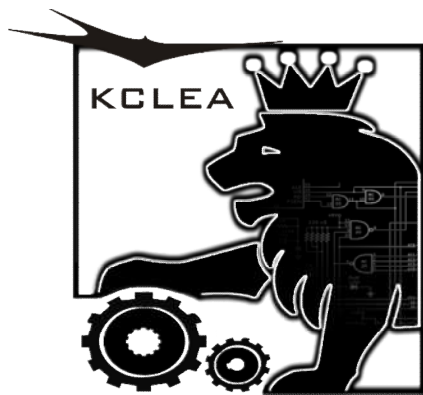


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# THE KING'S ENGINEER BULLETIN

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Spring 2019



Spread the word !  
[www.kclea.org.uk](http://www.kclea.org.uk) is live.

Date for your Diary  
Engineers' Lunch, Friday 7<sup>th</sup> June 2019

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**A message from  
the President  
by David Blacoe**



I am privileged to have taken on the role of KCLEA President, when so much good work has been put in place already both for the annual awards of Bursaries and Medals, together with our Events and of course this Bulletin, all of which ensure that both students and alumni are aware of our continuing existence.

We have relaunched the KCLEA website, which will put us back into worldwide contact with as many King's Engineers as possible. It is also a great pleasure that Professor Barbara Shollock has agreed to join our Committee to cement a close liaison with the College academic staff.

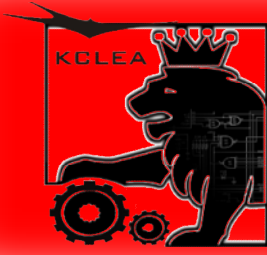
We want to continue a close relationship with KCLES, which is actively led by its President, Alex Mitton, with the potential for us to provide financial support to their activities.

Our Annual Lecture 'Cyberspace – Explainable Security' was given in an engaging manner by Professor Vigano on 27th February and has proven to be very topical. Interestingly, 49% of attendees were in the age range below 40 years. Looking to the future after the mist of Brexit disappears, our economy will continue to be driven by an increasingly technologically informed world. It should be no surprise that the recent BBC Two public poll for the National Icon of the 20<sup>th</sup> Century selected Alan Turing!

On a personal note – I don't believe it! 50 years have whisked past since I graduated from King's Faculty of Engineering in 1969. We lived in a pre-Common Market country, still paying in pre-decimal currency. Our calculations were performed on slide-rules, using traditional units of Poundals, Fahrenheit and Horsepower, although we were conversant also with the SI units! Professor Kastner led the Mechanical Engineering Division and Sir John Hackett was the Principal of a much smaller KCL.

I look forward to meeting as many '69ers' as possible on a Reunion table at the Annual Lunch on Friday 7<sup>th</sup> June in the Alumni Weekend. We anticipate a comprehensive update on Engineering Resurgence at King's!

A photograph of the Class of 1969 is shown on the following page. Please get in touch with us if you want further information.



# A message from the President by David Blacoe







## KCLES Report *President's Report* by Alex Mitten



A brief report was received from the KCLES for the KCLEA's committee meeting held on 4<sup>th</sup> April 2019

