IFAC PapersOnline.

The Executive Committee elected for 2020 consists of:

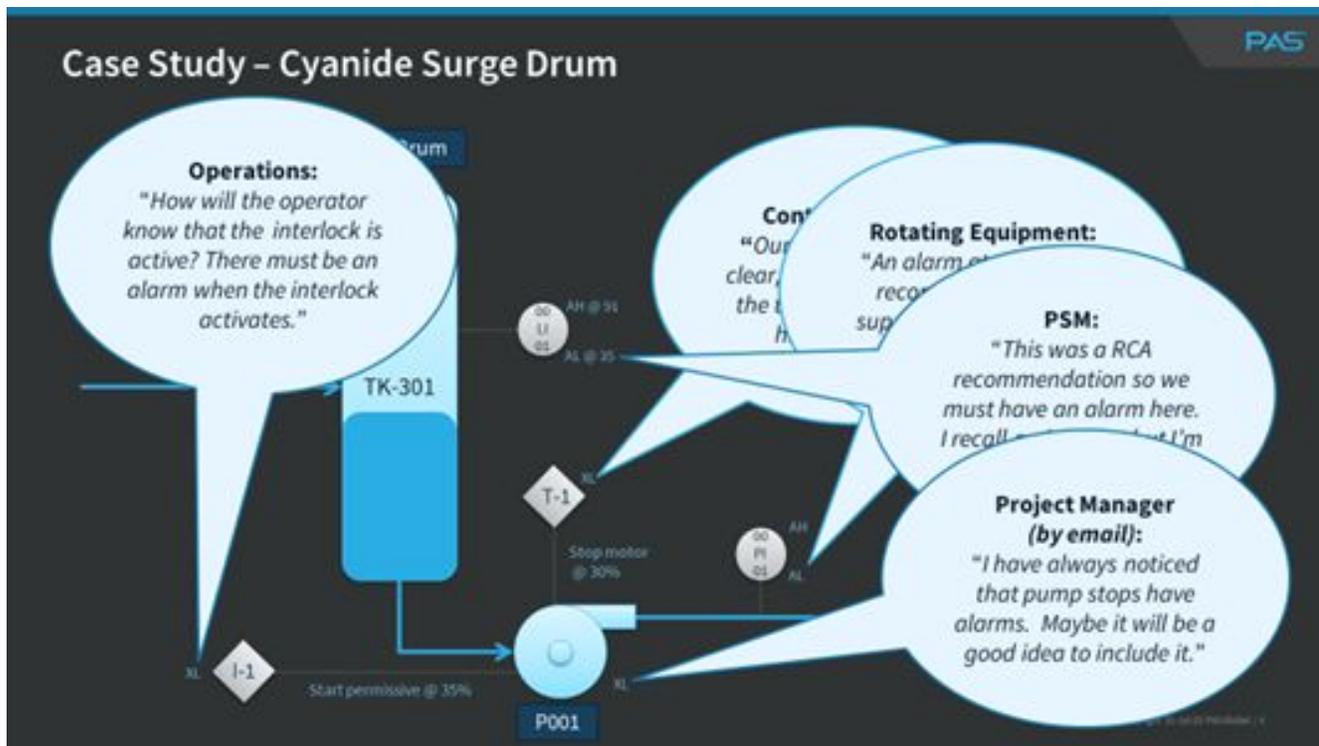
- Alfred Schroder (President) (previously with Aurecon)
- John Burchell (Vice-President) (Sibanye-Stillwater)
- Derik le Roux (Honorary Treasurer and Secretary) (UP)
- Lidia Auret (Stone Three)
- Dean Redelinghuys (Optimum)
- Loutjie Coetzee (Mintek)
- Merinda Westcott (BluESP)
- Kenny Uren (NWU)
- Murray Bwalya (Wits)
- Antony Higginson (Wits)
- Robyn Verrinder (UCT)



At the conclusion of the AGM, attendees were treated to a presentation by the Managing Director (SA) from the Bloodhound Land Speed Record project, Mr Altus van Heerden. Although the project has its origin in England, the speed record will be attempted at the very remote Hakspeenpan in Northern Cape, South Africa. Mr Van Heerden showed how simulation and modelling tools were used by engineers to optimize the performance of the car. Numerous successful tests were already conducted in the past few years at Hakskeenpan. Although the COVID19 pandemic has put the project on hold, the plan is to go for the record on their next visit to Hakskeenpan. Speed-junkies are encouraged to book accommodation well in advance should they want to see the Bloodhound SSC car attempt the land speed record.

