DEPARTMENT OF BIOMEDICAL ENGINEERING

ssn

Synergy

VOLUME FIVE :: ISSUE FOUR

SNEAK PEEK

HOD's DESK

It gives me great pleasure to pen a few words as a prologue to our quarterly magazine "Synergy" that gives a platform to the teachers and students of sharing their creativity and new ideas with the world and will help in their overall development. First and foremost, I congratulate all the students of the editorial board for bringing out such a beautiful magazine.

The Department of Biomedical Engineering has recorded consistent improvement in its academic, research and placement performance.Through a nice blend of theoretical courses and projects, the department endows students with the ability to apply knowledge of science, mathematics and engineering to work effectively in multidisciplinary teams, provide leadership and technical expertise, and practice engineering with ethical approaches and concern for society and environment.
We urge you to make the best of the numerous opportunities the department offers. Let us strive to keep the momentum going and scale new heights in the coming years. Let's spread our tentacles beyond the borders of our country. I wish you all the best for your upcoming new semester.

Dr. A. Kavitha
Professor and Head,
Department of Biomedical Engineering

EDITORIAL DESK

An inspirational start is always a refresher; it always promotes greater aspirations. Keeping this in mind, we bring to you this edition of Synergy at the start of yet another academic year.

Covering the happenings in the department from the months of Oct – Dec 2016: this edition comes with the hope of being a motivator and giving people a reason to celebrate yet another set of accomplishments of the department. We've also included a set of intriguing articles to take you into the astonishing world of BME.

The past is a stimulator but it is the future we look at to take us to newer and greater heights. We take this opportunity to welcome budding biomedical engineers into the department to take a splendid journey of learning and progress.

Cheers to more success, ideas and innovation!

- Newsletter team

EDITORIAL TEAM

STAFF EDITORS:

Ms. J. Delpha, AP /BME
Ms Laxmi. N, AP/BME

STUDENT EDITORS:

Deepika R., IV, BME
Lavanya Krishna, IV BME
Sanjhanaa R. Bhatt, IV BME

DESIGN:

Vismaya M., IV BME

INSTITUTIONAL ACTIVITIES

SSN DOCTORAL SCHOLARS DAY

- SSN Doctoral Scholars day took place on the first of December at the Placement Block on campus.

  The event saw the rise of revolutionary ideas that were presented as detailed papers.

- This gathering culminated in a prize distribution for the most ground breaking and well researched entries, a glimpse of which can be seen from the photos below.

Certificates were given for the Best Oral Presentations by our President Ms. Kala Vijayakumar and Principal Dr. S. Salivahanan

UNIVERSITY RANKINGS

- In the April/ May 2016 university rank list, the following students featured in the top positions :

NAME	RANK HELD
Nandhini T.	2
Archana S.	3
Sruthi M.	5
Banu Saranyan	14
Setapalli Dinesh Kumar Reddy	14
Sri Smruthi V.	16

SCHOLARSHIPS AWARDED

- Merit Scholarship was awarded for the following students from different years:

NAME	YEAR	SCHOLARSHIP STATUS
Arunkumar K.	II	Exemplary
Sucharitha S Praksh	II	Outstanding
Pavithran P.G.	II	Outstanding
Bhargavi K.	III	Exemplary
Divya Radhavi N.	III	Outstanding
Anuradha Lakshmanan	III	Outstanding
Sushmitha S.	IV	Full
Tanushree Devi B.	IV	Waiver
Abirami R.	IV	Waiver

The president M. Kala Vijaykumar welcoming the guest of honour, Dr. Vairamuthu.

The guest of honour, Dr. Vairamuthu addressing the gathering.

The dignitaries in attendance.

The President welcoming the audience with her bespoke cheer.

SNAPSHOTS FROM THE SCHOLARSHIP DAY

Left to right; top to bottom :
Megala N., Tamilamudhan, Shaktivel S., Tanushree Devi B., Sushmitha S. and Divya Raghavi, some of the BME students receiving due recognition for their academic excellence from Dr. Salivahanan, Principal, SSNCE and Professor V G Idichandy, Dept of Ocean Engineering, IIT Madras

FACULTY ACTIVITIES

PUBLICATION DETAILS

- Guhan Seshadri N P , **Ms. Geethanjali B** and Muthumeenakshi S "Visualizing the brain connectivity during negative emotion processing– An EEG study". *Front. Hum. Neurosci. Conference Abstract: SAN2016 Meeting.* pp 323 – 330 doi: 10.3389/conf.fnhum.2016.220.00005.
- **Ms. Nirmala K. ,** N. Venkateswaran and C. Vinoth Kumar, "Kernel SVM Classifier for Detection of Glaucoma Using LBP Based Fractal Features." *Asian Journal of Information Technology,vol 15, no15, pp2702-2708, October 2016 .*
- **Ms. Geethanjali B.,** Adalarasu K., Jagannath M. , & Rajasekaran R., "Enhancement of task performance aided by music." Current Science, 2016 VOL. 111, NO. 11, 1794-4801, Dec 2016. doi: 10.18520/cs/v111/i11/1794-1801 (Annexure 1 impact factor = 0.926)

PAPERS PRESENTED

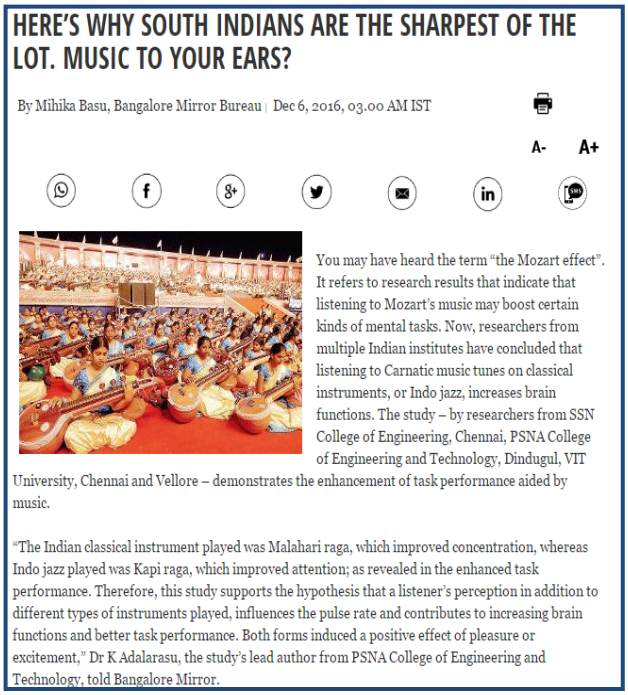
- **Ms. Nirmala. K** presented paper titled "Glaucoma Detection using Wavelet based contourlet transform" in IEEE Sponsored International conference on Engineering and Technology(ICET'16), organized by Karpagam college of Engineering, Coimbatore.
- **Ms. Kanchana. D** presented paper titled "Rehabilitation Robots: Need & Design" in the IEEE International Conference on Design and Manufacturing (ICONDM'16) held at Indian Institute of Information Technology Design & Manufacturing, Kancheepuram.
- **Ms. Subashini R** and Meenachi P presented paper titled "Stress analysis of bio ceramic coatings on orthopedic implants" in the International conference on Advanced materials, Scicon 16, Materials for a better tomorrow, held on Amrita University, Coimbatore.

