

PUTTING THE FOCUS ON THE IIoT



FEATURES//

UNDERPINNING INDUSTRY
WITH MEASUREMENT

BLUETOOTH -
BACK TO THE FUTURE?

SPECIAL INTERVIEW//

PROFESSOR KEN GRATTAN



JULY_2017_ISSUE TWO

PRECISION

MAGAZINE

INNOVATION CALL:

CONTROL SYSTEMS FOR WAVE ENERGY CONVERTERS - SPRING 2017

The Scottish Government-funded organisation, Wave Energy Scotland (WES) has already invested **£15M** in **51** separate collaboration projects. These were funded from its **3** previous technology innovation calls for Power Take Off, Novel Wave Energy Converters and Structural Materials and Manufacturing Processes.

WES opens a call for **Control Systems** on **5th April 2017**. Organisations from sectors such as Robotics, Electrical Engineering, Aerospace, Automotive, Mining, Offshore and Sub-Sea vessel stability & manoeuvring could all make valuable contributions. Up to **100%** of project costs, via a contract for Engineering Design Studies, are available under this call.

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SYSTEMS AND CONTROL FOR THE FUTURE OF HUMANITY

I am delighted to have been invited to provide the preface to this the second edition of Precision, the Institute's new magazine for members.

The publication date coincides with the 20th World Congress of the International Federation of Automatic Control which is taking place in Toulouse, France and will be attended by a worldwide audience from both industry and academia. The usual stimulating technical programme will see the launch of a far-reaching agenda for systems and control which seeks to articulate our essential role in meeting societal grand challenges around energy, healthcare, manufacturing, transport and water.

Requirements for such diverse problem domains can underpin, perhaps surprisingly, the formulation of a number of common innovation challenges. How can we best deploy distributed sensing to develop networked control systems that provide secure and robust operation resilient to failures and malicious intrusions? How should spatially distributed sociotechnical systems with heterogeneous information sources be managed and controlled to maximise overall performance under relevant constraints? How does one control complex systems which exhibit self-organisation, adaptation and/or evolution? The underpinning nature of the specialist skills of the Institute's members is clearly fundamental to all these challenges, as is the need to work in ever increasing inter- and cross-disciplinary teams as predicated by the grand challenges we face.

There are clearly exciting times ahead for our measurement and control community, presenting great opportunities to enthuse and motivate the next generation.

Sarah Spurgeon
OBE, FEng, FInstMC, CEng
President

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PRECISION

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Publications Manager
Danny Henderson
E: publications@instmc.org

Chief Executive
Patrick Finlay PhD CEng
E: ceo@instmc.org

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87 Gower Street, London,
WC1E 6AF
T: 0+ 44 (0) 20 7387 4949
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NEWS

WALKING SPEED MONITOR SEES THROUGH WALLS

WiGait uses wireless signals to continuously measure a person's walking speed. How fast you walk, considered by many to be a decent indicator of health, may predict cognitive decline, falls and cardiac or pulmonary disease.

Typically, walking speed is measured by stopwatches and motion tracking devices that may be bulky and not so accurate, making the measurement of walking speed, both continuously and without interference, almost impossible.

Now, a team from the MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) has been working on a wireless solution to the problem. The "WiGait" is a device that measures walking speed from a fixed point in the user's home. Roughly the size of a small painting, the device has a 95% - 99% rate of accuracy in determining speed as detected by surrounding wireless signals and the reflections off of a person's body. The device can even measure the speed of movement from rooms away. An algorithm created by the team can also distinguish other movements (like cleaning) from walking.

The measurement of walking-speed is also helpful in determining a person's stride length. The device can do this with an accuracy of 85% - 99%, helping researchers to better understand diseases like Parkinson's, cognitive decline and injuries that could result in dangerous falls (all of which are characterized by reduced size in step).



Image credit: Jason Dorfman, MIT CSAIL

"By using in-home sensors, we can see trends in how walking speed changes over longer periods of time," says lead author and Ph.D student Chen-Yu Hsu. "This can provide insight into whether someone should adjust their health regimens, whether that's doing physical therapy or altering their medications."

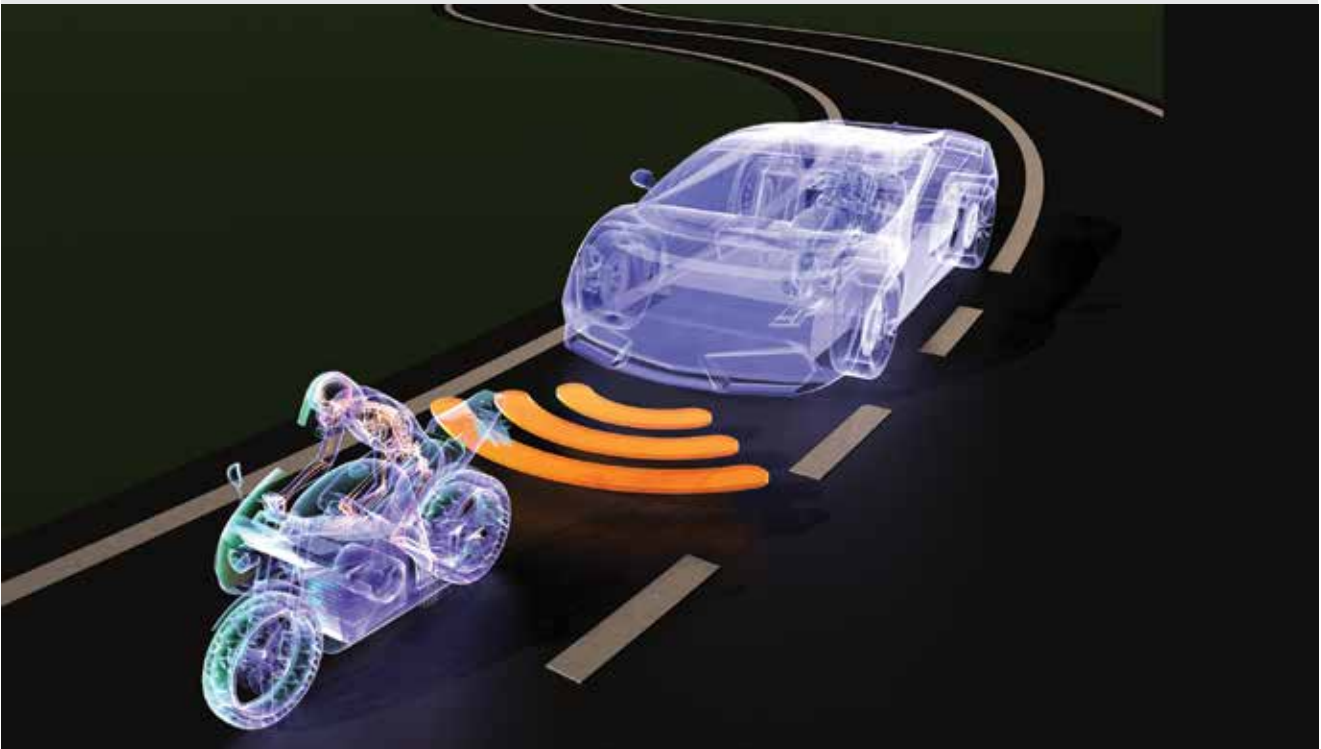
The team will present their paper in May at ACM's CHI Conference on Human Factors in Computing Systems in Colorado.