The AGM showed that SACAC is in good standing and in good hands. A special word of thanks is extended to all the members of SACAC for their continued support and to the EXCO for their excellent service to the automation community.

Practical Guide to the Management of “Bad Actor” Alarms - Evening Online Seminar Presented by Nirmal Narotam of PAS - August 2020



In this online event, Nirmal gave a practical and insightful discussion of the role of bad actors in alarm systems and how to reduce the number of such alarms. He stressed that this is not a software issue but rather an area that requires collaboration between several engineering disciplines, including process engineering, control systems, safety and risk operations and instrumentation.

We were particularly impressed by the use of a simple dynamic simulation to illustrate how not to build an alarm system.

This event was the first time that SACAC has dipped its toes in the muddy waters of online webinars. To our great relief, all went well and the evening was extremely successful. Some 55 people registered for the event and 30 people logged in for it. A recording of the presentation will be posted. We have purchased the Webex platform, which worked well, and which we will use in future events of the same nature.

If you would like to give a webinar on your favourite topic please let us know at secretariat@sacac.org.za . Please visit our website www.sacac.org.za to get details of our upcoming workshops.

Kevin Brooks
EXCO member

Future SACAC events

SACAC Begins Preparations for Control Conference Africa December 2021

The Control Conference Africa (CCA) 2017 was a conference hosted by the South African Council for Automation and Control (SACAC) to promote the exchange of ideas and developments in control engineering in Africa. Following the enormous Control Conference Africa (CCA) 2017, SACAC has begun preparations for a follow-up conference in 2021. The proposed venue is the Maropeng Conferencing Centre at the Cradle of Humankind. This impressive site includes an official visitor centre and the Sterkfontein caves.



Proposed dates are the 7th and 8th December 2021. SACAC usually takes the opportunity to arrange a workshop on the Monday before the conference – suggestions for a workshop topic are very welcome.

Events like these require good organization. Two bodies are formed – the local organising committee (LOC) and the International Programme Committee (IPC). The IPC has the important role of ensuring the quality of the papers presented at the conference. We are very pleased to announce that Professor Eric Kerrigan has agreed to chair the IPC. Eric did his first degree at UCT and his PhD at Cambridge and is currently an Associate Professor in control engineering and optimization at Imperial College London. The IPC co-chair will be Derik le Roux, current SACAC treasurer, who is very experienced with IFAC and the Papercept system used for the reviewing. The position of IPC Vice-chair for industry is currently vacant. Some 17 experienced professionals have agreed to serve on the IPC. IFAC approval has not yet been obtained for the event, as there are some items on the application form that remain to be finalized.



The LOC is chaired by Dr Kevin Brooks, who was co-chair of the IFAC MMM 2019 conference recently held in Stellenbosch. The co-chair will be Professor Sayed Hassen of the University of Mauritius; Sayed obtained his BEng (Hons) and MSc from Monash and his PhD from the University of New South Wales and has been with the University of Mauritius for eight years. An important role in the LOC that has not yet been filled is Vice-chair from Industry. Volunteers are welcome – the role forms the interface between the conference, including sponsorship, requests for papers and industrial plenaries.

We look forward to yet another great conference organized by SACAC reflecting the African voice in control.

Kevin Brooks
CCA Committee

Annual Hackathon And Control Systems Day 2021

It is almost 2 years since the last hosting of the control and Hackathon challenge. This was last organised at Stellenbosch in October 2018. A sub committee of four Exco members (Murray Bwalya, Antony Higginson, Derik Le Roux and John Burchell) is now vigorously pursuing the hosting of this event at the earliest possible date. The committee considered hosting the control day early next year as a physical meeting, subject to how the Corona pandemic pans out.

The Hackathon date was slated for a later date in 2021. However, after further deliberations with the rest of the SACAC EXCO, plans have been revised to get to grips with the available online facilities and allow this programme to run online. The sub-committee will be meeting in the first week of August to consider another date in the light of these new directives.

Murray Bwalya
EXCO member

Please visit the SACAC [website](#) for more information on these exciting free evening talks.

Industrial Innovation Funding - October 2021

Entrepreneurial innovation drives business creation and corporate innovation strengthens existing business. South Africa has identified innovation as crucial for job creation, and to enhance the global competitiveness of its businesses.