COMMITTEES FORMED

- **Dr. A. Kavitha** and **Dr. V. Mahesh** were nominated to be part of Syllabus Subcommittee for B.E Biomedical Engineering and B.E Medical Electronics, Anna University, Chennai, R-2017 under the Faculty of Information and Communication Engineering

MEDIA PRESENCE

- The Bangalore mirror newspaper published research work done by **Ms. B. Geethanjali**
- as an article titled "Here's why South Indians
- are the sharpest of the lot. Music to your ears?"
- Link: http://tinyurl.com/hrzluj3



HERE'S WHY SOUTH INDIANS ARE THE SHARPEST OF THE LOT. MUSIC TO YOUR EARS?

By Mihika Basu, Bangalore Mirror Bureau | Dec 6, 2016, 03.00 AM IST

A- A+

You may have heard the term "the Mozart effect". It refers to research results that indicate that listening to Mozart's music may boost certain kinds of mental tasks. Now, researchers from multiple Indian institutes have concluded that listening to Carnatic music tunes on classical instruments, or Indo jazz, increases brain functions. The study – by researchers from SSN College of Engineering, Chennai, PSNA College of Engineering and Technology, Dindugul, VIT University, Chennai and Vellore – demonstrates the enhancement of task performance aided by music.

"The Indian classical instrument played was Malahari raga, which improved concentration, whereas Indo jazz played was Kapi raga, which improved attention; as revealed in the enhanced task performance. Therefore, this study supports the hypothesis that a listener's perception in addition to different types of instruments played, influences the pulse rate and contributes to increasing brain functions and better task performance. Both forms induced a positive effect of pleasure or excitement," Dr K Adalarasu, the study's lead author from PSNA College of Engineering and Technology, told Bangalore Mirror.

A snapshot of the article as it appeared on 6 Dec '16

LECTURES DELIVERED

- **Dr. A. Kavitha** delivered a guest lecture at NIEPMD on," Innovative EEG recording", to the special educators of Autistic children.
- **Dr. A. Kavitha** delivered a guest lecture on "Computational Intelligence in Cognitive Neuroscience" in a DST sponsored two days' Workshop on "COMPUTATIONAL INTELLIGENCE TECHNIQUES" conducted by Department of Electronics Engineering, MIT Campus, Anna University on 21.10.2016.
- **Dr. V. Mahesh** and **Ms. B. Geethanjali** gave guest lecture and Hands on training on Biosignals analysis using LabVIEW at DBT sponsored Short term training programme organized by Annamalai University, Chidambaram.
- **Ms. N. Laxmi** delivered a guest lecture at Agni College of Technology on the topic "Signals and Systems" on 15.10.2016.
- **Ms. Kanchana. D** presented an abstract on the topic "Rehabilitation Robots: Need & Design" during the two-day IEEE International Conference on Design and Manufacturing (ICONDM'16) conducted at Indian Institute of Information Technology Design & Manufacturing, Kancheepuram on 16th and 17th December 2016.

PhD Scholars:

- Ph.D confirmation meeting was conducted for **Ms. R. Nithya** scholar of Dr. N. Venkateswaran Prof/ ECE in ECE Seminar Hall, SSNCE. Dr. A. Kavitha HOD/BME, SSN and Dr. Shenbagadevi Prof/ ECE, College of Engineering, Anna University were the DC members present in the meeting
- Ph.D confirmation meeting was conducted for **Ms. K. Sumathi** (Reg. No. 2011114023) and Ms. P.V. Pramila (Reg. No. 2011114033), research scholars of Dr. V. Mahesh Asso. Prof/BME in Division of Bioengineering, IIT– Chennai [25.11.16]

SEMINARS AND WORKSHOPS ATTENDED

- **Dr. V. Mahesh** participated in "Tech Day" Seminar organized by KeySight Technologies, Chennai on 14.10.16
- **Ms Delpha. J AP/BME** and **Ms Divya B** attended three days' workshop on "KALMAN FILTERS-THEORY AND PRACTICES" at Manipal Institute of Technology, Manipal, Karnataka from 20th to 22nd October 2016.
- **Ms. M. Dhanalakshmi** and **Ms. Richa M** attended one day presentation on "Automated low cost Malaria Diagnosis Kit" organized by University of Westminister, UK & Dept. of ECE, Anna University at CEG, Chennai.
- **Dr. L. Suganthi,** has attended short term course on " Mechatronics, MEMS and Micro-fabrication" at IIT Indore.
- **Dr. R. Subashini** and **Ms Richa Malviya** of Department of Biomedical Engineering along with Dr. Rajesh of Physics department visited Indira Gandhi Centre for Atomic Research. They met following people during their visit at different departments:
    - Dr. B. Venkatraman, Director Health Safety and Environment Group discussed about SSN's interests and IGCAR's interests and how they can be carried forward. They discussed installing a tower on SSN campus. Discussed on proposing projects related to processing oncological images and kidney stone composition detection with imaging techniques.
    - Dr. R. Baskaran, Head, Radiological Safety Division at IGCAR referred Dr. Subashini to and Ms Richa to Dr. Arul, and Dr. Menaka, who works on cytogenetics and Thermal images.
    - Dr. Arul shared his research experience on cytogenetics and showed cell culture lab and equipments related to it.

POST DOCTORATE

- **Dr. R. Sivaramakrishnan** joined the Lister Hill National Center for Biomedical Communications

(The first picture was taken in front of his research premises. The second picture, taken beside the Visible Human Project®, one of the most prestigious project of the National Library of Medicine, a complete, anatomically detailed, three-dimensional representations of the normal male and female human bodies, acquired from the transverse CT, MR and cryo-section images of

SEMINARS

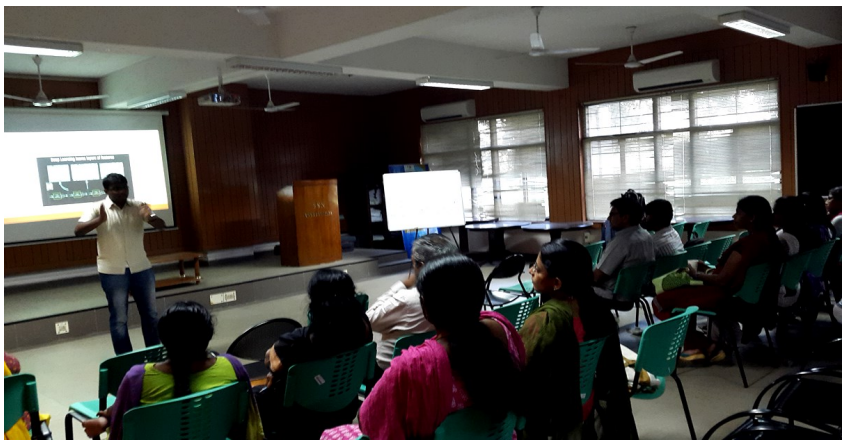
ADVANCEMENTS IN BIOMEDICAL ENGINEERING

- The Department of Biomedical Engineering in association with Center for Healthcare technology (CHT) had organized a seminar on "Advancements in Biomedical Engineering" by Dr. Vivek Indramohan, School of Health Sciences, Birmingham City University on 28.11.16.