By using in-home sensors, we can see trends in how walking speed changes over longer periods of time.



DRIVERLESS CARS CAN'T BE TRUSTED SAY BRITISH MOTORISTS



New research has found that less than one in five UK motorists say they would trust driverless cars built by technology giants.

Google has built cars to test self-driving software and there is growing speculation that Apple will also enter the automotive industry.

However, a study by analysts Inrix found that just 18 per cent of UK motorists would trust technology firms to build autonomous vehicles and to secure connected car data.

The report found that drivers have more faith in established car manufacturers, with 27 per cent trusting them with their personal information.

Inrix chief economist Dr Graham Cookson said: "The UK is charging towards a transport revolution and

time is ticking for Silicon Valley's tech giants to address data security and privacy concerns.

"Consumers are more aware than ever of keeping their data safe and the fact that they trust traditional car-makers over tech giants with their in-car data sends a powerful message.

"While UK drivers are more sceptical of today's tech titans, traditional car-makers still need to do more to show consumers the benefits of their connected and, in the future, autonomous vehicles to secure a concrete foothold in this highly lucrative market.

"As connected and autonomous vehicles become an essential part of brands' business model, the stakes have never been higher."

Over half (53 per cent) of UK drivers believe autonomous vehicles will be widely available within a decade, but just 17 per cent say they would be likely to buy one.

Some 5,054 drivers in the UK, Germany, France, Italy and the US were surveyed for the study.

Driverless cars will be deployed on UK motorways in the next three years.

The Driven consortium of technology firms said the project - described as the most complex autonomous vehicle trial anywhere in the world - will culminate in driverless cars travelling from London to Oxford by 2019.

A prototype driverless vehicle began testing near London's O2 Arena for members of the public to try out in April.

IoT RETAIL TO GROW BY 350%

A new Juniper Research (www.juniperresearch.com/home) study indicates that Internet of Things (IoT) platform-based devices in the retail environment, including Bluetooth Low Energy (BLE) beacons, digital signage or electronic shelf labels, and RFID devices, will rise to 12.5 billion over the next four years.



This represents a rise of around 350% from the 2.7 billion connected devices last year.

This report, entitled 'IoT in Retail: Strategies for Customer Experience, Engagement & Optimisation 2017 – 2021', finds that – while the IoT encompasses many technologies – much of this forecast growth is being fuelled by the increasingly widespread use of RFID in retail for inventory management. This is likely to accelerate as tag pricing becomes lower.

Such huge growth means that retailers are being advised how to manage that growth to better understand customer behaviour (and adjust services and operations to suit), to enhance the customer experience ('smart' mirrors, better automatic checkout etc), and to improve the supply chain.

This growth mirrors what is happening with Industrial IoT (IIoT) in industry, and the many technologies involved can – once compatibility, security and interfacing issues are sorted – provide a real transformation in business and industrial processes.

Such huge growth means that retailers are being advised how to manage that growth to better understand customer behaviour

EMERSON COMPLETES PENTAIR VALVES AND CONTROLS ACQUISITION

The global technology and engineering company, Emerson (www.emerson.com), has completed the purchase of the valves and controls business from Pentair plc for £2.44 billion (\$3.15 billion).

Headquartered in Schaffhausen, Switzerland, the valves and controls business is a leading provider of valve solutions and services with nearly 7,500 employees around the world. The business will be integrated into Emerson's Automation Solutions platform.

Commented Chairman and Chief Executive Officer David N. Farr: "This acquisition enables us to

continue to grow our global footprint in automation and expand our leadership position in key served markets such as chemical, power, refining, mining and oil and gas.

"By adding these highly respected products and aftermarket services to our portfolio, Emerson is better positioned to serve the needs of our global customers," he said.

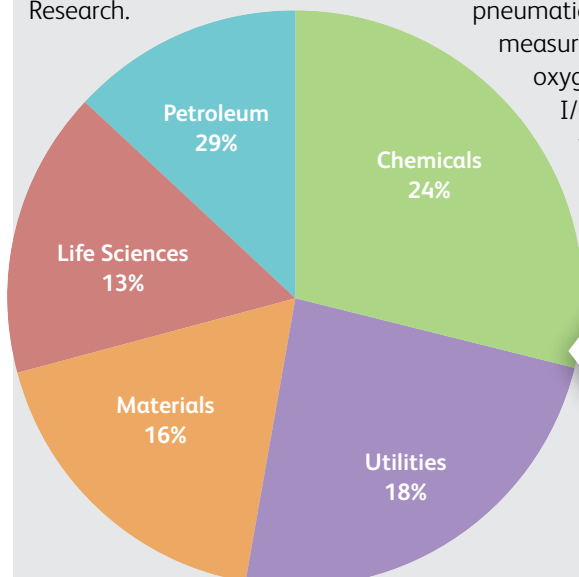
Mike Train, Automation Solutions executive president, said: "Pentair's valves and controls business fits extremely well with Emerson's existing portfolio of Fisher control valves and regulators and Bettis actuators.

"The addition of market leading product brands such as Anderson Greenwood, Vanessa and Keystone creates the most comprehensive global valve business.

He continued: "Emerson's final control portfolio now includes control valves, pressure relief, butterfly, gate, globe, ball and check valves, and an extensive global network of more than 200 service centres. The combination of these two leading businesses will allow us to better support and help customers select the right product and maintain it for the life of the asset."

GLOBAL PROCESS INSTRUMENTATION AND AUTOMATION MARKET SET TO GROW

The value of the global market for process instrumentation and automation is forecast to grow at a five-year compound annual growth rate of 4% between 2016 and 2021, according to figures from Global Automation Research.



Control systems, field measurements, and final control devices account for 80% of the total global market, with the fastest growing product lines including contact and non-contact microwave level, ultrasonic flow, Coriolis flow, electronic/pneumatic positioners, TDL moisture measurements, optical dissolved oxygen analyzers and remote I/O. Products that appear to be losing market share include mechanical flow,

mechanical level, data acquisition systems, and pneumatic positioners.