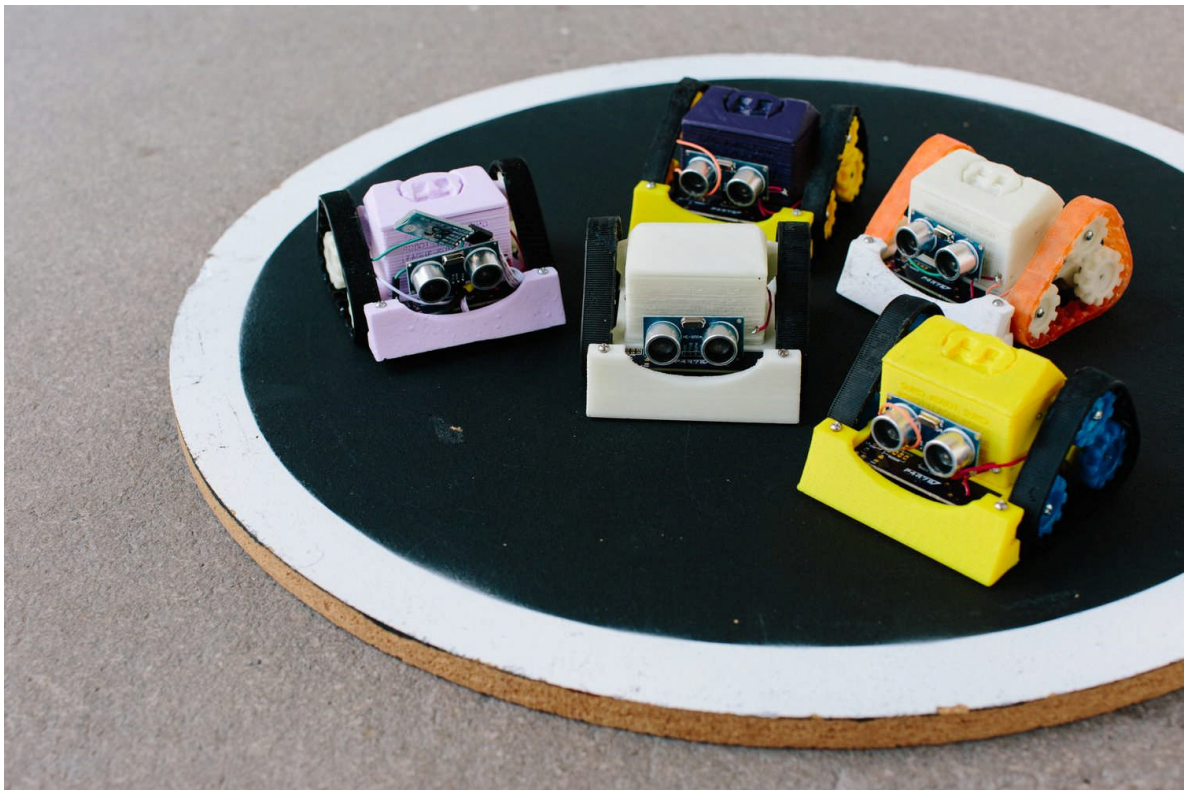
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*Following on from our CAD workshops last term, we have been running a weekly "Build your own Sumo Robot" workshop since February. Here, we introduce the members to Arduino and how to integrate basic electrical components, culminating in pitting the robots against each other in a competition!*

*We also held a successful "Beyond the BEng" event, whereby previous graduates from the course came and spoke to our members about different pathways to pursue after graduating. This was one of our most successful events to date, and we received lots of positive feedback.*

*We have also had our usual social events, taking the form of pub crawls!*

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*Sumo Robot competition*

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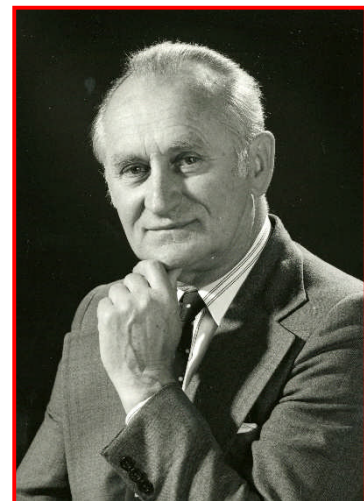
## Engineering Heritage *Biomedical Engineering* by Professor Colin Roberts



