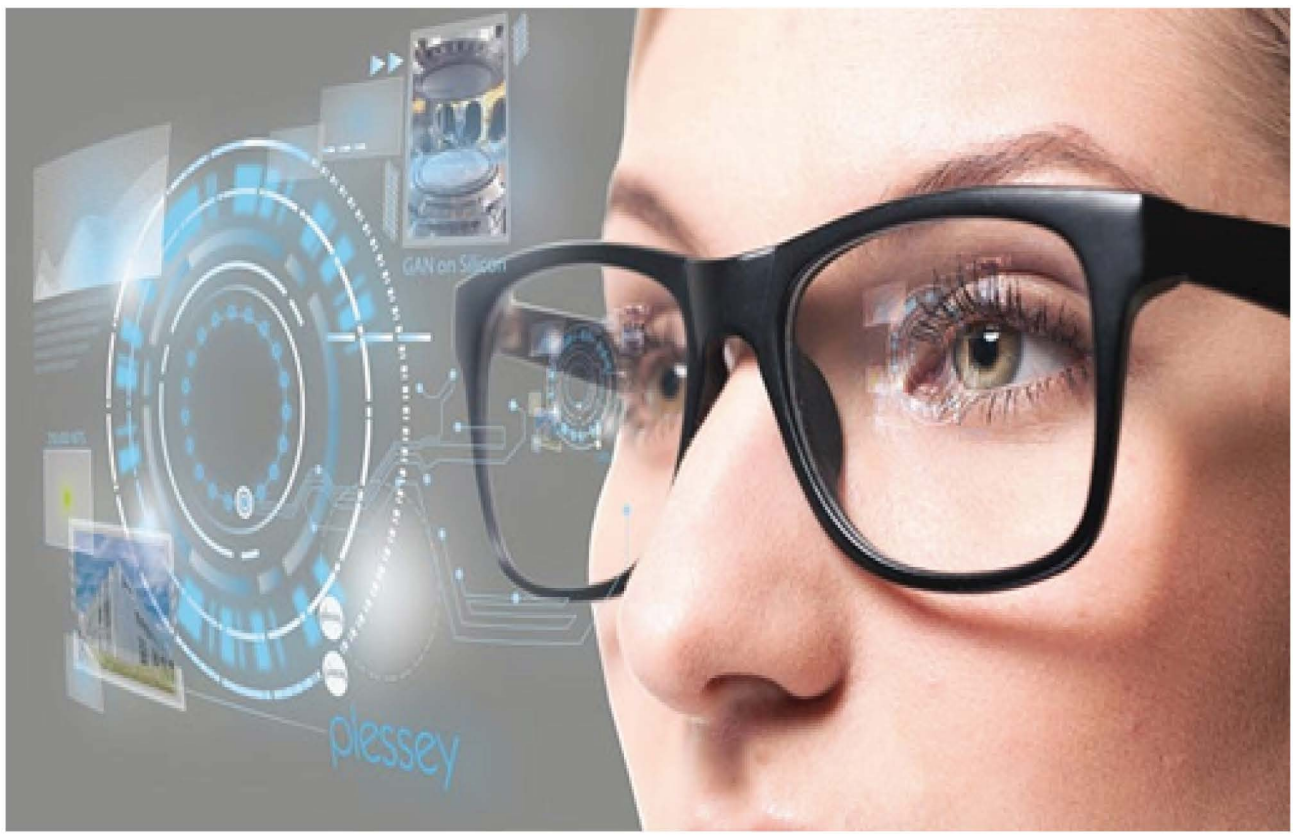
Artificial Intelligence and Quantum AI in Cardiovascular Medicine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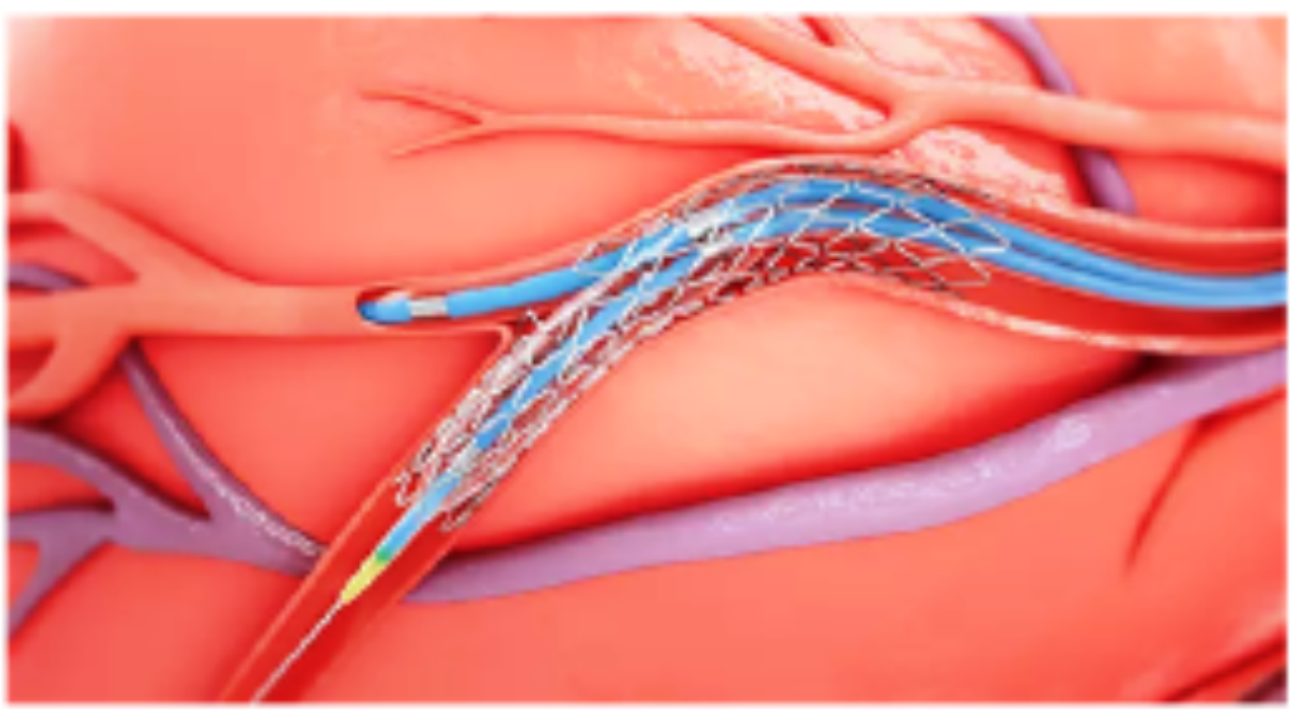