Application areas such as life sciences, electric and water & wastewater utilities, chemicals, and petroleum industries are all growing above the market average, while materials production industries are growing much slower as prices and global over-capacity dominate.

www.globalautomationresearch.com

2016 Global Market Process Instrumentation & Automation by industry



PUTTING THE FOCUS ON IIOT

The IIoT is opening up exciting new possibilities in measurement and control, so why isn't it being used more widely? Eric Byres breaks down the barriers to implementation.

The Industrial Internet of Things (IIoT) has been a major topic over the past year. You can't go to a trade show or read an industry magazine without getting overwhelmed with new IIoT products or services that promise to completely revolutionise your business.

But what exactly is the IIoT? Can it really help your company? And will it expose your plant floor to new security risks?

senior managers have fully grasped the implications of IIoT. Added to that, only 7% had developed a comprehensive strategy for IIoT with matching investments.

There are enough real-world IIoT deployments happening that allow the careful engineer to separate hype from reality. Companies that have successfully rolled out IIoT projects have discovered it really does have the potential to unlock tremendous value in their manufacturing chain.

Like all new technologies, IIoT is not without its challenges. According to a survey of IIoT experts conducted by Convetit, a company that organises on-line advisory boards and think tanks for Fortune 500 companies, the top four challenges of IIoT are:

- The interoperability of different silos and systems
- The resistance to organisational change
- Problems implementing IIoT into existing processes, and
- Increased security risks.

Manage any of these poorly and an IIoT project can hinder rather than help a company.

For every IIoT success story, there also have been some very difficult and failed IIoT projects. Good or bad, the same issues and solutions show up again and again. There are ways, however, to get an IIoT project focused while overcoming the security challenges facing IIoT implementations.

Rethinking IIoT

The Internet of Things (IoT), a term first coined in 1999, defines our era of connected devices. It has most recently been characterised by the explosive rate of the interconnectivity between intelligent objects that are “network-connected” in order to enable information sharing.

It isn't a revolutionary concept in and of itself – most people have

been interacting for years with some of the most useful, disruptive, and life-altering connected devices, such as the smartphone. Other popular examples of IoT consumer related goods include home light/temperature controls and wearable biometric devices.

In the industrial world we have been connecting smart devices for decades – network connected remote terminal units (RTUs), programmable logic controllers (PLCs), and human machine interfaces (HMIs) – are nothing new. What has changed is the depth of integration, its complexity, and the range of devices available. Until recently, most plant data stayed on the plant floor. Any connectivity was largely between controllers, input/outputs (I/Os), and operator stations.

What has changed with the IIoT is massive amounts of industrial data can now flow either up into the corporation and the cloud or down into increasingly smart field devices. Information previously locked into proprietary databases on a plant floor server now can end up accessed by corporate applications around the world.

Perhaps most important, information doesn't have to only flow up from the plant floor to management. It can simultaneously flow in multiple directions from multiple sources to different “data consumers.” At one major U.S. automotive parts manufacturer, measurements from field sensors in hydraulic presses now are being combined with feedback from customers to get a better understanding of the indicators of premature product failure.

This interconnectivity requires new ways of looking at how the entire company can effectively integrate and use all the data available in our industrial process. And it requires new ways of understanding how our industrial processes can use the data

If you can't answer those questions, you are not alone. Most business executives don't understand the IIoT either. Many don't understand what it can (or can't) do for their company. And even fewer have a plan detailing how they could deploy IIoT effectively. According to a 2015 Accenture survey, only 36% of 1,400 business leaders admitted their

Continued on next page...

available from other business units and the end customer to create a safer and more reliable product.

“IIoT is the new label for something which has actually been developing for decades: The growing interconnectivity of ‘cyber’ devices which control physical systems,” said Steven C. Venema, chief security architect at Polyverse Group.

Fear of change

The unprecedented scale of information exchange means IIoT is often a transformative process for businesses. Unfortunately, transformations of the workplace often result in deep-seated concerns in staff at all levels. These include macro reasons such as the natural fear of change to delaying factors ranging from the excessive review of possible risk elements to the confusion concerning the actual technologies and protocols to be used.

Consider the daily status meeting, a feature of manufacturing management for over a century. When an IIoT project is deployed, companies find their daily meetings miss huge opportunities to change operations in real time as new information comes in. A meeting format that is more responsive to real time information is often needed. Yet some staff will be reluctant to give up a meeting they have attended for decades.

For an IIoT project to achieve its full benefit, it needs to address these concerns up front. Questions like,

“How will this information get routed to the decision-makers? What systems will they use to evaluate it? If something dramatic changes, who gets told? And how do we make sure the right people can access the information?” all need answers before the IIoT project is launched. Businesses must strategise with a clear outlook regarding why, what and how their specific organisation will implement IIoT technologies.

Not the Field of Dreams

“If you build it, they will come” is not a model for successful IIoT rollouts – but it’s a frequent stumbling block for many companies. When creating an IIoT infrastructure, companies gain the most value by creating it with the end in the mind. So they should prepare for it with the skillsets needed to securely implement IIoT in existing processes and to effectively interpret the resulting data. IIoT infiltrates the entire company; it’s a mentality as much as it is a tool. A company culture must be such that it embraces – rather than resists – such a huge organisational overhaul.

As the foundation of such a strategy, it’s often wise to find a platform for alliances. Enlisting the help of organisations that provide the platform for experts to convene on a variety of subjects is a good idea. These external experts can engage online with your company’s team, either for short timeframes of intense discussion or more routinely over a longer timeframe.

Tom O’Malley, founder and chief executive of Convetit, has seen companies struggle to align their visions with their IIoT strategies “Lots of folks are trying to figure out why,” said O’Malley. “What is your business hoping to gain? Why should senior management decide to implement IIoT? Why is IIoT the optimal strategy?”

It’s essential to interact with IIoT experts whose successes are relevant to your industry. These experts demonstrate by example, explaining their own pitfalls and triumphs to help you make the right decisions and steer you toward the types of projects which produce real value.

Above all else, remember IIoT is all about driving business value. It’s not just how you’re collecting data through interconnectivity; it’s why you want to do this in the first place.

Eric J. Byres is a leading expert in the field of industrial control system (ICS) and Industrial Internet of Things (IIoT) security.

*First appeared in Control Engineer Europe
www.controlengineurope.com*



IIoT is the new label for something which has actually been developing for decades: The growing interconnectivity of ‘cyber’ devices which control physical systems.