### **The birth and growth of Biomedical Engineering at King's** *a personal view*

In 1953 Dr Joseph Zarek, a lecturer in Mechanical Engineering at King's, approached John Scales, then Senior Lecturer at the Institute of Orthopaedics in London, with a proposal to investigate why the original Judet hip prosthesis had turned out to be such a disaster. The prosthesis consisted of a stainless steel shaft which fitted into the shaft of the femur, topped with a Polymethyl Methacrylate (PMMA, commonly known as Perspex) ball. Their findings, which were published the following year in the British Medical Journal, were the start of a research collaboration into human biomechanics and biomaterials which was to last decades. Zarek and Scales were subsequently approached by the Government's Department of Scientific and Industrial Research to evaluate a new prosthesis made in stainless steel by Zimmer Orthopaedic. In the same year the pair evaluated the use of a simple hinged total knee replacement similar to that pioneered by Shiers (1954). However, although it proved unsatisfactory their work paved the way for much further research and development.

In 1957, Zarek who was by now Senior Lecturer at KCL joined orthopaedic surgeons John Charnley and George McKee in presenting at a Symposium at the Royal Society of Medicine, Zarek making a presentation on Engineering considerations in metallic osteosynthesis which further advanced the nascent field of biomaterials research.



*Professor J Zarek<sup>1</sup>*

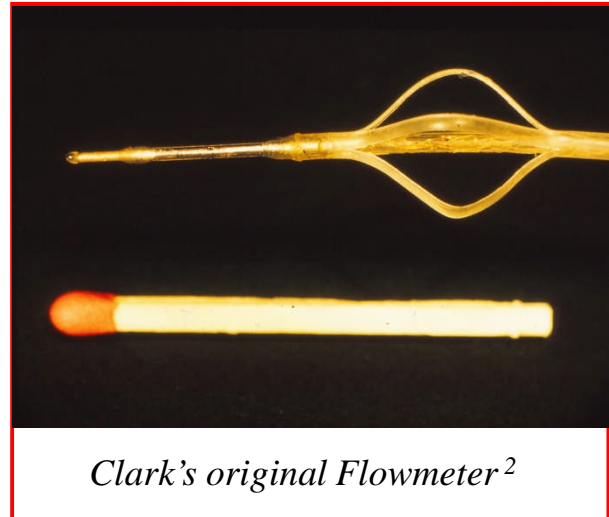
Zarek was a consummate collaborator and in early 1963, by now a Reader in Mechanical Engineering, he was approached by Leonard Cotton, a newly appointed vascular surgeon at King's College Hospital. The target of their collaboration was an acute and potentially fatal post-operative problem - the development of thrombosis in the deep veins of the leg (DVT). A mechanical engineering PhD student, Colin Clark, was recruited and a Biomechanics Laboratory established in the Civil Engineering Department at KCL.

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1. Staff portrait of Professor Zarek (US/PH/2/5/246) From the University of Surrey Archive, University of Surrey, © University of Surrey

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At that time no measurement techniques were available to measure volume blood flow in the veins of the leg, but Clark successfully developed a miniature catheterised thermal dilution flowmeter (smaller than a safety match) which was used in surgery and demonstrated, for the first time, the precipitous fall in blood flow which followed the induction of anaesthesia. The results were published in the British Journal of Surgery in 1968.



By 1966, Joe Zarek had been appointed to a new Chair of Mechanical Engineering at Surrey University. A chance encounter on Waterloo Bridge prompted him to invite one of his former electrical engineering students, Colin Roberts, to join a new MSc degree in Biomechanics that he was to start at Surrey. Roberts accepted the invitation, becoming one of the first cohort of graduates in the UK with an MSc in Biomechanics. But the link with KCH was to develop further and in 1968 Cotton and Zarek received a grant from the Wates Foundation to establish a Biomechanics Unit within the Medical School at Kings and take the research into the haemodynamics of DVT prevention further. Cotton and Zarek were joint Heads of the Unit. Roberts was invited to join the research team, then consisting of a Mechanical Engineer, a Mathematician and a Trainee Surgeon. Several years later Roberts attained his PhD on physical methods of preventing post-operative deep vein thrombosis (DVT), research which ultimately led to the development and marketing of the *BOC-Roberts Venous Flow Simulator*, the first device in the world to almost eliminate the occurrence of DVT. Though the device is no longer in production, the technique of intermittent limb compression is used across the globe and has had a major influence on improving safety of surgery.