The seminar has the relevant final year crowd enraptured

DEEP LEARNING

- Mr.Vignesh Baskaran, Data Scientist, Darts-ip, Master of Artificial Intelligence, KU Leuven Belgium gave a lecture on **Deep learning** to inspire people to pursue a career in Artificial Intelligence on 23rd November in the BME Seminar hall. It was a special occasion since **Mr. Vignesh Baskaran is an alumni of our department** and has made great strides forward in his chosen field of specialization.



Mr. Vignesh Baskaran, an alumni of SSNCE's BME Department, engaging the audience in an interactive session.

STUDENT ACTIVITIES

Internal Funding

- M. Abinaya (III-Year) S. Deepika (III-Year) S. Kertana (III-Year) and Dr. V. Mahesh : Attention enhancement system using virtual reality for adhd patients- 8 month
- S. Viswanath (II-Year) G. Praveen Kumar (II-Year) and Ms. M. Dhanalakshmi : External aid for amyotrophic lateral sclerosis (ALS) patients. -8 month
- R. Divya (II-Year) K.T. Meghna Murali (II-Year) R. Manuj (II-Year) and Ms. R. Nithya : Development of electronic nose for diagnosis of tuberculosis -1 year
- M. Annamalai (III-Year) K. Deepa (III-Year) A. Dhanuja (III-Year)Ms. B. Divya and Ms. J. Delpha: Indian sign language converter using sEMG -1 year
- K. Bargavi (III-Year) R. Haripriya (III-Year) V. Sandhya (III-Year) and Ms. N. Laxmi : EOG controlled motorized wheel chair for the disabled -18 month
- R. Rathi Adarshi (III-Year) R. Shuruthi Sree (III-Year) and Ms. R. Nithya : Development of lower extremity exoskeleton 1 year S.A. Jerome Jayakar (III-Year)
- N. Abinaya (III-Year) B.N. Shaalu Shree (III-Year) Dr. N.P. Rajesh and Dr. R. Subashini : Investigations on Design and fabrication of dielectric resonator antennas using ZrTiO4 -1 year
- S. Abinaya (III-Year) N. Divya Raghavi (III-Year) S. Manasvi (III-Year) S. Pushpika (III-Year) and Dr. Sachin Gaurishankar Sarate : Temperature measurement for hypoglycemic condition -1 year

Courses Completed

- Vardhini and Vishnu Priya K successfully completed an online certification on " How the brain creates mind" hosted by the NPTEL Platform.

ACCOMPLISHMENTS

- The following II year students attended internship at Kauvery Hospital between 14.12.16-20.12.16
  Abarna.R, Apurva S, Asha R, Arunkumar K, Om Prakash S,
  Pavithran PG, Praveen Kumar G, Sangeetha B, Sivaranjani.M,
  Viswanath S
- Meena Nisha,Kertana S,Yamini.N completed their internship at Bio Vision Medical Systems
- Aashika and Aishwariya RA got selected for semi finals in John Britto dance championship.

kauvery hospital

ACCIDENTAL DISCOVERIES

As Plato said, "science is nothing but perception," and this accidental act of discovery embodies the sentiment. Of course, it helps to be a leading scientist in the field—devoting your life to the pursuit of one cure, invention, or innovation—but a little luck goes a long way, too

THE MICROWAVE

Percy Spencer, an engineer at Raytheon after his WWI stint in the Navy, was known as an electronics genius. In 1945, Spencer was fiddling with a microwave-emitting magnetron — used in the guts of radar arrays — when he felt a strange sensation in his pants. A sizzling, even. Spencer paused and found that a chocolate bar in his pocket had started to melt. Figuring that the microwave radiation of the magnetron was to blame (or to credit, as it would turn out), Spencer immediately set out to realize the culinary potential at work. The end result was the microwave oven — saviour of eager snackers and single dudes worldwide.

RECENT INNOVATIONS

Medical technology companies are focusing more than ever on products that deliver cheaper, faster, more efficient patient care.
Here are five emerging technologies to watch in the year ahead.

Cutting Back on Melanoma Biopsies

With the most deadly form of skin cancer, melanoma, a huge number of dangerous-looking moles are actually harmless, but has always been impossible to know for sure without an invasive surgical biopsy. Today dermatologists have new help in making the right call — a handheld tool approved by the FDA for multispectral analysis of tissue morphology. The **MelaFind optical scanner** is not for definitive diagnosis but rather to provide additional information a doctor can use in determining whether or not to order a biopsy. The goal is to reduce the number of patients left with unnecessary biopsy scars, with the added benefit of eliminating the cost of unnecessary procedures. The MelaFind technology (MELA Sciences, Irvington, NY) uses missile navigation technologies originally paid for the Department of Defense to optically scan the surface of a suspicious lesion at 10 electromagnetic wavelengths. The collected signals are processed using heavy-duty algorithms and matched against a registry of 10,000 digital images of melanoma and skin disease.

Electronic Aspirin

For people who suffer from migraines, cluster headaches, and other causes of chronic, excruciating head or facial pain, the "take two aspirins and call me in the morning" method is useless. A technology under clinical investigation at **Autonomic Technologies, Inc.,**(Redwood City, CA) is a patient-powered tool for blocking SPG signals at the first sign of a headache. The system involves the permanent implant of a small nerve stimulating device in the upper gum on the side of the head normally affected by headache. The lead tip of the implant connects with the SPG bundle, and when a patient senses the onset of a headache, he or she places a handheld remote controller on the cheek nearest the implant. The resulting signals stimulate the SPG nerves and block the pain-causing neurotransmitters.

Needle Free Diabetes

Di-

abetes self-care is a pain—literally. It brings the constant need to draw blood for glucose testing, the need for daily insulin shots and the heightened risk of infection from all that poking. Continuous glucose monitors and insulin pumps are today's best options for automating most of the complicated daily process of blood sugar management – but they don't completely remove the need for skin pricks and shots. But there's new skin in this game. Echo Therapeutics (Philadelphia, PA) is developing technologies that would replace the poke with a patch. The company is working on a transdermal biosensor that reads blood analytes through the skin without drawing blood. The technology involves a handheld electric-toothbrush-like device that removes just enough top-layer skin cells to put the patient's blood chemistry within signal range of a patch-borne biosensor. The sensor collects one reading per minute and sends the data wirelessly to a remote monitor, triggering audible alarms when levels go out of the patient's optimal range and tracking glucose levels over time.