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UNDERPINNING INDUSTRY WITH MEASUREMENT

NPL; An InstMC
Companion
Company

Suzanne Loftus,
NPL's Head of
Training discusses
the decline in
measurement skills
in manufacturing
industry, and
how new training
initiatives can
inspire the next
generation of
engineers and
technicians

The National Physical Laboratory (NPL) is the UK's National Measurement Institute. Our mission is to provide the underpinning measurement capability for UK prosperity and quality of life. This role is highly diverse and finds us working on world-leading science and engineering that impacts healthcare, innovation of new technologies, environmental monitoring and advanced manufacturing. Our vision is to use our excellence in science and engineering to deliver the most extraordinary impact.

Established in 1900, NPL is the birthplace of Alan Turing's ACE computer, the first universal computer of its kind; packet switching, the basis of the internet; and atomic time, the backbone of GPS and global communications. Today, NPL is supporting the development of next-generation technologies and techniques with the potential to further transform our lives; from new antibiotics to tackle resistance and more effective cancer treatments, to unhackable quantum communications and superfast 5G. Based in Teddington, south-west London, NPL employs over 500 scientists and is home to

388 of the world's most extensive and sophisticated measurement science laboratories.

In 2015, NPL formed a strategic partnership with the Department for Business, Energy and Industrial Strategy, the University of Strathclyde and the University of Surrey to grow the impact from science and engineering through joint research and an innovative postgraduate institute. NPL also has regional bases across the UK, established to increase both the volume of measurement research in the UK and the impact of the national measurement infrastructure on the UK's prosperity and quality of life, including bases at the University of Surrey, the University of Strathclyde, the University of Cambridge and the University of Huddersfield's 3M Buckley Innovation Centre.

Decline in measurement skills

Measurement science (metrology) plays a vital role across all manufacturing industries. NPL works with many organisations that are facing critical skills shortages not only

Continued on following page...



in measurement science, but also across the wider STEM (science, technology, engineering and mathematics) subjects. The decline in measurement skills is partly caused by a lack of formal measurement training in academic and vocational qualifications, but is also due to the skilled population reaching retirement age. Together, these factors emphasise the increasing need for education and training providers to collaborate more widely to inspire the next generation of skilled workers into science careers and provide new curricula and resources which are readily accessible to learners at all stages of their careers.

NPL is actively involved in the skills agenda, delivering education, training and outreach programmes to schools, colleges, industry and academia. Our programmes and courses have been designed with industry to enable individuals to develop their metrology skills and to progress in their metrology careers. The impact of this engagement is tangible through activities and projects, such as:

- The intake of our own apprentices on NPL's Advanced Apprenticeship Scheme, which is now in its fourth year and offers apprenticeships in fields including Science, Engineering, Business Administration, IT and Finance. We've also created two new dedicated Metrology Apprenticeships, as part of the Institute for Apprenticeships' Trailblazer Programme, which will start to be delivered at NPL and rolled out through a network of providers across England from late 2017.
- Our Measurement Skills for Industry Programme, which sets the standard for metrology training in the UK and provides access to a framework of practical application-based qualifications in metrology for workforces and apprentices, as part of the UK's Regulated Qualifications Framework. We offer high-

quality training at Levels 2 to 8 – equivalent to GCSE through to postgraduate level. 2000 people currently go through NPL's existing professional development programmes per year and they can now work towards achieving a new Diploma in Metrology at

Level 3, via the awarding body EAL Ltd. Our e-Learning programme has also grown from strength to strength since its launch in 2012, and is designed to fit training into busy work schedules and make measurement knowledge even



more accessible, on a global scale.

- Our Product Verification Programme, which helps businesses increase productivity and reduce waste, through hands-on, in-company support with better measurement

technologies and processes. Now in its fourth year, the Programme is delivering over £10 million worth of quality improvements in more than 65 UK manufacturing companies.

- A series of freely-downloadable

good practice guides, written by experts in the field, for audiences from school and college leavers through to those who are highly experienced and looking to improve working practices.

- Our Postgraduate Institute for Measurement Science, which brings together more than 150 postgraduate researchers co-supervised by NPL staff in collaboration with over 30 UK universities. The Postgraduate Institute aims to develop the next generation of world-class measurement scientists and is managed in association with the universities of Surrey and Strathclyde to enable a postgraduate experience which will place students well for future employability and skills.
- And finally, A proposed professional recognition scheme for metrology – ALFAMet™ (Accredited Learning Framework for Applied Metrology). ALFAMet™ is a modular training provision with multiple dedicated learning pathways designed by industry sectors to deliver the skills they need. Learners will be able to study a range of accredited courses and, when combined with prior knowledge and work experience, can work towards achieving professional status. A consultation on the need for such a scheme will be open on the NPL website from mid-June 2017.

NPL continues to work collaboratively with industry, professional institutions, trade associations and education establishments to disseminate measurement knowledge as widely as possible. We remain responsive to industry and government, with our future work aimed at providing a pipeline of talented, skilled metrologists across industry sectors to generate real impact on the UK's productivity and global competitiveness.



BLUETOOTH — BACK TO THE FUTURE?

The technology is available to remotely access and adjust instrumentation from Smartphones and Tablets. But is the process industry ready for it?

Wireless communication for industrial field transmitters has been a popular topic in recent years. But what about the possibility of an accessible and simple means of instrument set up and operation using a smartphone or tablet?

Bluetooth has been a familiar feature in our everyday lives for many years. All modern cars, for example, now have a hands-free phone. Music, keyboards and mice, remote controls, televisions and portable speaker systems in our homes are all using this communication protocol to increase

safety and provide convenience.

It's secure too, every day, in shops and restaurants, we put debit and credit cards into wireless payment terminals that use Bluetooth communication to securely transmit sensitive financial information.

The technology is also beginning to find its way into the process industry. It has the potential to configure, adjust, analyse and retrieve data in sensors from a safe distance using every day devices, whether they are supplied by the company or are the users 'own'. 'Bring Your Own Device' (BYOD) is becoming a more familiar



Of course how often do instrument people hear “It just happened and you missed it”? When something does need checking, the ability for faster connection and sensor diagnosis means for example, during a process upset, it could help to see and capture ‘that moment’, which in itself could save money and reduce environmental danger.



term in our language, not just at the ‘hi-tech’ companies.

In industry Bluetooth is also starting to emerge and is now available on products like data loggers, controllers, analytical systems and valve positioners. It is already now also being introduced to field transmitters for set up, monitoring and asset management. This is facilitated by the development and implementation of Bluetooth 4.0, which is now low power enough to be used on ‘loop powered’ field based sensors.

