

Engineering TheFuture of Medicine

Since the growth of the field of medicine through Ibn Sina and his masterpiece *Al-Qanun fit-Tibb* (The Canon of Medicine), the health care system mainly comprised of the doctor, his education, and his “utility bag”. This system changed at the turn of the 20th century through technological innovations brought about by professionals with engineering backgrounds. These “medical engineers” have unique expertise that is often needed to bridge traditional engineering skills and conventional medical practices. They are now considered as part of the medical teams who are seeking new solutions for the challenging health care problems confronting our society. The impact of the synergies between doctors and engineers has been so intense that the health care systems worldwide transformed from a passive institution for the sick into a technologically sophisticated centre of excellence, with technical and clinical staff operating the latest medical gadgets. Medical engineers have played a significant role in this advancement and will continue to play a major role in reshaping the future of medicine and health care systems.



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**PROF. IR. DR. HJ.
MOHAMMED RAFIQ
BIN DATO' HJ. ABDUL KADIR**
Professor of Medical Engineering

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Biodata

**Prof. Ir. Dr. Hj. Mohammed Rafiq
Bin Dato' Hj. Abdul Kadir**

Mohammed Rafiq was born in Johor Bahru on the 15th day of the blessed month of Zul-Hijjah 1395 Hijri (December 18, 1975). His father is Dato' Hj. Abdul Kadir bin Hj. Sam'on, and his mother is Datin Hj. Sara binti Hj. Mohamed. He received his primary education from Sekolah Kebangsaan Temenggong Abdul Rahman (1), Johor Bahru. He started his secondary education at Sekolah Menengah Kebangsaan Agama Maahad Muar until form 3 and then at Kolej Islam Sultan Alam Shah (KISAS) until form 5.

In 1993, he received a government scholarship under the British-Canadian Top Universities (BCTU) programme to further studies in the United Kingdom. He spent two years at the Hurstpierpoint College, West Sussex, and completed his A-level with straight As and received awards as the best student in Mathematics and Further Mathematics. He was then admitted to Imperial College London to study mechanical engineering, where he was one of the top ten students in his batch, and completed his final-year project with Rolls-Royce. After graduating in 1999, he went back to Malaysia and worked as an engineer at SNC Laminates Sdn. Bhd. and then at Seksun Technology (Johor) Sdn. Bhd.

He spent a year at the University of Cambridge in 2001 for postgraduate studies before returning to Imperial College London for a full-time research leading to a PhD degree. He completed his medical engineering research in August 2005, where his thesis on cementless hip arthroplasty was accepted without a single correction. He then joined Universiti Teknologi Malaysia (UTM) as a lecturer with the Faculty of Mechanical Engineering and was promoted to senior lecturer in 2008. He was promoted to Associate Professor in October 2010, and three years later promoted to full Professor.

Prof. Rafiq is one of the country's leading figures in medical engineering research. He set up the Medical Devices & Technology Group (MEDITEG) in 2006, and within a span of six years, the group that he pioneered secured 60 research projects with a total grant close to RM14 million. He has published over 170 articles in internationally refereed indexed journals with a cumulative impact factor of 126.687 and his current h-index is 10. Some of his works were published in Q1 medical journals, such as *Journal of Dentistry* and *Journal of Orthopaedic Research*. He is an associate editor for the ISI *Journal of Medical Imaging and Health Informatics* and a reviewer for several Q1 ISI journals such as *Materials Letters*, *Journal of Biomechanics*, and *Journal of Engineering in Medicine*. He holds 22 granted patents, 32 patents pending, 36 copyrights, and 1 product for dentistry already commercialised by Pharmaniaga Bhd. He has published three books and 93 conference proceedings. He is the recipient of UTM's Overall Best Research Award, UTM's Intellectual Property Award and UTM's Best Paper in National Journal Award, as well as several research awards at faculty's level.

Prof. Rafiq was a key player in the establishment of the Faculty of Biomedical Engineering and Health Sciences in UTM. He spent two years with other committee members preparing all the required paperwork and successfully defended the proposal with the relevant ministries until the new faculty was approved by the government in September 2007. He was immediately appointed as the Head of the Department of Biomechanics and Biomedical Materials and held the post for two terms. In 2011, he was appointed as the Deputy Dean for Research and Graduate Studies. After the faculty merger with the Faculty of Biosciences and Bioengineering, he has been entrusted to be the Deputy Dean for Development.

He is a Professional Engineer (P.Eng.) registered with the Board of Engineers Malaysia and a corporate member of the Institution of Engineers Malaysia. He is also an associate member of the Institution of Mechanical Engineers, United Kingdom. He has been invited in numerous occasions to give presentations to medical practitioners nationwide on the synergies between doctors and engineers.

For academic teaching, he developed and taught four new courses: Biomechanics, Biomedical Materials, Biomedical Engineering Design, and Tissue Engineering. Other courses that he taught include Materials Science, Advanced Materials, Materials Technology, Engineering Drawing, and Experimental Techniques. He has successfully supervised 9 PhD and 27 master's research students and is currently supervising 12 doctoral and 3 master's candidates.