Artificial Intelligence and Quantum AI in Cardiovascular Medicine

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Science and technology are constantly changing fields. New research and experience broaden the scope of information and knowledge. The author has tried his best in giving information available to him while preparing the material for this book Although all efforts have been made to ensure optimum accuracy of the material, yet it is quite possible some errors might have been left uncorrected. The publisher, the printer and the author will not be held responsible for any inadvertent errors, omission or inaccuracies.

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I am also very grateful to my wife Dr (Mrs) Urmil Kanta Verma, formerly Prof. in the department of blood transfusion medicine and pathology for providing me a perfect congenial atmosphere and all material and moral support needed for writing such a voluminous book: **'Application of Artificial Intelligence and Quantum AI In Cardiovascular Medicine'**.

To my grand children, Advita, Sidhant Leena, Meera and Deven. (USA)

(Author)

FOREWORD

Dr KC Verma an eminent cardiologist practising in Jammu (J&K) has done a commendable job in writing a book ***"Application of Artificial Intelligence and Quantum AI In Cardiovascular Medicine':*** "The book is an exhaustive work covering all aspects of Artificial intelligence in diagnosis , prediction of prognosis and guidance in a particular disease. It gives details of entire subject on the various innovations which have taken place over the past a few years ,especially on impotant topic of **"Ocular images-based on Artificial intelligence in diagnosis of Systemic diseases"**

I know Dr Verma for more than 3 decades and always found him a very inquisitive person very well read and always practising ethical medicine. He has been an excellent teacher for his younger colleagues. The book should be of a great help to the practising cardiologists / Reserch scholars / cardiac fellows / cardiology residents and DM cardiology scholars in revising and refreshing their already acquired knowledge. it would, therefore, have a greater repurcussion in managing their patient with current techniques with mjnjmal cost and least morbidity and mortality. I recommend this very well written book for all the busy physicians and cardiologists who want evidence based guidance for treating their patients.