Security

This is probably the first and foremost question. Bluetooth communications are founded on three procedures:

Authentication & authorisation: This is the process of determining who is at the other end of a Bluetooth link and if their device should have access to yours.

Encryption & data protection: Bluetooth encrypts your data (128 bit) and only allows approved devices to decrypt it, making it much more difficult to for unauthorised

users to capture and decipher your information.

Privacy & confidentiality: In addition to encrypting the data being transmitted, the latest Bluetooth 4.0 also makes it possible to encrypt the address of the Bluetooth device itself.

An additional layer of security is provided by the App or software that is required to carry out the communication on. Often, only that specific App will identify the device, how and with what it operates.

Continued on following page...

Finally, if the user desires, the ultimate security should be also in enabling the Bluetooth to be physically switched off or removed. So, for example, in the process industry it may be used for convenience and safety during commissioning, calibration checks or testing, but it could then be disabled or removed during normal operation, if preferred.

What can be seen and used?

Due to the display quality and size of most smartphones and tablets, along with our familiarity with operating them, adjustment apps for process devices can offer excellent interface and visualisation capability for set up. This extends to sensor asset management and enabling performance analysis - like filters, echo curves, trends and diagnostic functions - to be easily visualised and evaluated. Bluetooth has the potential to offer simpler, faster adjustment and diagnosis, as well as better device management, safety and convenience for the user.

Heat, dirt, noise, dust or gases (or even just horrible weather!) are just some of the hazards that personnel can face in the process plant. Bluetooth 4.0 has a range typically around 25m, further, (50m+) in clear areas, enabling devices to be accessed and operated from a more secure, sheltered position. Another reason for utilising the technology could be the location or position of the device itself, helping to avoid prolonged awkward working positions, eliminating the need to climb ladders or work at heights. It could even help to reduce exposure risk to harsh/toxic chemicals. These are strong safety and productivity benefits for the user.

Hazardous area use

Smart phones and tablets enclosed in hazardous area cases with the correct approvals are also becoming both more commonplace and affordable. Up until now, any sensor requiring set up in a hazardous area has required either key pads on, or adjacent to, the transmitter; specialist communicator devices; or

the use of remote communication methods such as the HART protocol, typically typically a handheld terminal or PC connected on signal cables from a junction box/safe area some distance away. However, this is not always practical - it requires housings to be opened, connection into terminals at junction boxes or cabinets (with associated time consuming 'Hot work permits'), and the communication speeds can sometimes be slow. Because Bluetooth carries no energy in itself, as long as the communication devices at each end (e.g. sensor and smart phone) are appropriately protected and certified, there is no compromising of the hazardous area operating zone. Alternatively, with a 25m+ range, the Smartphone can also be used in a place of designated safety.

With it's easier to read displays, intuitive screens with pertinent user information and faster connection, wireless Bluetooth communication has the potential to increase productivity during sensor set up, commissioning and maintenance phases. It is also well known that a better quality, intuitive device interface means less 'adjustment returns' and improved process control. Of course how often do instrument people hear "It just happened and you missed it"? When something does need checking, the ability for faster connection and sensor diagnosis means for example, during a process upset, it could help to see and capture 'that moment', which in itself could save money and reduce environmental danger.

Back to the future!

The VEGA PLICSCOM universal display and adjustment module now has optional Bluetooth 4.0/LE. This is secure and encrypted, on/off switchable communication for both Android/IOS smartphone/tablet set up and diagnosis. Amazingly, it is also fully backward compatible with all plics level and pressure transmitters manufactured since 2002. Because of the built in modularity of the system, it can

be easily retrofitted without the need for any software update. A magnetic pen supplied with the unit offers the option to operate the PLICSCOM buttons through the glass viewing window, and an ATEX certified version is now available for some sensor variants with more to follow. There is also a Bluetooth USB dongle for PC connection via FDT/DTM / PACTware. This offers a great opportunity for tens of thousands of existing users and their already installed sensors to try it out the future today.

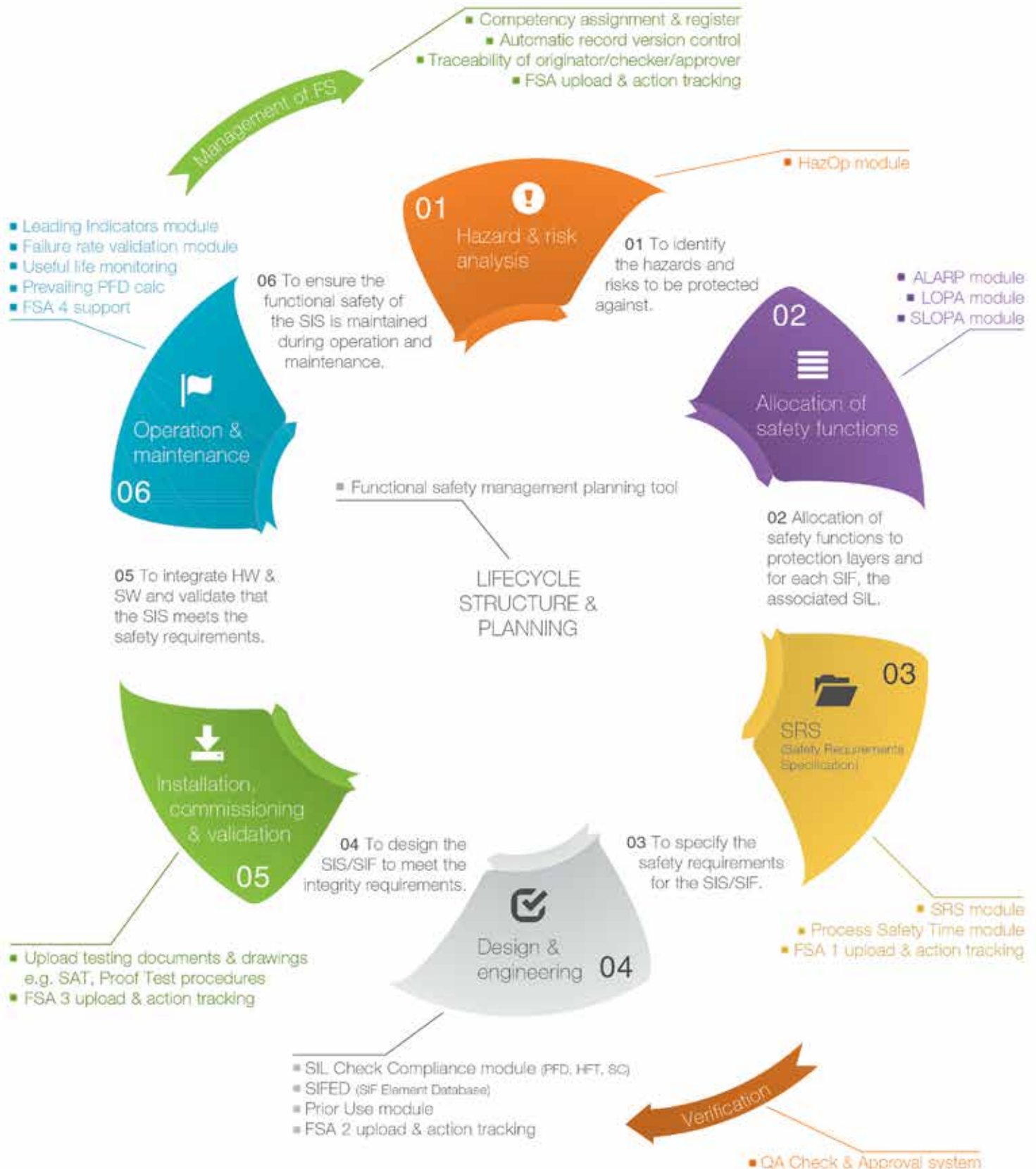
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*First appeared in Control Engineer Europe
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- InstMC Registered Functional Safety Engineer

