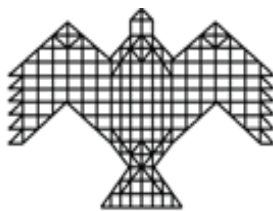


International Workshop on Futuristic Healthcare Technologies Emerging Trends: Telemedicine and Medical Drones



Organized by
National Design and Research Forum
The Institution of Engineers (India)

16-17
December
2017



National Institute of Advanced Studies

In association with
Apollo Tele Health Services
National Institute of Advanced Studies

Venue
**Apollo Children's Hospital Auditorium 4th
Floor, No. 15 Shafee Mohammed Road
Thousand Lights, Chennai**

In Association With



Sponsored by



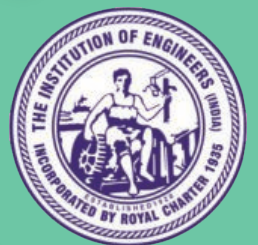
ICMR



ER&IPR



National Design and Research Forum
The Institution of Engineers (India)
#3, Dr. B.R. Ambedkar Veedhi
Bangalore – 560 001



Phone No: **080-22264336**



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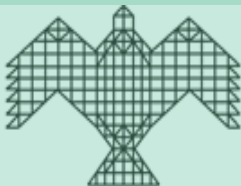
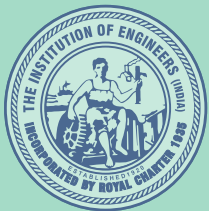
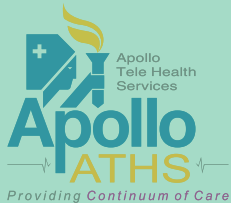
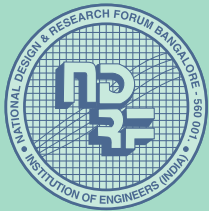
Shri. Harish Betageri, Research Associate, BMSCE

Shri. Akhilesh Kumar, Research Associate, NDRF

Shri. Mohammed Aejaaz Tumkur, Research Associate, NDRF



MESSAGES



National Institute of Advanced Studies



Prof. Baldev Raj, FTWAS, FNAE, FNA, FASc, FNASc
Director, National Institute of Advanced Studies
Indian Institute of Science Campus, Bangalore.



NATIONAL INSTITUTE OF ADVANCED STUDIES

Indian Institute of Science Campus, Bangalore - 560 012, INDIA

Prof. Baldev Raj, FTWAS, FNAE, FNA, FASc, FNASc
Director

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Message

National Design and Research Forum (NDRF), is an autonomous R&D wing of The Institution of Engineers (India) has been conducting focussed Seminars and Workshops on niche subjects of National Strategic and Societal impact. The International Workshop on Futuristic Healthcare Technologies: Emerging Trends: Telemedicine & Medical Drones is one such important Workshop that is being conducted during 16-17 December 2017, at Apollo Hospital, Chennai in association with National Institute of Advanced Studies (NIAS) and Apollo Tele-Health Services (ATHS).

This Workshop addresses the issues of transportation of Medical Supplies in particular human organs (heart, lung, kidney, and liver) during Medical Emergencies to distant and remote areas (urban and rural), utilizing Unmanned Medical Drones. This technology involves development of suitable unmanned vehicle and organ containers which can be transported across 250 -300 km within a time span of 2-3 hrs. This Workshop is aimed at identifying technology gaps and technologies required for developing indigenous passive and active organ containers for transportation by Unmanned Drones. Development of Organ Container is a multi-disciplinary program covering medicine biology, electronics, and mechanical engineering involving collaborative work among doctors, engineers and medical technicians. The interdisciplinary domains of telemedicine and healthcare Systems in the Country will also be deliberated during this Workshop as the organisers consider it important to improve on the delivery mechanisms at affordable cost, without sacrifice in quality.

I thank Dr. K. Ganapathy, President, Apollo Telemedicine Networking Foundation and his team for their sustained efforts in organising this Workshop. I extend my special thanks and gratitude to Dr. Prathap C Reddy, Chairman, Apollo Hospitals Group for extending his wholehearted support to NDRF in the organization of this International Workshop. I hope that the deliberations during the Workshop along with the continued support of Apollo Hospitals to NDRF will enable achieving development of an Indigenous Medical Drone for emergency medical supplies and transportation of human organs across the vast reaches of the Country to reach remotest parts in tune with our national objective of Healthcare for all.