The SACAC in collaboration with Cova Advisory will host a webinar on the government incentives that encourage innovation through research and development (R&D). These incentives include the following:

- The support program for industrial innovation (SPII) managed by the Industrial Development Corporation
- A tax deduction allowance as stipulated by Section 11D of the Income Tax Act
- The partners in industrial innovation (PII) fund, managed by the Department of Trade and Industry (DTI)
- The Technology and Human Resources for Industry Programme (THRIP), managed by the DTI and the National Research Foundation

The webinar will discuss the conditions that determine whether or not an R&D projects qualifies for an incentive. Some examples will be presented of recent projects that benefited from these incentives. There will also be an opportunity for the audience to engage specialists who assist companies and entrepreneurs through the process of applying for these incentives.

A preliminary date is set for the 1st of October 2020. We will post more information on our website and LinkedIn page shortly.



Hope to see you there!

For more information visit our website <https://sacac.org.za/pages-2/benefits-control/> .

Available On Request

SACAC continues to strive to present value to its members, and the following events are available on request:

- Observer Design Course
- Functional Specification Documentation
- Modern techniques for process control

If you would like to arrange a webinar on any of the above topics please let us know at secretariat@sacac.org.za . Please visit our website www.sacac.org.za to get details of our upcoming workshops.

SPONSORSHIPS AWARDED IFAC World Congress 2020

The following sponsorships were awarded for attendance at the IFAC World Congress 2020. All of the sponsorship recipients provided valuable feedback following the successful, virtual, World Congress. Read a little about their experiences below.

1. Kevin Brooks, BluEsp
2. Ralf Kusel, Sasol
3. Sibabalo Noludwe, University Cape Town
4. Wimpie West, Sasol
5. Johandri Vosloo, North West University
6. Erick Arwa, University Cape Town
7. Milka Madahana, University Witwatersrand
8. Sarita Greyling, North West University

"What a privilege it has been to take part in the first virtual IFAC world congress! I have to commend the organisers for such a positive response to the COVID epidemic. With just a little bit of imagination I got carried away to a world class stage featuring some of industry's brightest minds after logging into the virtual lobby. I found the platform easy to use and it definitely managed to get me excited, even though I was sitting in my living room and not in Germany as originally planned."

"I appreciated the fact that many experts emphasised the importance of traditional model-based control techniques and shared their research on how reinforced learning can be used to supplement model-based controllers (rather than replacing them) in regions of plant uncertainty. It is true that most plants do not have the luxury of allowing a machine learning algorithm to explore the limits of stability during the training phase, which is a challenge commonly faced by these research efforts."

"The highlight of the week for me was Professor Maarten Steinbuch's semi-plenary titled Pushing the Limits of Performance. His enthusiasm and passion is contagious, and he managed to open my mind to see what control engineering entails beyond a world of process control. From robots playing soccer to robot arms that enable surgeons to perform medical procedures with ultra-precision, this session was enough to make any aspiring researcher fall in love with control engineering!"

"I would like to thank SACAC for giving me the opportunity to attend the conference. It has certainly enriched my career as a researcher and control engineer. Congratulations to IFAC for hosting a successful conference!"

"Fortunately, I can say that the conference organisers took great effort to make it a very "real" virtual experience. From the attractive lobby scenery you are greeted with when entering the virtual congress hall, to the rooms you can enter to watch the current speaker or visit a booth of one of the many conference sponsors; the organisers' hard work and effort can be seen."

"The opening and closing ceremonies feature a composite of the IFAC control orchestra where each musician played their respective parts separately. A "Control-and-the-Universe" online quiz was hosted amongst the participants to simulate social interactions and from the virtual congress hall, fellow participants could be introduced through online profiles. With regards to the technical and academic contributions, various plenary and semi-plenary sessions could be watched live which included a presentation from the speaker followed by a panel discussion, thankfully if for some reason a session could not be watched live,

the presentation and panel discussion was made available for streaming at a later stage. This was particularly helpful for me since internet speeds and quality sometimes hindered the virtual experience. "

"Although no virtual experience can compare to a real conference interaction, I felt that my overall experience of the virtual IFAC world congress was extremely positive, which I feel can be directly associated with how well the virtual conference was organised and executed."