Robotic Check - Ups

A pillar of health reform is improving access to the best health care for more people. Technology is a cost-effective and increasingly potent means to connect clinics in the vast and medically underserved rural regions of the United States with big city medical centers and their specialists. Telemedicine is well established as a tool for triage and assessment in emergencies, but new medical robots go one step further—they can now patrol hospital hallways on more routine rounds, checking on patients in different rooms and managing their individual charts and vital signs without direct human intervention. The RP-VITA Remote Presence Robot produced jointly by iRobot Corp. and InTouch Health is the first such autonomous navigation remote-presence robot to receive FDA clearance for hospital use. The device is a mobile cart with a two-way video screen and medical monitoring equipment, programmed to maneuver through the busy halls of a hospital.

Compiled by Haripriya R.

III Year

CYCLONE VARDAH EFFECTS ON CHENNAI

6 December 2016 – 13 December 2016

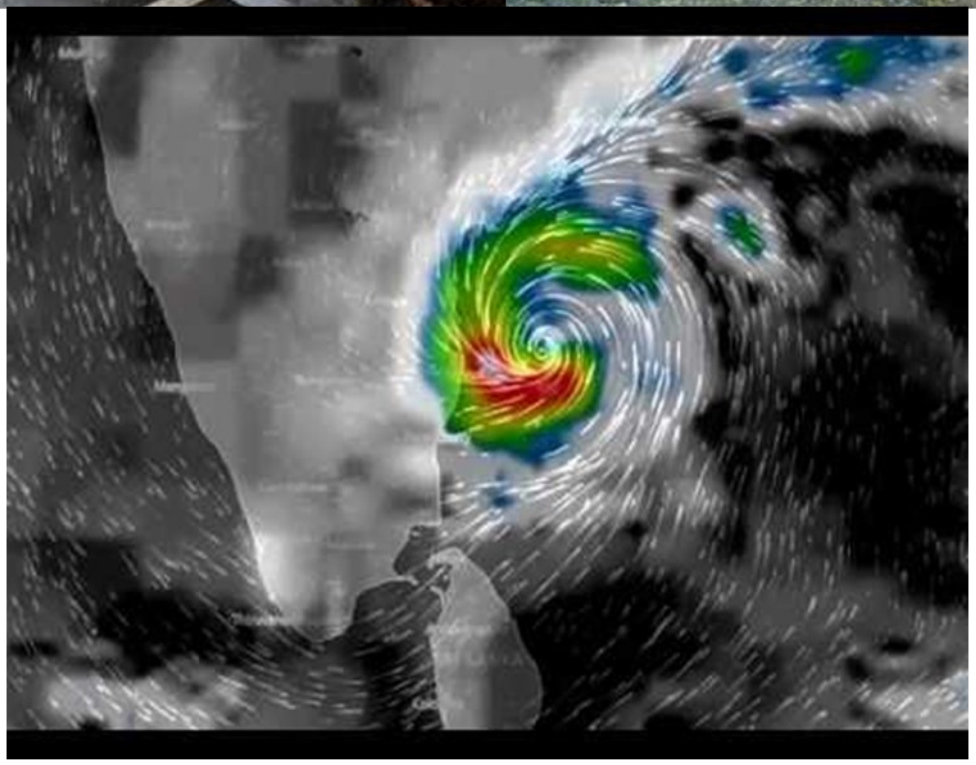
Sometimes, calamities can go way beyond our predictions. One such event is the occurrence of Cyclone Vardah. Chennai was unaware, to put it rightly, unprepared for such an intense cyclone. The weather forecast department realized its strength only by Sunday afternoon when the skies got cloudy and windy. However, it was expected that Chennai would get a heavy by Monday afternoon and then cyclone would weaken. But things changed when the eye of the cyclone was over north Chennai completely, intensifying the situation.

When cyclone Vardah became furious after the landfall, Chennai experienced historic winds. The winds were clocking at the rate of 100 km/hr and rainfall was close to 160 mm in the morning itself. The entire landfall in south Chennai witnessed the highest with around 300 mm rainfall in Shollingallur – Katupakkam – Kancheepuram belt. Undoubtedly, cyclone Vardah made Chennai stand-still. The fury of cyclone was absolute carnage. Chennai was not used to this kind of high speed winds and the resultant damage was beyond imagination. Cyclone Vardah's historic winds and massive deluge rains have created a fearful memory of cyclones for Chennaites. However, the after-effects of the cyclone in Chennai are unraveling. Uprooted trees, hanging electricity poll wires, damaged compound walls, roads blockage, power cut, lack of everyday supplies, and fallen hoardings make Chennai a ripped up city. The clean-up of the city was in full force. The corporation officials cleared away the fallen trees and road blockages hindering the flow of traffic. However, most suburbs were cut off from main city, until Tuesday.

With dark clouds and disrupted power supply, Chennai had to face the aftermath of cyclone havoc. To top it all, the communication and internet was completely wrecked up. This affected banking transactions and PoS devices to remain unusable in many retail outlets. There was a temporary downtime in the entire nation's internet as the cyclone has damaged the major internet connectivity lifeline in the Bay of Bengal. With the country moving towards digital economy, this internet connectivity collapse was unfortunate. Most of the institutions and corporate offices announced a holiday to let Chennai recover from the wreckage.

The encounter of Cyclone Vardah was way beyond catastrophic. If the previous year (December 2015) saw historic floods, cyclone Vardah is the toughest every cyclone in Chennai history.

Source
whatistheurl.com



Demonetisation: Understanding the event, impact, narrative and meaning

On November 8, government announced the decision to discontinue the legal tender status of Rs 500 and Rs1000 notes. The original objectives were stated as: eliminating fake currency; inflicting losses on those with black money; and disrupting terror and criminal activities. Later, new objectives were tacked on: enabling growth in bank credit, turning India into a cashless economy. A cost benefit analysis suggests that the benefits were relatively small when compared with the costs.

Four key arguments are being forwarded in support of the decision:

1. It is claimed that the decision is likely to have a *smaller impact on the poor* than what many, mostly anecdotal, reports suggest.

2. The monetary shock can be, and will be, quickly overcome by the use of *monetary policy instruments to restore liquidity*.

3. This decision will expedite the process of making India a *"cashless economy"*, with benefits that will make short-term costs worthwhile.

4. Since the *decision is popular*, it must be good. This raises an interesting question: in a democracy, can there be a better measure of goodness of a policy than its popularity?

The original assumptions underlying the decision remain unclear, but it seems to be causing considerable harm. All this harm is likely to buy us only a small dent on the black money problem and the elimination of a few hundred crores of fake currency. This is not a good bargain, especially considering the long-term consequences. I am not sure the government intended this bargain. Still, at the moment, the decision is popular. Government may have painted itself into a corner of righteousness. Since, this decision seems to have struck a chord with a larger number of citizens, political ambition might tempt the government to double down on this path, and take more "shock and awe" decisions. It would take considerable statesmanship to veer away from this path of temptation fraught with enormous risks but questionable benefits.