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2. *Clark's original Thermal Dilution Flowmeter.* A thermistor temperature sensor can be seen at the tip and there is a second inside the structure close to the four antegrade injector nozzles. The internal sensor measures the temperature of the saline injectate (usually room temperature) while the tip measures the temperature of the mixture of saline and venous blood as it flows past the tip.

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The success of Roberts' researches led to his appointment as Lecturer in Biomedical Engineering and the establishment of a Department of the same name within King's Medical School. The Department's expanding researches into haemodynamics extended into the peripheral arterial system and the non-invasive measurement of vascular disease, through to the microcirculation, lower limb amputation and the design of lower limb prostheses. Roberts was elected President of the Biological Engineering Society from 1976-78 and during his Presidency took the first steps to ensure that those like him who worked as engineers within the medical environment could be professionally Chartered. In 1982 he became the first person in the UK to be Chartered as a Medical Engineer. The BES has since then amalgamated with the Institute of Physical Science in Medicine to become the Institute of Physics & Engineering in Medicine. Roberts edited two of the leading international journals in the field (one of which, *Medical Engineering & Physics*, he founded in 1978) and has been awarded with many distinctions over the years, but most notably his election to Fellowship of the International Academy of Medical & Biological Engineering in 2002. Fellowship is limited to 100 persons worldwide, only a handful coming from the UK.

In 1983 Roberts was appointed to King's first ever Chair of Biomedical Engineering. He was a contributor to the University's Intercollegiate MSc in Bioengineering & Biophysics from 1986-1990 and negotiated its transfer to King's and directed its expansion to become the MSc in Medical Engineering & Physics. It has proved to be an international national leader and prize winner ever since. It included the only course module on Medical Engineering Design in the UK. The latest prize to be won by a graduate of the current MSc in Medical Engineering & Physics is Ms Aisling Barry who received the 2017 Mercia Award for Medical Engineering. This is the 4th time one of our graduates has received this coveted Award – an unprecedented and unequalled achievement. The Award was presented by HRH Princess Anne at the Annual Meeting of the Worshipful Company of Engineers – at a really grand ceremony !

The department's researches into the non-invasive measurement of vascular disease led to the establishment at King's College Hospital of the first clinical laboratory in the UK to use non-invasive methods for the routine diagnosis of arterial disease. The laboratory now sees some 6000 patients every year. In 1990, the Medical School's Department of Biomedical Engineering amalgamated with the Department of Medical Physics at King's College Hospital to become the Department of Medical Engineering & Physics.

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Roberts was appointed as Foundation Professor and Head of the combined Department, a post that he held until his retirement in 2003 by which time it had some 120 staff plus postgraduate students. On the way, Roberts established within the Department, and was Director of, the national Centre of Rehabilitation Engineering (CoRE) whose remit was to provide the educational underpinning for those working within the NHS as Rehabilitation Engineers. By the time of his retirement almost 80% of those practising as professionals in the UK had graduated from one or more of CoRE's courses on rehabilitation engineering.

As a joint NHS/Academic department, Roberts established a regional training programme in Medical Engineering & Physics for those seeking employment in the NHS as Clinical Scientists. The programme proved to be an exemplar and paved the way for an EU-Leonardo collaboration to provide training programmes across the world. Led by King's, the training materials produced during this ten year programme are now used in over 30 countries across the globe. In 2004 the team won the Inaugural Leonardo da Vinci Award for Excellence and Innovation in Vocational Training.