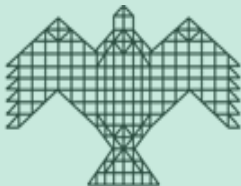
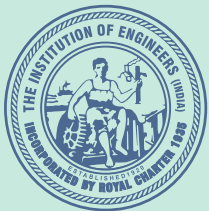
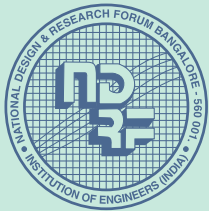
I wish the organizers and participants success in meeting the objectives and friendship to grow collaborations of interest and value to their organisations and the country.


Baldev Raj

Place: Bangalore

Date: 12th December 2017

Chancellor, Academy of Scientific and Innovative Research (AcSIR) | Distinguished Scientist & Former Director, Indira Gandhi Centre for Atomic Research, DAE |
Past President, International Council of Academies of Engineering and Technological Sciences | Past President, Indian National Academy of Engineering |
Hon. Member, International Committee on NDT | Hon. Fellow, International Medical Sciences Academy | Fellow, German National Academy of Sciences



National Institute of Advanced Studies



Dr K. Ramachandra

Director, National Design and Research Forum
Bangalore.



NDRF

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Dr. Baldev Raj
Chairman, Board of Governors

Dr. K. Ramachandra, FIE
Director

MESSAGE

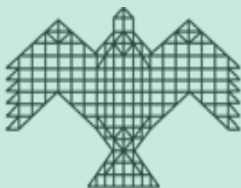
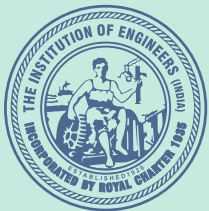
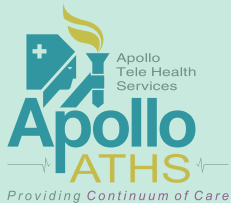
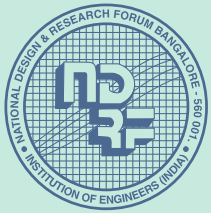
It is gratifying to see that this Workshop of importance and relevance to our societal needs, health care in particular, which was seeded as a concept-note just a few months back is indeed becoming a reality, with close cooperation between the National Design and Research Forum and the Apollo Hospitals. As the first of the three events planned in the coming years, this Workshop is an attempt to bring together Doctors, Engineers, Hospitals, NGOs and Regulators and identify critical technological areas to be tackled to make the dreams of launching Medical Drones in the Country come true.

Though ambitious, I am certain that this small but focused group of experts in multi-disciplinary fields will work together to forge a plan of action to raise the technology-readiness levels in the Country to that of global levels, especially in the development of emergency medical-drones & organ-transport drones, and discuss processes to operationalize these aerial medical systems within a few years. Participation of both Indian and International experts, including those of Apollo Hospitals in this Workshop will certainly add momentum to the on-going Telemedicine Programs in the Country

I wish all the participants good networking opportunity and exchange of ideas during this unique Workshop and hope this will lead to faster realization of products and processes to improve health-care systems in our Country

(Dr. K Ramachandra)





National Institute of Advanced Studies



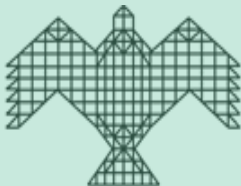
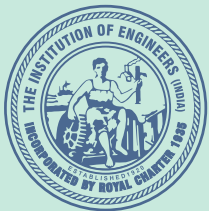
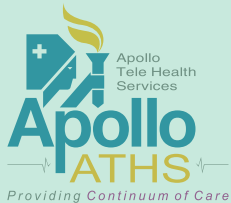
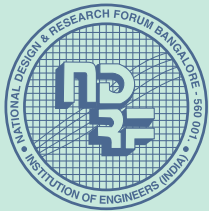
Dr. Prathap C Reddy
Chairman, Apollo Hospitals Enterprises Ltd.