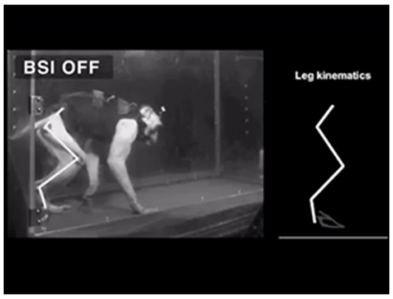
The government would do well to reflect on the failures of the policymaking process that led to what appears to be a bad decision. If this was indeed a genuine mistake, and government's assumptions turned out to be wrong, it would be unwise to risk making more of such mistake in an impatient pursuit of lofty goals. Our government's capacity to run complex programmes is very limited, and it is best expended on higher priority problems, such as building the criminal justice system, achieving public health goals, improving learning outcomes in primary education, building a credible defence apparatus, ensuring provision of sound infrastructure, ensuring clean air and water, and so on.

Source: business-standard.com

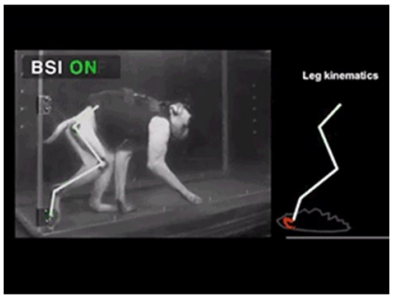
BRAIN AND SPINE IMPLANTS LET A PARALYZED MONKEY WALK AGAIN

Enabling someone with paralyzed legs to rise to their feet and walk again has long been considered impossible, the kind of bogus miracle promised by faith healers. But who needs faith healers when you have clever scientists and electricity? In the new field of bioelectronic medicine, doctors may soon make the miraculous a reality. A new experiment using paralyzed monkeys has shown the way toward that goal.

Researchers conducted a proof-of-concept study using two monkeys with partial spinal cord injuries, which prevented brain commands from reaching a back leg. The researchers used electrodes implanted in the monkeys' brains to record electrical signals from the motor cortex, the part of the brain that controls movement. They used a computer to decode those signals and translate them into commands sent to other electrodes implanted in the monkeys' lumbar spines; those electrodes stimulated the spinal cord. This brain -spine interface (BSI) bypassed the injured part of the spinal cord, allowing the monkeys' natural movement commands to reach their injured legs.



Study coauthor David Borton, a neuroengineer at Brown University, says he was surprised by how effortlessly the animals took to the technology. "Their behavior did not make us think that they were bothered by it at all," he tells *IEEE Spectrum*. "They didn't turn around and look at their legs—they just walked."



Much research remains to be done before humans can benefit from this technology, says study coauthor GregoireCourtine, a professor at the Swiss Federal Institute of Technology Lausanne, where he focuses on spinal cord repair. "We're not going to see people walking in the street with brain-spine interfaces tomorrow," he says. But Courtine and his colleagues are working toward that goal, and are striving to improve the hardware to make it suitable for paraplegic humans.

Other research groups are working toward the same goal, including Susan Harkema of the University of Louisville in Kentucky. *IEEE Spectrum* has covered her success in using electrodes implanted in the spine to get paraplegic people back on their feet. Harkema's research, however, uses an external computer to generate the commands that are sent to the implanted electrodes, rather than tapping into the brain's natural commands.

Both research projects are exciting examples of bioelectronic medicine, a new field that leverages neuroscientists' growing ability to understand the electrical signals neurons use to communicate. Neurons in the brain "fire" with electrical impulses that control every aspect of our bodies and behavior, and electrodes can pick up these patterns of pulses as they arise in the brain and course through the nervous system.

The brain-spine interface used in the monkeys didn't directly stimulate specific neurons in the spinal cord to send commands down the leg nerves to the muscles. That type of micromanagement would be akin to a person trying to walk by consciously flexing each leg muscle in turn. Instead, the researchers sent the brain commands to what Courtine calls the "spinal brain," a network of neurons in the lumbar spine that automatically controls the basic mechanism of walking. "This spinal brain is very smart, and is able to make a lot of decisions," he says. "But it needs some instructions, and that's what we've been able to provide with this interface."

There were engineering challenges aplenty in the effort to build a brain-spine interface that worked for freely moving monkeys. The researchers didn't want any entangling wires, so the brain implant had to wirelessly send its data to the external computer. And there was a lot of data: The 96-electrode array, implanted in the part of the motor cortex that controls the back legs, sent out 40 MB of data per second. Decoding the signal recorded in the brain was another enormous challenge, this one for the software team. They further developed decoders created by the BrainGate research consortium, which has made headlines over the last decade by using brain-computer interfaces to let paralyzed people control robotic arms and computer cursors. Study coauthorBorton explains that they decided to pull all the data from the neurons—to get a "full bandwidth recording" rather than some filtered data set. "We don't yet know what the most useful parts of the signal are," he says. "Later, we can simplify."

Photo: Alain Herzog/EPFLThe tiny brain implant (shown here inside a silicon model of the brain) records signals from the motor cortex.

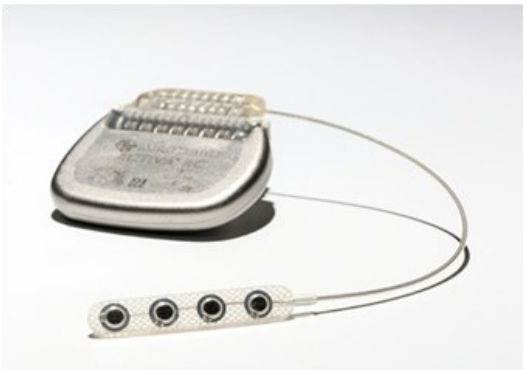


Photo: Alain Herzog/EPFLThe pulse generator implanted near the ribs sends the signal to stimulating electrodes in the spine.

The final challenge was to get the movement command to the monkeys' spinal cords. Again, the researchers wanted a wireless system, so the monkeys wore little vests containing transmitters that sent the data through skin and tissue to a small pulse generator implanted in the muscles between the ribs. The pulse generator then sent the electrical signal through wires that connected to the electrodes sitting on top of the spinal cord. All the hardware deployed has already been used in humans; both the electrode array implanted in the brain and the pulse generator are commercial products. Courtine says the research team chose to use this gear to facilitate the move from monkey experiments to human clinical trials. The pulse generator comes from medical device company Medtronic, which helped support the research. Courtine is now working with Medtronic on a human feasibility study, which just enrolled its first patient in Lausanne, Switzerland. This preliminary study will only test the spinal stimulation protocol that the researchers developed.