Prof. (Dr) Sanjay Tyagi

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DEDICATION

Dr. Dabbala Rajagopal "Raj" Reddy (born 13 June 1937) is an Indian-born American computer scientist and a winner of the Turing Award. He is one of the early pioneers of artificial intelligence and has served on the faculty of Stanford and Carnegie Mellon for over 50 years. He was the founding director of the Robotics Institute at Carnegie Mellon University. He was instrumental in helping to create Rajiv Gandhi University of Knowledge Technologies in India, to cater to the educational needs of the low-income, gifted, rural youth. He is the chairman of International Institute of Information Technology, Hyderabad. He is the first person of Asian origin to receive the Turing Award, in 1994, known as the Nobel Prize of Computer Science, for his work in the field of artificial intelligence.

Reddy is the University Professor of Computer Science and Robotics and Moza Bint Nasser Chair at the School of Computer Science at Carnegie Mellon University. From 1960, he worked for IBM in Australia. He was an Assistant Professor of Computer Science at Stanford University from 1966 to 1969. He joined the Carnegie Mellon faculty as an associate professor of Computer Science in 1969. He became a full professor in 1973 and a university professor, in 1984.

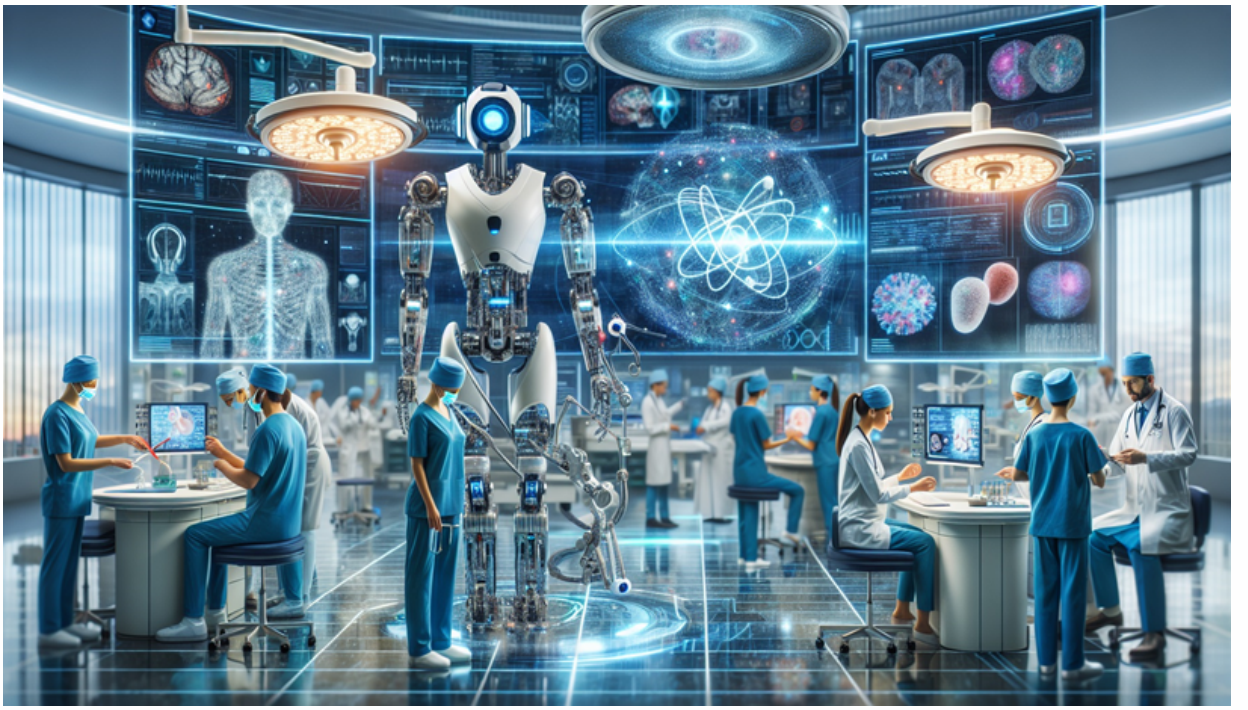
Artificial Intelligence Research

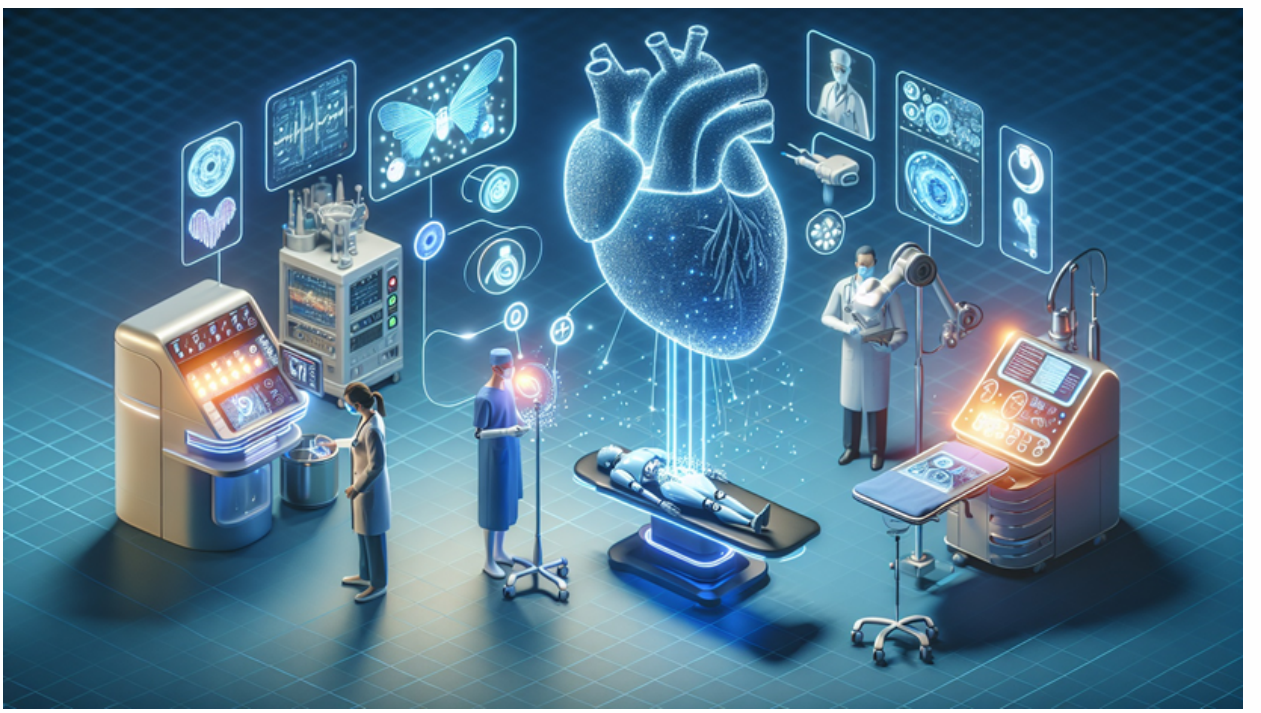
Reddy's early research was conducted at the AI labs at Stanford, first as a graduate student and later as an assistant professor, and at CMU since 1969.His AI research concentrated on perceptual and motor aspect of intelligence such as speech, language, vision and robotics. Over a span of five decades, Reddy and his colleagues created several historic demonstrations of spoken language systems, e.g., voice control of a robot, large vocabulary connected speech recognition, speaker independent speech recognition, and unrestricted vocabulary