Dr. PRATHAP C REDDY
Chairman, Apollo Hospitals
9th December, 2017

I am glad to know that Apollo Telehealth Services in conjunction with the National Design and Research Forum of the Institution of Engineers India is organising an International Workshop on "Futuristic Healthcare Technologies". It is particularly noteworthy that deployment of medical drones will be discussed. That ICMR, DRDO and the National Institute of Advanced Studies have associated themselves with this workshop speaks for itself. I am particularly happy that many transplant surgeons will be discussing the challenges of storage and quick dispatch of retrieved organs. Transplant Institutes of the Apollo Hospitals Group constitute one of the world's largest and the most comprehensive solid organ transplant programs. It is particularly relevant that this workshop is being held at Apollo Hospitals, Chennai, where, the first multiple organ transplant in India, occurred on December 25th 1995. Tamil Nadu has consistently been the leading state in the country in carrying out cadaveric transplants. Contemplating the use of medical drones reiterates that we are always future ready. I once again congratulate Dr K Ramachandra Director NDRF for taking this initiative and Prof K. Ganapathy for ably supporting him. I wish the programme all success.

Dr Prathap C Reddy



National Institute of Advanced Studies



Ms. Sangita Reddy

President, Apollo Telemedicine Networking Foundation,
Chennai, India



Sangita Reddy

Joint Managing Director | Chairperson
Apollo Hospitals Group | Apollo Knowledge

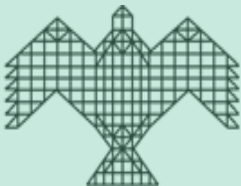
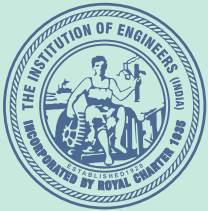
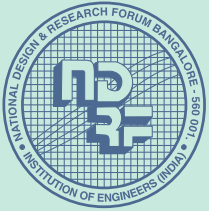
I am glad to know that the National Design and Research Forum of the Institution of Engineers, India is organising an international workshop on “Futuristic Technologies” in conjunction with Apollo Telehealth Services. It is a sign of the times that we are getting future ready. It is noteworthy that emerging areas like medical drones and the future of Telemedicine are being discussed. Drones could particularly be useful during disaster and emergencies when time is crucial. Google has already patented a device that can call for a drone in an emergency. A UAV can be dispatched without human interaction and could cover a distance “as the Crow flies”. UNICEF is testing feasibility of transporting lab samples in Malawi, Tanzania, Rwanda, Madagascar and other countries. Drones can reduce a 4-hour delivery time to 15 mins. Medical products can be dropped, landing gently and accurately at the health facility in an open area, the size of a few parking spaces. Although regulators are catching up with drone technology, there are many concerns

Rome was not built in a day. Creating awareness among stakeholders is the first step. Apollo Telehealth Services has always been in the forefront in deploying tomorrow’s technology today. Health Net Global is another example of a future ready organisation providing one stop integrated Emergency and Healthcare Management and remote high quality cost effective solutions using reliable and high-speed technology also promoting wellness the eWay .

We look forward to closely working with NDRF and other engineers, technologists and scientists to carry out pilot projects in the real world. I am confident that in spite of what appears to be insurmountable obstacles today, “ medical drones” in India will soon be a reality. I congratulate Dr Ramachandra and Prof Ganapathy for spearheading this initiative.

Sangita Reddy

7th Dec 2017



National Institute of Advanced Studies



Prof. K. Ganapathy

President, Apollo Telemedicine Networking Foundation,
Chennai, India

It is a privilege for Apollo Telehealth Services to be associated with the National Design and Research Forum of the Institution of Engineers, India in helping organise this international workshop on “Futuristic Technologies”. The future is not something we enter. The future is something we create. The future is always ahead of schedule. In 2016, about 9.4 Million drones were sold and this number is expected to grow exponentially. Amazon has already started delivering popcorns using drones. Books, beer and cakes will soon fall from the sky. The world’s largest shipping company UPS has started developing its drone fleet. Deployment of drones for healthcare will eventually be a reality. Safety, accuracy, speed and special packing and coolers for transport of medical samples, blood and organs would be necessary. The healthcare industry has always been conservative in modifying or adopting cutting-edge technology to suit their specific requirements. However, we no longer follow the west. We used to piggy back and even leap frog. But then, how far can a frog leap? Today we pole vault ! Taking the first baby steps to make “Medical Drones” a reality in India is proof enough.