Safety engineers are regularly responsible for system-critical decisions affecting the operation of large processing facilities. Their judgment can have serious implications for the economic operation of the plant, and of course for the safety of those working and living close to it.

All the more surprising therefore that there is no recognised professional qualification for safety engineers in the UK. This is a gap in the system: employers and regulators need a way to identify engineers who have achieved a level of competence that equips them to make these critical decisions.

Safety is a fundamental priority in many of the sectors that InstMC members work in, and our Safety Special Interest Group is one of the most active in the Institute. The InstMC has therefore taken a national lead in developing two new professional qualifications in the field of functional safety

and explosive (Ex) atmospheres; both fields which are subject to regulatory overview. These qualifications are positioned at a professional level and are awarded through peer review.

To ensure standards, registration as a safety engineer is as rigorous a process as for any other professional qualification. To achieve the designation of Registered Explosive Atmospheres Engineer or Registered Functional Safety Engineer, a candidate must already be registered with the Engineering Council as an Incorporated or Chartered Engineer (IEng or CEng). This in turn requires that they belong to a professional engineering institution such as InstMC.

Why this insistence on registration?
There are two reasons:

- a) Registration requires demonstration of 'Underpinning Knowledge & Understanding' (UK&U), which is the foundation upon which a professional engineer builds and maintains their competence. This is the primary skill that allows the professional engineer to engage intelligently with other professionals and engineering standards and guidance.
- b) Registration, and membership of a Professional Engineering Institution, requires the professional engineer to abide by a professional code of conduct. Two key aspects of this are a requirement not to undertake work for which they are not competent and a commitment to engage with ongoing CPD.

The new qualifications are awarded upon demonstration of comprehensive experience &

professional engagement in the related field; there is no requirement for demonstration of experience in every aspect. The expectation is that in any unfamiliar territory, the individual engineer would first undertake appropriate study/CPD, typically with validation of learning by consultation with his/her peers.

The certificates awarded by other bodies, such as TUV 'FS Eng' or 'IEC Ex'/'CompEx' are very different from this professional registration. They are typically awarded following attendance on a short course with a subsequent assessment of learning. The new qualifications from the Institute are of a different order, intended to identify professional safety engineers with the training, experience and responsibility to make key decisions.

Successful applicants will be listed on a public register hosted by the InstMC; this allows others to validate claims of qualification. Successful applicants also have the right to use the title 'InstMC Registered Functional Safety Engineer' or

'InstMC Registered Ex Engineer' as appropriate.

The registers are now open to applicants. For further details please consult our website, or contact membership@instmc.org



All the more surprising therefore that there is no recognised professional qualification for safety engineers in the UK.





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THE TEST & MEASUREMENT MARKET SEES M&A SURGE IN EUROPE

The Test & Measurement market had a buoyant start to the year, with strong levels of deal activity Q1 2017. While volumes in the quarter were down slightly from the record highs of late 2016, year-on-year deal volume growth was up by a third.

Europe, in particular, saw surging activity, with a 29% increase in transactions compared to the last quarter of 2016. Q1 was also remarkable for a rising wave of cross-border transactions, as they increased to represent over half of all deals. Europe is responsible for most cross-border deals, with France and Switzerland home to key bidders. In contrast, it is the UK, US, Canada and Germany which have been home to most target businesses.

The prospect of Brexit is by no means dampening the market; in fact we see the reverse. International acquirers are taking advantage of opportunities to acquire quality UK businesses, and we currently see more UK businesses sold to international buyers than we see UK buyers acquiring overseas. The weakening of the pound has contributed to increased overseas appetite for UK businesses, allowing them to make offers ahead of their domestic counterparts.

A notable example in Q1 2017 was Socotec France SA's decisive move into the UK market with the acquisition of Environmental Scientifics Group Holdings Ltd, providing an exit for private equity investor 3i. Other recent buyers into the UK market have included



Chinese robotics business Nanjing Estun Automation which completed the £15.5m acquisition of Trio Motion Technology Ltd, Swedish conglomerate Indutrade AB which acquired controls business Ellard Ltd, and US investor Industrial Physics Inc which bought UK-headquartered gas and moisture measurement business Systech Illinois.

Private equity's appetite for the sector remains strong too. There were two notable deals completed in the quarter: NVM Private Equity backed the MBO of £15m turnover Thyson Technology Ltd, a specialist analytical and instrumentation business, and Inflexion Private Equity Partners led the buy-out of Cawood Scientific Ltd, the UK's largest independent provider of analytical laboratory testing services for land-based industries.

A further notable deal in the quarter was 3M Co's acquisition of Scott Technologies Inc for \$2bn from Johnson Controls. Scott Technologies manufactures air-purifying products, gas and flame detection instruments, thermal imaging cameras and other life support products for firefighting and personal protection against environmental and safety hazards. The enterprise value paid is

equivalent to 11x estimated annual adjusted EBITDA.

Attractive valuations in the sector persist, with BDO's T&M index revealing trading multiples of quoted businesses averaging 14.3x EBITDA, and growth of 79.8% in the share price index during the five years to March 2017.

Roger Buckley, M&A Partner at accountancy and business advisory firm BDO LLP, commented: "The Test & Measurement market remains a hive of activity, with buyers and investors thirsty to acquire or back quality businesses. Market chatter suggests we will continue to see high levels of transactions at healthy valuations through 2017."