King's had achieved international recognition as a centre for research and teaching in medical engineering, but things were changing at King's. The disestablishment of the Faculty of Engineering was followed by the Medical School's decision that Medical Engineering was not a suitable subject for a Medical School and its department was dismantled. Its unique portfolio of MSc degrees (Medical Engineering & Physics, Assistive Technology (the only course on this subject in the UK at the time), Medical Ultrasound and Vascular Ultrasound) were transferred to strengthen other departments. The impact which the Department has had in all areas of Biomedical Engineering have, over the years, encompassed research, teaching and training of major importance in the delivery of healthcare. Many former research students occupy posts of considerable importance both in the UK and overseas. Many are full Professors, others head Departments of Medical Engineering, a few are and have been Presidents of National and International Societies across the globe.

Fortunately, King's took the decision to use the imaging research being undertaken at Guy's and St Thomas' to open a new chapter in the development of Biomedical Engineering at King's - something which has proved to be enormously successful under the direction of Professor Reza Razavi. Biomedical Engineering activity is now based in one of the UK's centres of excellence for medical imaging in a clinical setting at St Thomas' Hospital, but continues to draw on the resources of Guy's and King's College Hospitals.

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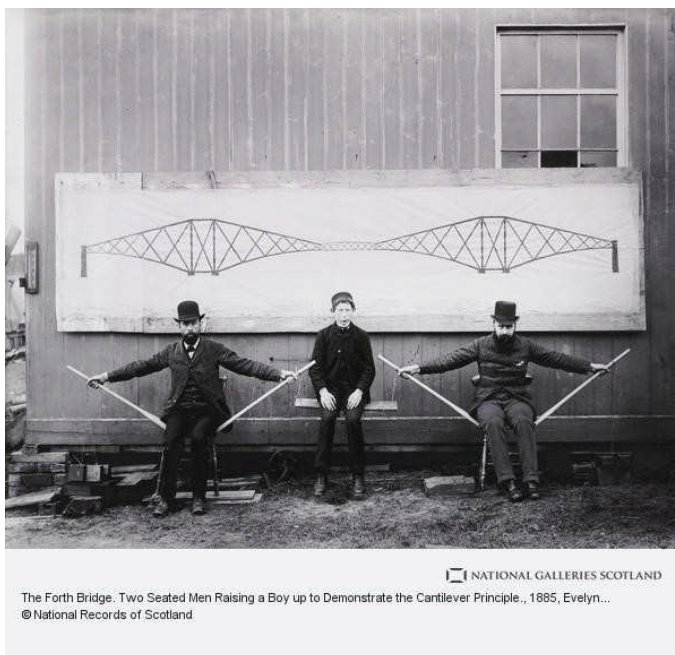




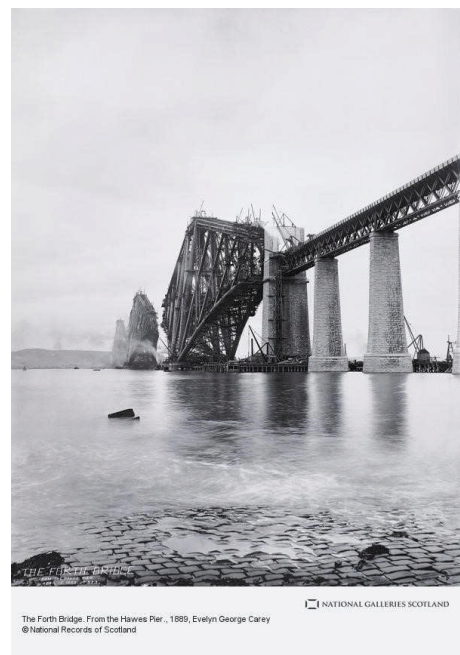
## Did you Know ? *King's Engineers* by Keith Newton



More than 30 iconic photographs of the structural theory and construction of the Forth Rail Bridge were taken between 1882 and 1890 by an Assistant Engineer working on the construction of the bridge who was appointed the official progress photographer. His name was Evelyn George Carey. He was a KING'S ENGINEER.