"The Virtual IFAC 2020 World Congress was the best of the virtual conferences I attended this year. The online portal was very user friendly, the conference organizers were quite supportive, and the virtual platform was robust."

"I learnt new ideas on reinforcement learning such as multiagent off-policy actor-critic algorithm that promises better scalability and convergence. Conventional actor-critic algorithms are on-policy methods. Thus, their scalability and convergence are limited. What I observed about the topic of AI in power systems is that dynamic stochastic control of power systems is still an existential challenge. Although most AI presentations were not on power systems which is my area of interest. I was keenly following this topic to see how the techniques could be transferred to power systems control."

"I got the much-needed challenge, global exposure and insights on research. I am deeply grateful to SACAC for sponsoring me to attend the Congress."

"Overall, I enjoyed the virtual congress, thanks to the organizers for the great work."

"I would like to extend my heartfelt gratitude to SACAC for sponsoring me to attend the IFAC virtual world congress. It would have been great to interact with the delegates in person but I still was able to learn and extend my knowledge through the virtual conference."

"My overall experience was a positive one. The conference was well-organised, structured and very interesting. Every login and accessing of the contributions, live tracks and exhibitions were sophisticated. One could access more sessions and information than would be possible in person."

"Thanks to a SACAC sponsorship, as well as permission from my company BluESP, I was lucky enough to attend the IFAC World Congress held in Berlin. This event was exceptional in that the organisers had a mere ten weeks to put a virtual congress together, having previously been hopeful of being able to hold the "normal" conference we are used to. The event had nearly 40 hours of live events, including the opening and closing ceremonies, plenaries, semi-plenaries, industrial keynotes, awards, tutorials, competitions, demonstrators and panel discussions. Some 3,000 papers were available in 250 virtual sessions. The lobby of the virtual congress hall will be open until 31st August; this means that one can download the recordings of presentations until then."



“Control engineering and the modern world”, was the theme that, to me, most epitomized the IFAC 2020 World Congress. This theme was perhaps most prominently portrayed with the virtual nature in which the congress took place due to the 2019 novel coronavirus. Many of us are currently forced to work remotely to ensure the health and safety of colleagues and friends, and the adaptation of the congress by its organizers to meet this challenge is a demonstration of the adaptability of the control community to rising challenges.

“My personal highlights, however, were the presentations regarding machine learning and control. There has been a renewed focus in the last decade on machine learning and the development of artificial intelligence, to the extent that I have heard the comment made: “So when can we rip out the DCS and use this new AI system?” This was horrifying to me, but I did not have an academic proof as to why this was such a bad idea. But in this conference, this gap was finally answered for me.”

“My conclusion is: do not rip out your PLC or DCS systems, control engineering is still at the heart of the future for autonomous systems!”

IFAC News



The Use of a Semi-Rigorous SAG Mill Model for a Hands-On Workshop

Margret Bauer¹, Kevin Brooks², John Burchell³,
Loutjie Coetzee⁴, Derik le Roux¹, John McCoy⁵,
Jason Miskin⁶, Danielle Winter⁶

¹Department of Electrical, Electronic and Computer Engineering, University of Pretoria, Pretoria

²Department of Chemical and Metallurgical Engineering, University of the Witwatersrand Johannesburg

³Sibanye-Stillwater, Johannesburg

⁴Mintek, Johannesburg

⁵Stone Three Digital, Somerset West

⁶Opti-Num Solutions, Johannesburg

All in South Africa



Figure 2 Eight authors, six affiliations!

IFAC Industry Committee Update - The Use of a Semi-Rigorous SAG Mill Model For a Hands-On Workshop

This was obviously the best paper in the session, but the papers on “A Steady-State Model of the High-Pressure Grinding Rolls” and “A Survey on the Status of Industrial Flotation Control” were also very interesting. Several papers in the session employed artificial intelligence or machine learning techniques. Surely these techniques will become more and more important in the MMM area. For a review of this field I can recommend this paper:

McCoy, J. T., & Auret, L. (2019). Machine learning applications in minerals processing: A review. *Minerals Engineering*, 132, 95-109.



My other main area of interest is the use of historical data for dynamic modelling. Yuri Shardt, Xu Yang, Andrey Torgashov and I arranged a session on “Data-Driven Process Monitoring and Control For Complex Industrial Systems”. This open invited track had thirteen contributions, including a review article by the session organisers entitled “Data Quality Assessment for System Identification in the Age of Big Data and Industry 4.0”. The papers in this session were of great interest to me with “Sensor Fault Detection for Salient PMSM Based on Parity-Space Residual Generation and Robust Exact Differentiation” being a highlight.