BDO LLP, which is the UK's No.1 M&A Adviser*, produces quarterly reports highlighting the M&A trends, economic drivers and events impacting the Test & Measurement market. Each quarter highlights M&A updates in the market and shines a spotlight on a specific sub-sector. In the Q1 2017 edition, there is a focus on the high-growth water treatment and testing market.

A full report on Q1 2017 M&A Highlights can be downloaded from BDO's website: <http://bit.ly/2rGFyU1>

NEWS FROM THE INSTITUTE

CPD: POLICEMAN OR SERVANT?

Patrick Finlay

One of my more embarrassing professional moments was during a tour of a well-known manufacturer's plant. The tour was included in the programme of a major international conference, and the other members of my group were nearly all from overseas. We were being shown round by a production line supervisor, and at one point he was asked politely "do you use ISO9000 for quality management?" To which came the blush-invoking reply "I dunno mate, I'm production – nothing to do with quality..."

People split into two polar camps about quality assurance systems: they're either a bureaucratic pain that you just put up with or they really are useful processes that make life so much more efficient and effective. The same polarisation seems to apply in attitudes to Continuing Professional Development: to some people it's a chore that must be done once a year to keep professional registration going, whilst to others it's a valuable way of tracking progress through a career and updating technical knowledge.

The people who seem to benefit most are those who realise that the C stands for Continuing. They Google instmc/mycareerpath immediately after the event they've just attended, and fill in the details while the mind is fresh. The opportunity to reflect on the pluses and minuses of the experience are at their most useful then, as it helps

to point out any gaps in knowledge. Sometimes a further Google search at the same time can fill these holes there and then.

The purpose of CPD, of course, is to serve the professional engineer, not to act as a policeman. It's been interesting to talk to several members who have been persuaded to view it as a useful tool, and discovered that it really does add value. No system is perfect and we are keen to hear from anyone who has improvements to suggest to mycareerpath, but for many engineers it seems to fit the bill.

INSTITUTE OF MEASUREMENT AND CONTROL AWARDS LECTURES 2017

The Institute of Measurement and Control is hosting three awards lectures this year, given by its principal prize winners

Thursday 26 October 2017:
Professor Danielle George, MBE

Venue Wellcome Institute, 183 Euston Road London NW1 2BE

Danielle George is Professor of Radio frequency engineering and Associate Dean for Teaching and Learning at the University of Manchester. She gave the 2014 Royal Institution Christmas Lectures "how to hack your home". She also developed a robot orchestra, for which she received the 2016 Royal Academy of Engineering Rooke Award for public promotion of engineering.

Winner of the 2017 Sir Harold Hartley medal of the Institute of Measurement and Control, awarded annually for outstanding

contribution to the technology of measurement and control.

Tuesday 28 November 2017:
Professor Masatoshi Ishikawa

Venue City, University of London

Masatoshi Ishikawa is Professor of Creative Informatics, Information Physics and Computing and Dean of Information Science and Technology at the University of Tokyo. He was winner of the 2016 Advanced Robotics Best Paper Award from the Robotics Society of Japan.

Winner of the 2017 Finkelstein medal of the Institute of Measurement and Control, awarded annually for notable contributions to measurement internationally.

Wednesday 6 December 2017:
Professor Roy Taylor

Venue Imperial College, South Kensington London

Roy Taylor is Professor of Ultrafast Physics and Technology at Imperial College London. He is an experimental physicist in the field of fibre based non-linear optics and established the Femtosecond Optics Group at Imperial in 1986. His interests are in the generation and application of ultrashort pulses to fundamental nonlinear processes, primarily optical fibre based, with the objective of making versatile systems of commercial interest in various applications.

Winner of the 2017 Oxburgh medal of the Institute of Measurement and Control, awarded annually for contribution to measurement, instrumentation and control of outstanding merit.

All of these lectures are free to attend and for more information please visit instmc.org



JOIN THE InstMC AND GAIN A COMPETITIVE EDGE

What are the benefits of becoming a member of the InstMC?

- ▶ Official recognition of your skills and expertise
- ▶ Special Interest Groups to connect with like-minded professionals and grow your network
- ▶ Programmes, local and national events to build your skills
- ▶ Opportunity to engage with other professionals to influence national strategy
- ▶ Advice from experienced members and mentoring programmes designed to develop your career
- ▶ Access to relevant technical publications and information
- ▶ Discounts on a range of services essential for today's engineers.

Q&A

Professor Ken Grattan

This month's interviewee is Professor Ken Grattan, Dean of the City Graduate School at City, University of London and Royal Academy of Engineering-George Daniels Professor of Scientific Instrumentation. He is also President of IMEKO, the International Measurement Confederation (of which the Institute is the UK Member), and Past-President of the Institute of Measurement & Control (2000)



What was the root of your interest in engineering?

I started out as a physicist – and in my view it is an excellent route into engineering – as an applied, experimental physicist. I am very pleased that in the UK there are ‘fuzzy borders’ between that type of physical science and engineering. I enjoyed science at school – in spite of my Chemistry Master – and my first real encounter with electrical engineering was working as a student in the electrical department of a department store during the vacation – if only in doing minor repairs and in putting plugs on appliances. When I became an undergraduate physics student at Queen's Belfast, I was quickly introduced to lasers – then a relatively new subject – and became fascinated with lasers and what they could do. My undergraduate project was on characterising a ruby laser and I was sold on laser research by seeing my future supervisor demonstrate a tunable dye laser and watch the green laser light change to orange and then red. That led to a PhD project to build

both a nitrogen laser and one of the first excimer lasers in the UK – the type now used for laser eye surgery. We built these lasers to do some fascinating photophysics, trying to get the maximum power out of them to study dye laser molecules. After that I was a post-doc at Imperial, sponsored by the Rutherford Laboratory to build and use more lasers – this time electron beam and discharge – pumped vacuum ultraviolet noble gas excimer lasers to look at the possibilities of energy generation by fusion using these lasers – again very engineering focused, even though in a Physics Department. When I joined City University it was again joining a Physics Department – but one that quickly merged into the Electrical Engineering department there. At City I was introduced to fibre optics by Professor Ludwik Finkelstein and supported by him to build a group and a research centre there. A few years later I became Head of Electrical Engineering Department – by which time I had become a member of the Institute and a Chartered Engineer. And I haven't looked back....

What is your vision of engineering in Britain in 2020?