That stimulation protocol is a source of pride to the research team. Most bioelectronic medical treatments use a steady and unvarying sequence of electric pulses; that's how current treatments such as spinal stimulation for chronic pain work. To get a response from the body, these treatments use blasts of electricity. In contrast, the researchers' stimulation sequence varied according to the monkey's brain signals, providing more subtle instructions to the spinal cord. It's an improvement over prior methods that essentially shouted at the nervous system, Borton says. "Now, we're learning how to really communicate with it."

- Bhargavi.K
III year

A HISTORY OF PROSTHETICS

While heart and lungs keeps a man alive, the hands and legs keeps him independent .Losing a limb makes a man feel incomplete. Prosthetics is a field that gives man a second chance. It has evolved itself over years, and now the advanced prosthetic is artificial limb which is functional. While we cherish upon its betterment, it is important that we look upon the events that lead to the evolution of prosthetics.

Long Long ago

Egyptians are considered the first pioneers of prosthetic technology. They made prosthetic limbs using fibres. Scientists consider it as world's first prosthetic that appears to be functional.

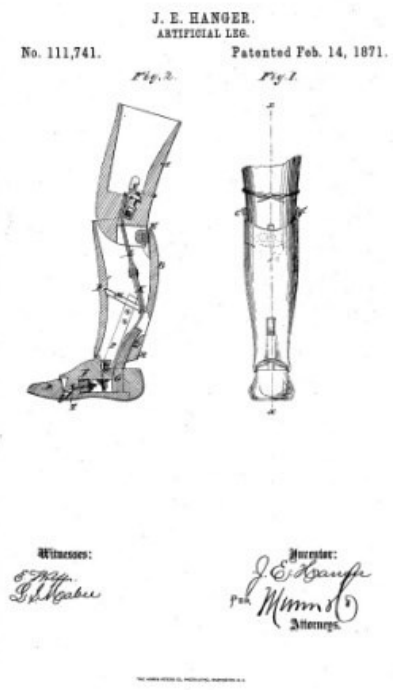
424BC to 1BC

During this period people who made artificial limbs where common people, tradesmen or soldiers.
424 BC : A Persian seer fashioned himself a wooden foot.
300 BC : An artificial leg made of bronze and iron with wooden core was unearthed in Capua, Italy.
218-210 BC: A roman general who had his right hand amputee wore an iron hand fashioned to hold his shield.

476-1000 AD

Little advancement was seen in this period except for hooks and peg legs. Watchmakers where used to make intricate internal functions using springs and gears.

From 1400



Copper and steel were used during this period.
1508: German mercenary Gotz von Berlichingen made technologically advanced iron hands. The fingers could be moved by a series of movement of springs attached to it and it was suspended in leather straps.
1529-1536: French army surgeon Ambroise Pare is considered as father of amputation surgery and prosthetic design. He invented above knee device which was a kneeling peg leg, foot prosthesis that had a fixed position, adjustable harness, knee lock control and other engineering features that are used in today's devices. His colleague, Lorrain, used leather, paper and glue in place of heavy iron in making prosthesis.

1696: Pieter Verduyn developed the first non-locking below knee prosthesis, which is current joint and corset devices.
1800: James Potts designed a prosthesis made of wooden shank and socket, a steel knee joint and an articulated foot that was controlled by catgut tendons from knee to ankle. Later it was called as "Aglesey leg".
1863: Advanced prosthesis with suction socket, polycentric knee and multi articulated foot.

1868: Aluminium was used instead of steel to make artificial limbs lighter and more functional.
2010: Dr.A.P.J.Abdul Kalam along with his team developed lightweight prosthetics from space-age material to enable disabled children to walk easily.

Now
Prosthetics is taken into next level of advancement. Microprocessors computer chips are being used to make artificial limbs functional. . Device makes use of accelerometers, gyroscopes, torque sensors, and load cell work in conjunction with software to mimic the natural human gait. Advanced plastics and carbon-fibre composites are used. These materials can make a prosthetic limb lighter, stronger and more realistic. Electronic technologies make today's advanced prosthetics more controllable, even capable of automatically adapting their function during certain tasks, such as gripping or walking.
Prosthetics have been around for nearly 3,000 years and it's still evolving today. The day is not too far when prosthetics becomes an analogy to real.

Source
http://www.amputee-coalition.org/resources/a-brief-history-of-prosthetics/
http://unyq.com/the-history-of-prosthetics/
http://unyq.com/the-history-of-prosthetics/
http://unyq.com/the-history-of-prosthetics/
http://newsworldindia.in
http://science.howstuffworks.com/

Rukmani Krishnamurthy
II year

THERMOGRAPHY IN BREAST CANCER DETECTION

Breast cancer is defined as the cancerous growth in the breast tissue which produces milk for newborn nutrition. In this type of cancer, the cells in the breast grow in an abnormal fashion and at a very fast rate. Breast cancer has become one of the most horrifying experiences in today's women's health. Its incidence in India is on the rise and is becoming the most prominent type of cancer in females. India accounts for nearly six percent of deaths due to breast cancer in the world. One out of every twenty-two women in India is diagnosed with breast cancer.

Hence, early detection of breast cancer is highly essential. The earlier the detection, the easier is the cure and survival. It is therefore the most significant step in reducing the health and social complications of the disease.

Traditional methods for breast cancer detection is by a physician inspecting the breast followed by a physical examination and he/she will try to feel and measure the mass or lesion if they are present. Currently, the widely used techniques for the detection of this disease are mammography and ultrasound methods. The former employs the usage of X-rays whereas the latter uses ultrasound. Both these techniques give reliable results to an extent, but also give negative results occasionally. Furthermore the mammography procedure is a very painful proceeding and also exposes the patient to radiations. Recently the effectiveness of mammography has also been questioned, saying that positive results have been confused with dense breast tissues. These concerns have led to a renewed interest in alternative techniques for breast cancer screening and diagnosis.

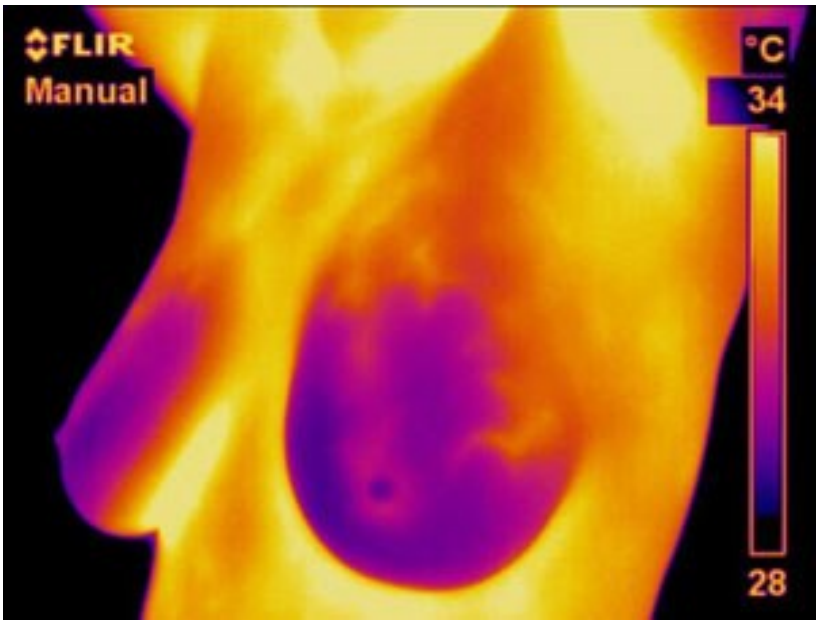
Breast thermography is a non invasive technique which is intended for breast cancer detection and to view precancerous conditions. It is also known as thermal breast imaging which produces heat pictures of the breast. In a thermographic image we see the various temperature gradients in the breast tissue. Normally cancerous tissue is at a higher temperature than the surrounding tissue. This is due to the fact that they are rapidly growing cells. Since these cells grow at a fast rate, they will need blood supply for their multiplication. This is accomplished by a process called angiogenesis which literally means the formation of new blood vessels. All of these reasons sum up to an increased temperature at the sight of the cancer. Hence the tumours can be seen as 'hot spots' in the thermographic image.