© National Records of Scotland



© National Records of Scotland

If you are a deep-sea sailor, you may have had occasion to be grateful for the warning lights from lighthouses around the shores of the UK, in particular the Eddystone, off Plymouth and the Bishop's Rock, off the Scilly Isles. William Tregarthen Douglass was initially an assistant to Thomas Edmond and then Superintendent of the construction of the 4<sup>th</sup> Eddystone lighthouse and the dismantling of the upper levels of the earlier lighthouse constructed by Smeaton. After this project he was responsible for supervision of the renovation and reinforcement of the Bishop Rock lighthouse and several others as well as many life-boat stations around the UK's coast. Thomas Tregarthen Douglass was a KING'S ENGINEER





KCLEA Activities  
*KCLEA Annual Lecture*  
by Ted Willis



The annual lecture was given by Professor Luca Vigano on the 27th February 2019 in the K4U.12 Lecture Theatre, King's Building, Strand Campus. As has now been established for the annual lecture, it was very well attended. The topic of the lecture was the concept of 'Explainable Security' (XSec.) based on the 6 W's, (Who?, What?, Where?, When? Why?, and How?) Professor Vigano is the Vice Dean (External Relations) of the Faculty of Natural & Mathematical Sciences and Head of the Cybersecurity Group of the Department of Informatics at King's College London

The lecture was very interesting and informative. It was illustrated with many slides often incorporating well known cartoon characters. It is not surprising that Professor Vigano had recently been presented with a Teaching Excellence Award in a student led competition.

After the lecture drinks and light refreshments were served





Where are they now ?  
*King's Engineers*  
Sarah Manning (*nee* Curtis)



I graduated in Mechanical Engineering in 1983, but sadly I had to abandon Engineering as it was too hard to develop as a graduate Engineer as a “trailing spouse” (*after university it was 10 years in 5 different countries*)  
How is an Engineering career meant to survive that?



I came to Singapore in 1988, with a few brief diversions in Japan and Shanghai - but I am back here again.

Since 1995 I have been a yoga teacher - a vocation that has sustained me and kept me curious and thinking even today.

I talk about materials, energy, peizo electric and semi-conducting connective tissue, structures, tensegrity, stability, stressing of materials - and all of it is body based !!!!

I am currently volunteering for a Channel News Asia documentary on "Work is a Four Letter Wrđ" - coming out in April 2019. I am the nominal over 55'er and it entails filming me facing challenges to get me up to speed in the modern world. These challenges so far are:



1. Check out the Chatbot - through messenger - "Office Yogi" a first level look at posture, stretches, mindfulness - all at the office desk - potentially could develop into a much bigger tool/ office ergonomics/ vitality and creativity/health at a desk
2. And the current challenge is to record and post videos on Skillshare. I have chosen 'Yoga and Fertility', with the current statistics on the drop in sperm count (*guys you need guard your treasures from your mobile phone and figure out some stress (adrenal fatigue) reduction !*)

Otherwise work is, yoga classes in Singapore, facilitating yoga teacher training in Australia or supporting my spouse/grown kids/parents.





## Where are they now ? *King's Engineers* Ken Hubble



### Ken Hubble, King's Engineering 1952-1955 – *a few memories*

Growing up with a father in the automobile business and with a young boy's interest in the military equipment being gathered along the coast prior to D-Day, I just wanted to be an engineer. I was accepted by the Engineering faculty at King's College London University at the age of 17. At that time some students had already completed 3 years of National Service so there was a wide range of ages and maturity in the freshman class. However, the small class size, compared to other London colleges, allowed us to get to know and be supportive of each other very quickly. This of course was in addition to learning to live in the big city from my hometown of Worthing.