I wish the programme all success and once again applaud NDRF and its director Dr Ramachandra for having the conviction to take the initial steps.



PROGRAM SCHEDULE

PROGRAM SCHEDULE			
Date:16/12/2017, Saturday		DAY-I	
Registration			0800 - 0900
Session I: Challenges in Organ Preservation and Transport		CHAIRPERSON: Dr Amalorpavanathan	
Sl.No	Name and Affiliation	Title of the Talk	Duration
1	Dr R Surendran	Administrative Challenges in Mobilizing Liver for Transplant	0900 - 0920
2	Dr Anil Vaidya	Normothermic Liver Preservation	0920 - 0940
3	Dr Gomathy Narasimhan	Recent advances in preservation techniques in Liver transplantation - how can we improvise to adapt to our scenario Liver for Transplant	0940 - 1000
Audience Interaction			1000 - 1015
Tea & Networking			1015 - 1030
Session II: Challenges in Organ Preservation and Transport		CHAIRPERSON: Dr Thais Russmano	
1	Dr K R Balakrishnan	Heart Transplants Non Medical Challenges	1030 - 1050
2	Dr Paul Ramesh	Biochemical basis for optimal transportation of heart and lungs for transplantation	1050 - 1110
3	Dr T V Gopal	Some Meta-Physical Perspectives of Technology Enabled Healthcare	1110 - 1130
Audience Interaction			1130 - 1145
Inauguration			1145 - 1245
1	Welcome Address	Dr K. Ganapathy	1145 - 1150
2	Workshop Objectives	Dr K Ramachandra	1150 - 1155
3	Invocation & Lighting the lamp		1155 - 1200
4	Address by Chief Guest	Dr Prathap C Reddy	1200 - 1215
5	Healthcare Services	Ms Sangita Reddy	1215 - 1230
6	Presidential Address	Shri Ravi Ramaswamy	1230 - 1240
	Vote of Thanks	Shri R. Vijay Krishna	1240 - 1245
Session III: Telemedicine and Healthcare		CHAIRPERSON: Dr K Selvakumar	
1	Dr K Ganapathy	Future of Telemedicine	1245 - 1305
2	Dr Thais Russmano	Deployment of Technology in Space Medicine	1305 - 1325
3	Dr Russell Andrews	Drones in Disaster Management (thro VC)	1325 -1345
Audience Interaction			1345 - 1400
Lunch & Networking			1400 - 1430

Session IV: Group Discussion			CHAIRPERSON: Prof. S. N. Omkar
1	Shri Arun Shroff	Revolutionising Healthcare with Artificial Intelligence	1430 - 1450
2	Shri Ravi Ramaswamy	Healthcare in India	1450 - 1520
3	Prof B. Guru Murthy	LifeBox: An active heart perfusion container for extending preservation times during transport by drones.	1520 - 1550
Group Discussion			1550 - 1615
Date:16/12/2017, Saturday DAY-II			
Session V: Drones for Emergency Medical Care			CHAIRPERSON: Dr K Ganapathy
1	Dr Ganesh Subramanian	Introduction of Drones: A Story from Panimalar Engineering College	0900 - 0920
2	Dr Kota Hariyanaryana	Challenges of Medical Drone Operations	0920 - 0940
3	Dr K Ramachandra	Active and Passive Organ Containers	0940 - 1000
4	Prof. Senthil Kumar	Design And Development of Unmanned Aerial Systems for Medical Emergency	1000 - 1020
Audience Interaction			1020 - 1040
Tea & Networking			1040 - 1100
Session VI: Challenges in Design of Organ Containers & Transportation			
CHAIRPERSON: Lt. Gen. Dr. V. J. Sundaram, PVSM, AVSM, VSM(Rtd)			
1	Dr Santosh Varghese	Organ storage and transportation challenges in Kidney Transplants	1100 - 1120
2	Shri Nagendran. K	Medicopter- An Autonomous Drone	1120 - 1140
3	Ms Ayushi Mishra	Advances in design of organ preservation systems and their application in delivery through drones.	1140 - 1200
Audience Interaction			1200 - 1215
Session VII: Challenges in Deploying Drones in Healthcare			Moderator: Dr Sunil Shroff
1	Dr K Sridhar, Ms Ramya Kannan, and other selected Speakers	Panel Discussion with Audience Participation	1215 - 1315
Lunch & Networking			1315



ABOUT ORGANIZATIONS



National Design and Research Forum

National Design Research Forum (NDRF) established by the Institution of Engineers (India) [The IEI], has been promoting Research, Design, Development, and Innovation initiatives through collaborative effort since 1969. NDRF is anchoring interdisciplinary technological research in many engineering disciplines including for societal applications, and plays a major role in deploying engineering and technology services, systems, and solutions for nation building.