dictation. Reddy and his colleagues have made seminal contributions to Task Oriented Computer Architectures, Analysis of Natural Scenes,Universal Access to Information, and Autonomous Robotic Systems.Hearsay I was one of the first systems capable of continuous speech recognition. Subsequent systems like Hearsay II, Dragon, Harpy, and Sphinx I/II developed many of the ideas underlying modern commercial speech recognition technology as summarized in his recent historical review of speech recognition with Xuedong Huang and James K. Baker. Some of these ideas—most notably the "blackboard model" for coordinating multiple knowledge sources—have been adopted across the spectrum of applied artificial intelligence

Awards and honors

He is a fellow of the AAAI, ACM, Acoustical Society of America, IEEE[and Computer History Museum.. Reddy is a member of the United States National Academy of Engineering, American Academy of Arts and Sciences, Chinese Academy of Engineering, Indian National Science Academy, and Indian National Academy of Engineering. He has been awarded honorary doctorates (Doctor Honoris Causa) from SV University, Universite Henri-Poincare, University of New South Wales, Jawaharlal Nehru Technological University, University of Massachusetts, University of Warwick, Anna University, IIIT (Allahabad), Andhra University, IIT Kharagpur, Hong Kong University of Science and Technology, Rajiv Gandhi University of Knowledge Technologies, and Carnegie Mellon University.\ In 1994 he and Edward Feigenbaum received the Turing Award, "for pioneering the design and construction of large scale artificial intelligence systems, demonstrating the practical importance and potential commercial impact of artificial intelligence technology." In 1984, Reddy was awarded the French Legion of Honour by French President François Mitterrand. Reddy also received Padma Bhushan, from the President of India in 2001, the Okawa Prize in 2004, the Honda Prize in 2005, and the Vannevar Bush Award in 2006