KINGS COLLEGE LONDON  
ENGINEERING SOCIETY FINALS, MEN 1955



BACK ROW:  
K. Sathirakul, I. W. Osborne, P. G. Sims, W. S. Kohn, R. W. Mellor, V. S. Clemow, P. A. Hammett, D. G. R. Evans, G. B. Harris.  
SECOND ROW:  
L. A. Harris, M. K. Eley, B. A. Partridge, R. C. Hipkin, M. F. Marks, A. Pryor, J. M. Campbell, B. T. Scales, P. A. Thomas, K. Hubble, W. Robinson.  
FRONT ROW:  
R. W. Studden, M. J. Saller, K. V. Buton, Prof. J. Greig, G. D. Blunt, Prof. S. J. Davies, J. R. Melluish, Prof. A. D. Ross, M. R. Quirk, I. S. Harvey, A. T. Holmes.

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## Ken Hubble, King's Engineering 1952-1955 – *a few memories ...continued*

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I had to work hard to keep up academically but still found time to help the rest of the engineers protect Reggie, participate in other typical student nonsense and represent Kings in tennis, table tennis and soccer. With lodgings in Clapham South, I could easily meet with friends in Halliday Hall and it was convenient to the Mitcham sports facility. I will never forget the 'Great Fog' of '52 and somewhere in this period 'Belisha Crossings' were introduced and the Engineering Society celebrated the event with a continuous parade from Waterloo Bridge down to the Embankment bringing traffic on both to a halt.!

Although my goal was mechanical engineering, I will be forever grateful that the King's method had all of us studying mechanical, electrical and civil engineering subjects for the first two years before specializing. It gave me the desire to learn new skills at every opportunity and English Electric/Marconi (British Aerospace), Honeywell, Sperry and Lockheed Martin provided such opportunities for a very satisfying career in aerospace engineering and management.



Come 2020 I will have been retired 25 years. Had to give up tennis in 2014 but my lifelong interest in classic cars continues – present, 1954 XK120 OTS and past, 1939 SS100 roadster (Murray Motor Museum, Elgin Scotland). I also keep busy hand caning antique chairs, a hobby 'picked up' from a relative on visits to the UK.



*My 1939 SS100 roadster*



*My 1954 XK120 OTS*

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## Obituaries

*Engineers who have  
sadly died in the past year*



The KCLEA has been notified of the following deaths

<i>Name</i>	<i>Discipline</i>	<i>Class of:</i>
Christopher Pennington	Mechanical	1954
John Wragg	Engineering	1952
Denis Dowling	Engineering	1951

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## Editor's Oddment by Mike Clode



Keeping in touch with our Engineering Alumni will hopefully be easier now that we have a new WEB site that is managed by the KCLEA Committee. A huge thanks must go to Al Steger-Lewis who has who has managed to keep the old site going for many years with little input from the committee. Our Treasurer, John Thomson, has created the new site which will be further developed by the Committee.

I was really pleased to receive articles from Sarah Manning and Ken Hubble for the 'where are they now' feature. I would love to receive a lot more of these. Go on, don't be shy !

The article on the history of Biomedical Engineering by Professor Colin Roberts was very interesting and I am sure will be equally interesting to past and present Engineers.

Colin also sent me a lovely photograph of him in the 2009 London to Brighton veteran car run. The Photograph shows Colin in a 1904 Steam powered Stanley. His co-driver was a thoracic surgeon



Xmas 2018 Poser answers:

1. The odds remain at 1/3
2. The student sleeps at night

Check out Sarah's 'Work is a for letter word' Available on line NOW

*I will leave you with a thought.*

**“A common mistake that people make when trying to design something completely foolproof is to underestimate the ingenuity of complete fools.”**

*Douglas Adams*

If you have any contributions to the Engineering Alumni of King's please e-mail me at [kclea@clode.net](mailto:kclea@clode.net). I am happy to consider contributions of all types, especially self indulgent ones. I wish you all the very best and look forward to hearing from you.