Breast thermography is a non invasive technique and does not have any radiation exposure on the patient. X-ray mammography is usually suggested only for women who are above 35 years of age whereas this test can be done for women of all age groups. One of the major advantages of this method is that it can aide in providing an early alert to the physiological changes many years before structural changes occur. It is also possible to capture the digital image and process it. Clinical analysis of the thermography images is based on asymmetry analysis. The heat patterns are found visually and are analysed subjectively.

Breast thermography has been used widely as a cancer detection tool but has not been accepted on par with mammography. This is due to the incidence of high false positive cases. It is now largely regarded as a complementary diagnostic tool because of a lack of evidence to support its efficacy.

Keerthana. M

IV Year



Source: www.breastthermography.com

GAZE INTO THE FUTURE

Imagine being able to walk right into a dream as and when you want to. Imagine being able to land yourself on Mars or coexist with Simba. Imagine grabbing onto a pot of gold and never letting go or realising that you can defeat your worst fears. Dreams do come true and sometimes they segue into marginal reality or as they say 'Virtual Reality'.

Virtual Reality is indeed the "pot of gold" that the Tech-World has managed to give us in recent times. It can be referred to as immersive multimedia or computer-simulated life, that replicates an environment simulating physical presence in places in the real world or imagined world and lets the user interact in that world. Having said all of that, what do we do with this?

One of the major applications of Virtual Reality in recent times has been gaming. Thanks to Oculus Rift, it is quite popular and understandably so. What has however revolutionised this world and given it a wider reach is Google Cardboard. Gaming aside, let us look at the real world applications of VR.

VR is both changing and saving lives. In the world of Medicine, it is an immensely useful therapeutic tool. Imagine trying to work with a 5 year old who can't stay in his seat for more than 30 seconds or an 80 year old war veteran with post trauma stress. Whatever be the condition, there is a cure. Be it mini games to improve your cognition or a vacation in Hawaii to help you alleviate stress, it can be done. Moreover, VR is being increasingly used by surgeons to make three dimensional models of the human form from CT scans and Ultrasound Images. This allows them to analyse and understand the safest surgical approaches. Meditation guided by VR is the latest tool that used in Psychiatry to not just make Yoga more fun but also to relax your senses.

In essence, it is probably fair to say that VR has a lot of untapped potential and coincidentally a lot of unexplored territory to venture into.

Tanushree Devi

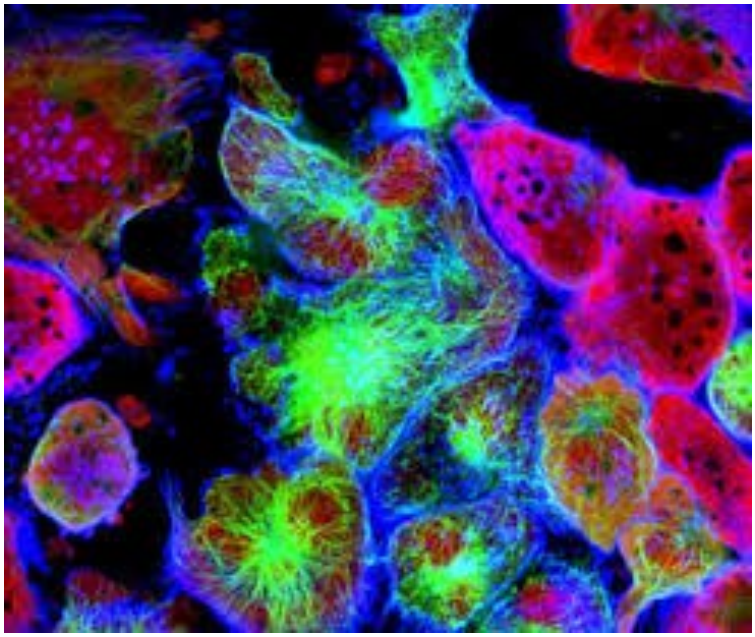
IV year

UNDERSTANDING THE PHYSICAL WORLD

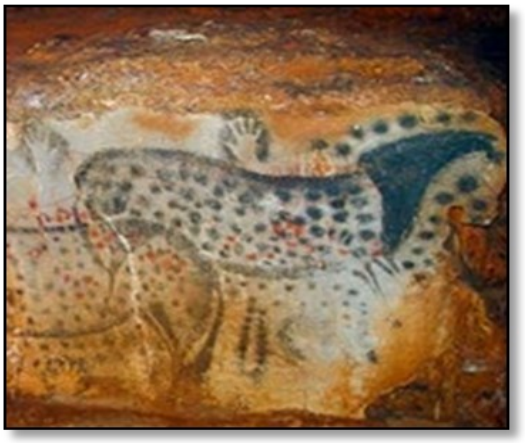
Every aspect of our lives are sketched and designed right from the most primitive stage. The size, shape, length, breadth and width of all elements from the very basic cell fragments to an entire tissue architecture follows a pattern. This is pre-determined by our genes, and any deviation from this pattern results in an atrophy. One such anomaly referred to as cancer is the uncontrolled division of abnormal cells. The basic biology behind the growth of these cancer cells is that the cancer attempts to make cells acidic on the outside as a way to attract the attention of a blood vessel. The function of this blood vessel would then be to get rid of this acid, which instead allows the oncogenes present on these cells to latch on to the blood vessel and uses it to make the tumour larger. This process is termed as angiogenesis. A new non-invasive method of selectively destroying these cancer cells has been proposed lately. This method involves injecting a chemical compound, Nitrobenzaldehyde, into the tumour and allowing it to diffuse into the tissue. A beam of light is then aimed at the tissue, causing the cells to become very acidic inside, and essentially, “commit suicide”. Within two hours, up to 95 percent of the targeted cancer cells are estimated to be dead. This is possible because all cancer cells are susceptible to this induced cell suicide. This method is believed to help cancer patients with tumours in areas that are proven to be problematic for surgeons, such as the brain stem, aorta or spine. Further, various research in developing a cancer-killing nanoparticle that can be activated with a particular wavelength of light which can harmlessly pass through skin, flesh and bone is being carried out. These advancements are aiming to improve the standard of healthcare and the quality of life of every human being. Great thought process is being put into action by researchers across the globe and a plausible future where cancer treatment would be effective within a short span of time is not far away.