Figure 3 Robocup

Towards a 4th generation University....

	3 rd Generation	4 th Generation
Objective	Education, research & know-how exploitation	Education, open innovation (research)
Role	Creating value	Enabling value creation
Method	Inter-disciplinary science	Multi-actor innovation
Human capital development	Professionals, scientists & entrepreneurs	Professionals, scientists entrepreneurs, artists, customers, ecosystem participants
Orientation	Global	Ecosystem
Language	English	English
Organization	Institutes & centers	Innovation spaces
Management	Professional management	Disruptors

The plenaries and semi-plenaries were of high quality. Jay Lee spoke on “Reinforcement Learning for Process Control and Beyond”. I had attended a workshop on the Saturday before the congress that discussed this field so Professor Lee’s talk was of particular interest. Maarten Steinbuch spoke on “Pushing the Limits of Performance” and he had cool robots so couldn’t go wrong.

Professor Steinbuch has an interesting take on where universities should be going – food for thought.

Was IFAC 2020 a conference? Not really – the fact that people were not in the same space made the confer aspect difficult. Was it a successful virtual event? Very much so and the photo mosaic below has 220 happy attendees.

The IFAC-CSS Corona Control Community Project

IFAC has partnered with IEEE CSS to create a resource for members of the control community to work and collaborate on Coronavirus/Covid-19 issues. To quote IFAC President Frank Allgöwer: “The envisioned idea of such an interactive website is to provide a hub for information exchange, to share ideas and to find potential collaboration partners.” Check out the resources available at: <https://covid.ifac-control.org>



CALENDAR OF IFAC EVENTS

[IFAC Events - Read more](#)

New IFAC Executive Structure

Many constitutional changes were adopted by the IFAC General Assembly in recent months. These changes are aimed at giving effect to the New IFAC Executive Structure that were detailed in the IFAC President's letter to National Member Organizations dated 22 May 2020. These main changes are:

- Introducing one additional Vice-president and one additional Board by separating Technical Activities and Conferences.
- Publications shall have a more important and visible position with a Vice-president and a Board.
- All Executive Committees report directly to the Officers and the Council (flat hierarchy / no Executive Board).
- A&F Committee will be discontinued and the supervision of the Secretariat will be done directly by the Executive Officers and Council.

As an example of the impact of these changes, the Publications Committee that I chaired has been replaced by a Publications Board which is now chaired by a Vice-President for Publications, Prof. Sarah Spurgeon. The chair of this board is now one of the Executive Officers of IFAC, whereas before the Publications Committee Chair reported to the Executive Board which has now been disbanded. The purpose of this change is to give more prominence to IFAC publications which are responsible for about 60% of IFAC's income.

Individuals with South African connections that hold prominent positions in the new IFAC structure include Chris Aldrich as Chair of the Mining, Metals and Minerals Processing Technical Committee; Margret Bauer as Chair of the new Activities Fund; Kevin Brooks as a prominent member of the Industry Committee; and Derik le Roux as a member of the Publications Board. Derik le Roux also chairs the IFAC database task force.

IFAC Journals

Journal Impact Factors, as published by Clarivate Analytics, are widely used as a journal “quality” indicator, but care should be taken not to use them out of context. The IFAC Journals, published by Elsevier, did particularly well over the last 7 years (see Figure 1).