Dr. K. C. VERMA
(MD DM)





PREFACE

Artificial intelligence (AI) is a growing phenomenon, and will soon facilitate wide-scale changes in many professions, including medical education. In order for medical educators to be properly prepared for AI, they will need to have at least a fundamental knowledge of AI in relation to learning and teaching, and the extent to which it will impact on medical education. This Guide book begins by introducing the broad concepts of AI by using fairly well-known examples to illustrate AI's implications within the context of education. It then considers the impact of AI on medicine and the implications of this impact for educators trying to educate future doctors. Drawing on these strands, it then identifies AI's direct impact on the methodology and content of medical education, in an attempt to prepare medical educators for the changing demands and opportunities that are about to face them because of AI. The names of various chapters which have been discussed in this book "Application of Artificial Intelligence In Cardiovascular Medicine" are as follows:-

What is Artificial Intelligence?, Artificial intelligence-enhanced Electrocardiography in cardiovascular disease management, Artificial intelligence in advances in the World of Cardiovascular Imaging, Artificial intelligence in hypertension management, Artificial intelligence in Atherosclerotic Cardiovascular Disease,. AI in cardiovascular imaging for risk stratification in CAD, Current and future applications of Artificial intelligence in Coronary artery disease, Machine Learning and Artificial intelligence to improve Peripheral artery disease management, Artificial intelligence and automation in Valvular heart diseases, Artificial intelligence in diagnosis and Management of Cardiac arrhythmias, Ocular images-based Artificial intelligence in diagnosis of Systemic diseases including cardiovascular ailments,Artificial intelligence in Pediatric Cardiology, The future of Cardiothoracic surgery in Artificial intelligence, Artificial intelligence in the diagnosis and detection of heart failure, Artificial intelligence in guidance of advanced heart failure therapies: Artificial Intelligence and cardiac Magnetic Resonance imaging in myocardial Infarction (CAD), Artificial Intelligence / Machine learning for predicting cardiac events What does the future hold? Artificial intelligence-based Smart Comrade Robot for elders healthcare,. Emerging role of Artificial intelligence in cardiac electrophysiology, Applications of ChatGPT in medical practice, education and research, Educating future physicians in Artificial intelligence., Will AI eventually replace Doctors?, Artificial intelligence advancements in the cardiovascular imaging of Coronary atherosclerosis, Artificial intelligence-(AI) empowered Echocardiography interpretation, AI empowered diagnosis of Epicardial, Pericardial Fat and Pericardial effusion., Implantable cardiac Pacemakers embedded with Artificial intelligence. Artificial Intelligence, wearables & remote monitoring for heart failure. The role of Artificial intelligence (AI) in clinical practice, Artificial intelligence in the differential diagnosis of Cardiomyopathy phenotypes and Artificial intelligence in cardiovascular medicine: current insights and future prospects. Since it was not possible to accommodate the detailed descriptions of the other newer innovations in the field of Cardiology, hence brief notes have been added in the last chapter of this book. Quantum AI is an emerging field that combines quantum computing and artificial intelligence to create powerful new algorithms. It leverages the ability of quantum computers to process vast amounts of data exponentially faster than classical computers, allowing AI models to tackle complex problems that are currently intractable. This integration has the potential to revolutionize fields like machine learning, data analysis, and optimization. I have also discussed the role of Quantum AI in cardiology which is gaining importance in cardiology.

Quantum AI in cardiology uses quantum principles to enhance AI models for superior diagnostics, personalized risk prediction, faster drug discovery, and more detailed cardiac imaging, leading to earlier detection, more precise treatments, and better patient outcomes. Key applications include quantum-enhanced sensors for heart conditions like atrial fibrillation, improved imaging for better scans, and quantum machine learning for complex patient data analysis and treatment optimization.

This book in its present format and educative contents of various selective chapters, is certainly would be very informative particularily better understanding of recently introduced Artificial intelligence technology, to research scholars, practicing cardiologists, post-gradutes including DM cardiology, senior residents of cardiology and medicine.

Dr. K. C. VERMA

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