Over the years, NDRF has transformed itself and grown from being the captive engineering R&D Wing of The IEI to India's leading collaborative R&D ecosystem with significant indigenous capabilities in Micro Air Vehicles, Rapid Prototyping, Chemical and Bio-Sensor Systems, and Biomedical Devices.

NDRF has been successful in expanding the scope and quality of engineering research by building a collaborative platform of academia; research organizations; and entrepreneurs and industry; and continues to strive to grow the envelope of research

activities in the collaborative mode to address societal needs. NDRF can leverage the growth till date to expand into the following areas:

- ❖ Advanced and Enabling Technology Hub • Centre for Technologies and Agents for Social Impact
- ❖ Agency for Advisory Role and Policy Guidelines to State and Central Government Agencies
- ❖ Technology Forecasting
- ❖ Skill Development and Manpower Upgradation

By doing this, NDRF will develop a multi-pronged framework to handle the entire lifecycle of activities to promote deployment of engineering advances to address India's needs for economic and social development; progress activities on multiple fronts to leverage the successes achieved till date; and realize the goal of promoting and advancing the science and practice of engineering design in all branches of engineering.

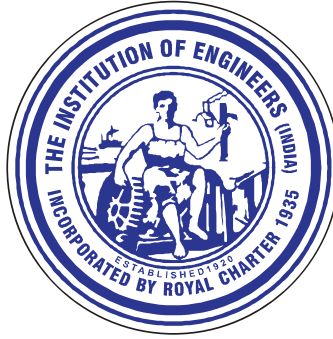
NDRF's activities will need to expand from the current "project-driven" Research and Development to strategic Research and Development; technical support to technical services with significant program management; management of National Resource Facilities and other technology infrastructure; and strong industry-relevant research initiatives. Through this, a resurgent NDRF will be in a position to translate innovative engineering ideas to products and solutions useful for society.

These initiatives will need significant investments with respect to attracting Experts to nurture and grow teams, establishing infrastructure, strengthening working teams, building program and project management excellence, and creating National Resource Facilities.

We are slowly becoming more reliant on renewable energy due to awareness and availability of greener solutions. One such solution has been the development of energy storage technologies, specifically micro-grids

Micro-grids achieve important goals such as reliability, carbon emission reduction and cost reduction. They work to integrate renewable resources, which, if can be established will become the Ideal Power System.

Micro-grids are the product of investment in the design of traditional grids leading to the creation of 'smart grids'. They rely heavily on renewable energy and are rapidly becoming a useful tool. One of the greatest benefits has been that they are better equipped to meet our future needs.



The Institution of Engineers (India)

The Institution of Engineers (India)-IEI is the largest multidisciplinary Professional Body in Asia that encompasses 15 engineering disciplines and gives engineers a global platform to interact and collaborate professionally. IEI has membership strength of nearly 0.7 Million. Established in 1920, with its headquarters at Kolkata, IEI has served the engineering fraternity for over nine decades. In this period of time, it has been inextricably linked with the history of modern-day engineering.

In 1935, IEI was incorporated by the Royal Charter and remains the only professional body in India to be accorded this honour. Today, its quest for professional excellence has given it a place of pride in almost every prestigious and relevant organization across the globe. IEI functions among professional engineers, academicians, and research workers. It provides a vast array of technical, professional, and supporting services to the Government, industries, academia and the Engineering fraternity, while operating from over 100 centres located across the country. The Institution

has established R&D centres at various locations in the country and also provides grant-in-aid to its members to conduct research and development on engineering subjects.