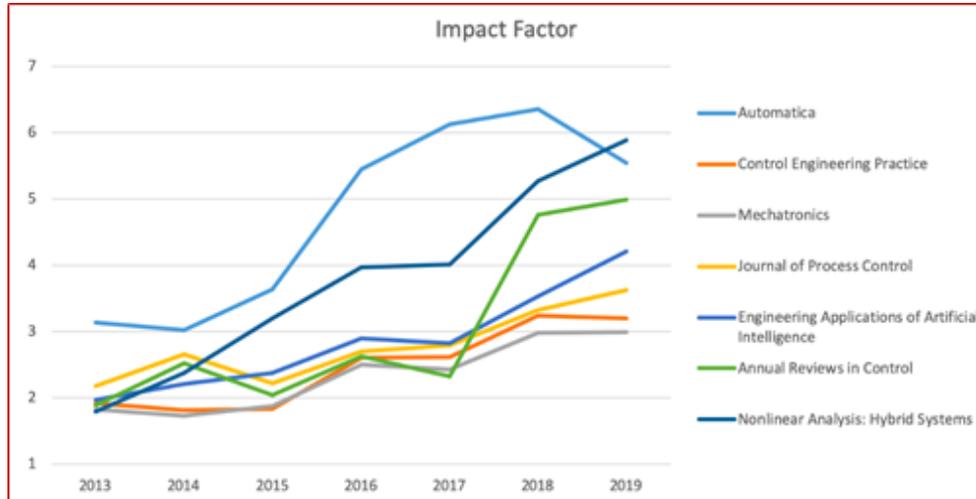


Figure 1: IFAC Journal Impact Factors: 2013-2019

An important publication development is that IFAC PapersOnline is as of 2020 Daimond Open Access under a Creative-Commons license (CC BY-NC-ND 4.0). What it means is that IFAC PapersOnline papers are free to read and no fees have to be paid by readers, authors, or their institutions for these papers to be freely available

(see <https://www.sciencedirect.com/journal/ifac-papersonline>). The costs to make this possible are paid by IFAC.

Future IFAC World Congresses and Presidents

The 22nd IFAC World Congress (see <https://www.ifac2023.org>) will be held in Yokohama, Japan, at which the term of the new IFAC President, Hajime Asama, will come to an end. He will be replaced by Dan Cho of South Korea and the 23rd IFAC World Congress will be held in Busan, South Korea, in 2026. From 2026 onwards the IFAC presidency and the congress location will no longer be tied, i.e. the president does not have to come from the country in which the congress is to be held. This additional degree of freedom will make for some interesting scenarios when it comes to deciding on the congress venues for 2029 and beyond.

Ian Craig
Vice-Chair of the IFAC Publications Board
Chair of the IFAC Foundation Board
IFAC Advisor

Member update

SACAC would like to warmly welcome our new EXCO members, as well as those returning for a second term.



ANTONY HIGGINSON

Antony Higginson is a lecturer in the School of Chemical and Metallurgical Engineering at the university of the Witwatersrand.

After completing his BSc (Eng.) and MSc at Wits, Antony worked in the automation industry before returning to Wits to teach and is currently working on his PhD on the use of model predictive control in fed batch biological fermentations.

His other research interests include the use of machine learning in process modelling. He currently teaches the undergraduate course in process control as well as biochemical engineering at both undergraduate and postgraduate level.

LOUTJIE COETZEE

Loutjie Coetzee is a Chief Process Control Engineer in the Measurement and Control division at Mintek. Loutjie works with mines around the world to improve the efficiency and productivity of concentrators by improved automation in the form of model predictive control. Loutjie believes that more efficient and profitable mines and concentrators grows the economy and uplifts people and provide them with honourable living and believes that process automation plays an important role in making and sustaining this goal. Loutjie had the privilege to work with a local platinum producer in South Africa from close to the mine and to see how the communities around the mine developed as a direct result of the money flowing from the mine to the community. Mining still plays an important role in South Africa in terms of job creation and Loutjie does not believe that process automation goes contrary to job creation, but rather frees humans to do what they do best while computers do what they do best.



Loutjie obtained a PhD in electronic engineering with specialisation in robust nonlinear model predictive control from the University of Pretoria in 2009. Loutjie went on to commercialise the technology at Mintek and in 2012 had the first commercial installation of the robust nonlinear model predictive controller in South Africa. Since then, the controller has continually improved and added real-time optimisation as well as dynamic real-time optimisation.

The controller has also been successfully installed in a number of countries around the world, such as Australia, Chile, Sweden and USA to name a few. Loutjie is proud and privileged to be able to develop such technology locally to benefit South African mines but also to benefit South Africa and our reputation through international sales. It is also a joy to help clients with specific challenges that are further reaching than just process control that leads to building long term relationships and partnerships that are mutually beneficial.

Loutjie currently serves on the executive committee of SACAC on the behalf of Mintek and enjoys participating in the activities of SACAC to further the field of automation and control in South Africa, but also the world through SACACs affiliation with IFAC. Loutjie has also benefited immensely from the local and international conferences and workshops by SACAC and IFAC in developing his knowledge and his career and is especially thankful for all the excellent people that share their time and knowledge selflessly.