Engineering in the UK has a long history and its contribution to the wealth and success of the nation cannot be underestimated. That is in part built upon the quality of our educational system but also on our openness to engineers from across the world who come to live and work in the UK. I expect engineering in the UK in 2020 will be much like it is today – but more challenging due to Brexit and the inevitable increase in costs that the devaluation of the pound has caused. Yet we are an extremely resourceful nation and have made a contribution to innovation and invention well above that expected from our size or GDP – which I am sure will continue. I hope for a closer linkage between our industrial sector and our world-class universities and more of an ‘invisible’ wall between them: to allow a clear flow of talent in both directions. The UK will still be a place, in 2020, where engineers will want to be and to enjoy working in some of the most exciting areas of technology. Above all, we want a buoyant engineering sector that attracts the best talent and rewards it and keeps on creating the new products that will change the world. We need to be mindful of the challenges that will be even more evident in 2020 – from our finding our new way forward, post-Brexit and from the growing influence of China and a more insular United States. Above all I would hope that the value of engineering achievement to the success of our country and community could be more widely seen by the public at large – however I fear that seeing that before 2020 is unlikely. I want a clear vision for engineering in 2020 and leadership from our government that will give and support that. Engineering will inevitably also become more interdisciplinary and that is a good thing – breaking down the barriers both in industry and in universities.

What should the UK Government do to address the shortage of engineers?

The shortage of engineers is a long term issue, and we know that in the short term it will get worse – the pipeline of engineering graduates is becoming narrower and the absence of talent is becoming more evident. The government could do more – but we, as engineers, also have our role to play and must shoulder some of the responsibility. We must continue to let young people know of the rewards – financial and intellectual – of an engineering career – and get into our primary schools to do so. We must put forward the good role models that we have from the industry and academia to show this. Above all we should not be afraid to push for – and shout about – the best financial rewards for our top engineers and show that combined with good entrepreneurial skills, there are real benefits to be had in the engineering

profession. Many people are put off engineering as a career at too early a stage at school – and most then find it hard to recover the situation later when they have missed out on vital A-levels. The Government could help with a student loan scheme tilted towards recruiting engineers – why not write off the student loan of an engineer (who will probably earn enough from day one of employment to have to start paying back the loan immediately) after five years for engineers who pay tax in the UK during that time? This could be a significant incentive towards encouraging young people into the profession. So let’s not leave it all to a government that will be distracted by European issues in the next five years – if we are to make a difference to the next generation, we need to do it ourselves.

What do you do in your free time to relax?

Like many of us, relaxing is difficult in a connected world. E-mails never stop and when collaborating with colleagues overseas, there is always someone working and expecting a reply as soon as you get up. So carving out some real free time – when your mind can relax and not be waiting for the next e-mail – is difficult. I enjoy travelling as part of my work, and in particular taking some extra time to see places that when I was in that science class at school, I could only have imagined. It has been a wonderful part of being an engineer working in a profession that circles the globe – and making friends with people in many countries. So travelling helps me to relax and switch off for a while. I still enjoy one of the most traditional of pastimes – reading – and from a paper book, not a screen or Kindle. To take time to read is such a pleasure, as is spending time with friends and family. And ice cream – what better way to relax than to enjoy something that is so easily available today – and all because of the work of engineers and physicists in understanding thermodynamics and creating refrigerators. In many ways the simpler things in life are often are still the best.

What would your one wish be?

World peace and reconciliation perhaps? A cyberhacker permanently disabling the world’s e-mail system to allow us to learn to communicate better? Ice cream free on demand? Whatever wish we make, we need to be able to play our part in it coming to pass. I expect that I won’t be able to do much about the three suggested but perhaps to be able to encourage and help people to have as good a career as I have enjoyed would be a worthwhile – and perhaps achievable – wish.

INTRODUCING

We are pleased to announce the appointment of Dr Maurice Wilkins FInstMC as engineering director of the Institute of Measurement and Control.

Maurice is a PhD Chemical Engineer with over 38 years of experience in human factors, batch solutions, procedural operations, HMI design, advanced process control, benchmarking analysis and the chemicals and refining industries.



He currently works as Executive Advisor to Yokogawa, working mostly on technology and solutions innovations and also standards and human factors. In his earlier career he held positions with Esso Chemicals, Honeywell, Lyondell, ARC Advisory Group, KBC and as an independent consultant.

Maurice is a Fellow of ISA, our sister organisation in the US, and was inducted into the Process Automation Hall of Fame in 2011. He is currently Vice President of the ISA Standards and Practices department.

Within InstMC Maurice will be responsible for providing technical support to our professional activities, including our learned society programme and Special Interest Groups. He will also be supporting our marketing department in outward-facing activities and representing the Institute as our technical spokesman to the media and on related engineering bodies.



Maurice is a PhD Chemical Engineer with over 38 years of experience



OUR CORE TEAM

Chief Executive Officer

Patrick Finlay
Tel: +44 (0)20 7387 4949
patrick.finlay@instmc.org



General Manager

Velda Wong
Tel: +44 (0)20 7387 4949 Ext 4
professdev@instmc.org



Accounts and Subscriptions Officer

Ernest Kyei
Tel: +44 (0) 20 7387 4949 Ext 1
admin-subs@instmc.org



Professional Registration and Membership Manager

Leila Atherton
Tel: +44 (0) 20 7387 4949 Ext 8
membership@instmc.org



IT and Communications Manager

Aytan Malka
Tel: +44 (0) 20 7387 4949 Ext 6
communications@instmc.org



Publications Manager/ Events and Conferences

Danny Henderson
Tel: +44 (0) 20 7387 4949 Ext 3
publications@instmc.org



Marketing Manager

Catalina Pascu
Tel: +44 (0) 20 7387 4949 Ext 5
marketing@instmc.org



IT Support (Trailblazer Apprentice)

Aaron Leigh
Tel: +44 (0) 20 7387 4949 Ext 8
aaron.leigh@instmc.org



Digital Marketing Assistant

Sydney Reed
sydney.reed@instmc.org





COMPANION COMPANY SCHEME BENEFITS

Companies involved in measurement, instrumentation & process control are welcome to become members of our Companion Company Scheme. Over 100 leading businesses already benefit from CCS membership.

Over the past 70 years, the InstMC has become an established and recognised professional body in the Measurement, Control and Automation industry. InstMC is widely acclaimed for its continuous efforts to facilitate the exchange of information aimed to improve instrumentation and control industry standards. The Institute supports the development of our Member Companies through a wide range of business oriented benefits:

- ▶ Opportunity to organise networking events and services;
- ▶ Discounted advertising space on InstMC platforms;
- ▶ Introductory article in InstMC journal;
- ▶ Certificate acknowledging InstMC Corporate Membership (CCS) and status within the industry;
- ▶ Possibility to submit internal news articles and technical material on InstMC Website and Journal.
- ▶ Discounted Exhibitors and Conference fees.



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