IEI offers a non-formal engineering course, the successful completion of which is officially recognized as equivalent to a degree in engineering. Every year as many as 60000 candidates appear for these exams. Website: www.ieindia.org

The technical activities of the Institution are performed through 15 Engineering Division Boards, pertaining to Aerospace, Agricultural, Architectural, Chemical, Civil, Computer, Electrical, Electronics and Telecommunication, Environmental, Marine, Mechanical, Metallurgy and Materials Science, Mining, Production and Textiles.

The Institution of Engineers (India) is recognized as a Scientific & Industrial Research Organization by the Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of

India. To foster R&D culture in Engineering Colleges, IEI is taking several initiatives including providing of grant-in-aid to engineering student projects at Graduate, Post Graduate, and Doctorate levels.

The Institution has grown from strength to strength and has a national presence with 106 State and Local Centres. It also boasts of having a membership strength of nearly seven hundred thousand members. It has further extended its services to the International community with the Overseas

Chapters at Abu Dhabi, Bahrain, Dubai, Kuwait and Qatar. In the international arena, the Institution has bilateral relations with 29 engineering organizations in 22 countries. The Institution has been certifying Professional Engineers (PEs) for over a decade. It is now a full member of the Engineers' Mobility Forum (EMF), which facilitates the international mobility of professional engineers certified by IEI according to the international standards.

Apollo Tele Health Services

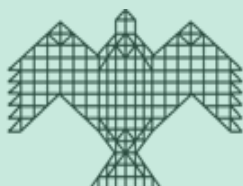
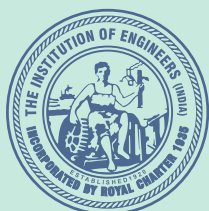
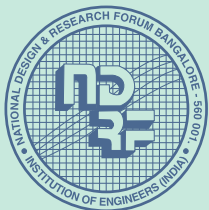
Apollo Hospitals was established in 1983 by Dr. Prathap C Reddy. It was India's first corporate hospital, and is acclaimed for pioneering the private healthcare revolution in the country. Since then, Apollo has risen to a position of leadership and has emerged as Asia's foremost integrated healthcare services provider. It has a robust presence across the healthcare ecosystem, including Hospitals, Pharmacies, Primary Care & Diagnostic Clinics. The Group also has Telemedicine units across 10 countries, Health Insurance Services, Global Projects Consultancy, Medical Colleges, Medvarsity for E-Learning, Colleges of Nursing and Hospital Management and a Research Foundation. In addition, 'ASK Apollo' - an online consultation portal and Apollo Home Health provide the care continuum.

The cornerstones of Apollo's legacy are its unstinting focus on clinical excellence, affordable costs, technology and forward-looking research & academics. Apollo Hospitals was among the first few hospitals in the world to leverage technology to facilitate seamless healthcare delivery through electronic medical records, hospital information systems and telemedicine-based outreach initiatives. The organization embraced rapid advancement in medical equipments worldwide, and pioneered the introduction of several cutting edge innovations in India. Soon the country's first-ever Proton Treatment Cancer Centre will be launched by Apollo, and it will serve over 3 billion people. Since inception, Apollo Hospitals has been honored by the trust of over 50 million patients from 140 countries. At the core of Apollo's patient-centric culture is TLC (Tender Loving Care), the magic that inspires hope amongst its patients.

As a responsible corporate citizen, Apollo Hospitals takes the spirit of leadership well beyond business and it has embraced the responsibility of keeping India healthy. Recognizing that Non Communicable Diseases (NCDs) are the greatest threat to the nation, Apollo Hospitals is continuously educating its fellow Indians on personalized preventive healthcare as a key to wellness. Dr. Prathap C Reddy's initiative aptly named the "Billion Hearts Beating Foundation" endeavors to keep Indians heart-healthy; over half a million people have taken a pledge on www.billionheartsbeating.com

Apollo Hospitals has always championed social initiatives that transcend social and income barriers. Notable ventures introduced by the organization are Save a Child's Heart Initiative (SACHi) which provides quality paediatric cardiac care to children from underprivileged sections of society. SAHI (Society to Aid the Hearing Impaired) and the CURE Foundation focused on cancer care assist children from financially challenged homes. Envisioned by Dr. Reddy, to introduce population health into the Indian narrative, the Total Health Foundation is piloting a unique model of healthcare in the Thavanampalle Mandal of Andhra Pradesh. It aims to provide "holistic healthcare" for the entire community starting from birth, through one's journey into childhood, adolescence, adulthood and old age.

In a rare honour, the Government of India issued a commemorative stamp in recognition of Apollo's widespread contributions, the first for a healthcare organization. Dr. Prathap C Reddy, Founder Chairman of the Apollo Hospitals Group has been conferred with the prestigious Padma Vibhushan, India's second highest civilian award.



National Institute of Advanced Studies

Speaker Bio-Data

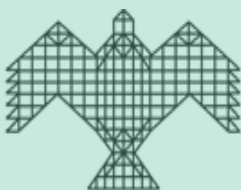
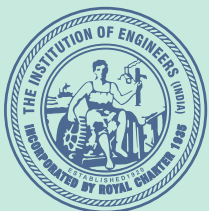
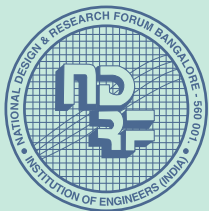


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Dr. T V Gopal is presently teaching Computer Science and Engineering at CEG Campus, Anna University. One of his research areas includes "Science and Spirituality". Dr. T V Gopal has published around 75 Research Papers. He has written four books and Co-Edited Seven Conference Proceedings. He is actively associated with many professional societies such as CSI, IEEE and ACM India Council. He is an Expert Member of the Editorial Advisory Board of the International Journal of Information Ethics. He has served as the Honorary Chief Editor for 75 issues of the CSI Communications [CSIC] and also been the Chairman, CSI Division II [Software] for two consecutive terms.

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Some Meta-Physical Perspectives of Technology Enabled Healthcare

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ABSTRACT

Golem is a term that connotes "artificial man, automaton". In Hebrew it means "shapeless mass, embryo" derived from the root "galam" meaning "he wrapped up, folded". The Jewish legends portray golem as a monster or an automaton due to its shapelessness and incompleteness.

Tiny and powerful computing devices can eventually be fixed in the ear canal or worn as a sub-millimeter thin patch no more intrusive than a Band-Aid. Body Nets or Internet-Connected Bodies with tiny implants are very much on the anvil today. The combination of exploding compute power, extreme miniaturization, IoT and the rise of big data and cognitive analytics holds huge breakthrough potentials. "Cognitive hypervisor" that show an end to end integration from multiple wearable sensors with seamless access to powerful back-end machines are driving powerful user interactions even with the Unknown Human Form.

The study of how the human body functions when considered as a real-time computing and control system is of considerable interest from many points of view including those of robotics, signal processing, adaptive learning and medicine. This paper describes the basic model of the human body and mind brain, how it can be represented as an enormously complex real-time computing and control system and how its operation relates to cybernetics. The basic model of human body and mind is based on the Kundalini Tantra. There is no compelling work to show that the system represents insights into actual human anatomy. Prana has been translated as the "vital breath" and "bio-energetic motility"; it is associated with maintaining the functioning of the mind and body. The Chinese concept of qi (or chi) can be safely identified with the Indian concept of prana. Kundalini and its system of prana, channels and chakras can be modeled as a real – time computing engine based on Sanskrit letters and their potentiated sums.

It is often observed that while the Greek Mathematics originated from Geometry, the Indic Mathematics originated from literature. The form of the human can be computed using the representation of the spinal cord as shat-chakras with a distribution of Sanskrit letters as per the Kundalini Tantra. The Indic scriptures facilitate a process by which the expansion in multi-dimensional modeling can seamlessly be shrunk into a nano-scale interface to the human body.

The role of biology is the key because it provides guiding principles and suggests useful components. A very important lesson from biology is the scale of structural components. The lower energies involved in non-covalent interactions make it much more convenient to work on the nanometer scale (or lesser) utilizing the biological principle of self-assembly. There are two major technical issues. One is positional control (holding and positioning molecular parts to facilitate assembly of complex structures) and the other is self-replication.

The proposed transform aims to map the human body and mind that can be systematically analyzed for better understanding of robotics, signal processing, adaptive learning and medicine. Technologies such as Drones reach out life-saving cures faster than any ambulance. They will fly the extra mile in delivering drugs, vaccines, blood or organs. Drones can easily sense and manipulate Golems resulting in a healing touch to a complicated social system.

[Can we then say: God : Golem :: Man : Machines?]

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