Prathyusha Ravichander

IV Year



ADVANCEMENT IN BIOMETRICS



Biometrics or (biometric authentication) refers to the identification of humans by their characteristics or traits. Biometrics has been around since about 29,000 BC when cavemen would sign their drawings with handprints. In 500 BC, Babylonian business transactions were signed in clay tablets with fingerprints. The earliest cataloging of fingerprints dates back to 1891 when Juan Vucetich started a collection of fingerprints of criminals in Argentina.The earliest cataloging of fingerprints dates back to 1891 when Juan Vucetich started a collection of fingerprints of criminals in Argentina.

Biometrics are used to identify individuals by measuring certain unique physical, physiological and behavioral characteristics. Individuals must be identified to allow or prohibit access to secure areas—or to enable them to use personal secured digital devices such as a computer or mobile phone. Virtually all biometric methods are implemented using the following

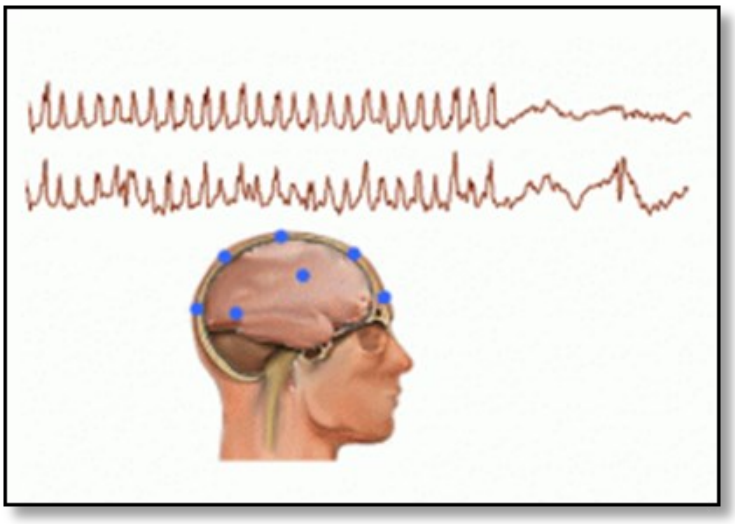
1) sensor, to acquire raw biometric data from an individual
2) feature extraction, to process the acquired data to develop a feature-set that represents the biometric trait
3) pattern matching, to compare the extracted feature-set against stored templates residing in a database
4) decision-making, whereby a user's claimed identity is authenticated or rejected.

As of today, the countries using biometrics include: Australia, Brazil, Canada, Gambia, Germany, India, Iraq, Israel, Italy, Netherlands, New Zealand, Norway, United Kingdom, and United States.

For many years, biometric identifiers like fingerprints and DNA have been in use, and proved most accurate. Iris and retina scanners also have been, and still are in use. But finger prints can be altered. For example, in 2005, Malaysian car thieves cut off the finger of a Mercedes-Benz owner when attempting to steal the car. Iris and retina scanners can also be rendered inaccurate by the onset of medical conditions like astigmatism and presbyopia. DNA information is difficult to collect in terms of both the work that goes into processing, and expenses incurred. Other traits that are used to confirm a person's identity include one's gait, tapping rhythm, signature and voice, although these are not as commonly used compared to fingerprint and iris/retina. Facial recognition is by far the best way of verifying a person's identity due to the unobtrusive nature of its process, which doesn't require physical contact with the person.

Newer methods that have been experimented are recognition by shape of the ears and by veins in the palm. Ear shape doesn't change with age or with smiling, but may be obstructed by hair. Palm and finger vein pattern are established in the womb and do not change during the person's lifetime. They also don't change with damage to skin, wearing gloves and cannot be manipulated as they lie underneath the surface of the skin. However, both these techniques involve physical contact with the scanner and have been perceived as unhygienic. Facial recognition is by far the best way of verifying a person's identity due to the unobtrusive nature of its process, which doesn't require physical contact with the person.

Other traits that have been proposed for research in biometrics are body shape recognition, investigation of internal body parts through imaging, analysis of face and head vibrations while speaking, and electrical and magnetic signals created by the body. Particularly, there has been keen focus in the research based on using electrocardiogram (ECG), and electroencephalogram (EEG) of a person as identifiers. The research group at University of Wolverhampton lead by RamaswamyPalaniappan has shown that people have certain distinct brain and heart patterns that are specific for each individual. Brain waves and heart rhythms are internal identifiers that are much more difficult or impossible to change. Heart rhythms are slightly more difficult because they can change with the onset of heart problems, and they may also change when a person is under stress. In general, however, your heart rhythm is unique to you. Your brain waves are essentially foolproof, because they simply cannot be changed. While there is criticism that brain and heart rhythms can change due to various situational factors, they have potential to become the most secure biometric parameters and further research can eliminate ambiguities related to their adoption.



SOURCE: www.ijettcs.org

V.Sandhya,
III year

Carbon Nanotubes Make New Approach to Microfluidics More Effective

Circulating tumor cells (CTC) are key early indicators of metastasis, which is the process by which cancer cells move from one organ group in the body to another. Once cancer spreads, the prognosis is generally not good. So, early identification of CTCs can help prevent them from creating new colonies of malignant cells.

Researchers at Worcester Polytechnic Institute (WPI) in Massachusetts have developed a new approach to microfluidics to detect CTCs in blood. The WPI researchers believe that their technique could form the basis of a simple lab test for quick detection of early signs of metastasis and help physicians select treatments targeted at the specific cancer cells identified.

Current microfluidic techniques used in tumor cell isolation have been dependent on flow rate and require off-chip post-processing. The WPI researchers' technique employs static isolation of tumor cells from the blood by fractionation of the blood into small droplets. In research described in the journal *Nanotechnology*, the WPI researchers were able to create a chip design in which antibodies are attached to an array of carbon nanotubes at the bottom of a tiny well in the chip. The chips have an array of these tiny wells, each about three millimeters across.

When the blood droplets are put into the well, the heavier cancer cells drop to the bottom where they become attached to the antibodies. Each of the wells holds a specific antibody that will bind to one type of cancer cell. The chip's electrodes detect electrical changes that occur when the cancer cells are captured by the antibodies.

Using an array of antibodies makes it possible to identify several different types of cancer cells within a single blood sample. To put that in perspective, the researchers could fill 170 wells with just 0.85 millileter of blood. The chips were able to capture between one and a thousand cells per device, equating to an efficiency of between 62 and 100 percent. The advantages of this technique over traditional microfluidic methods are numerous and significant. But let's just focus on the advantages derived from the use of carbon nanotubes.

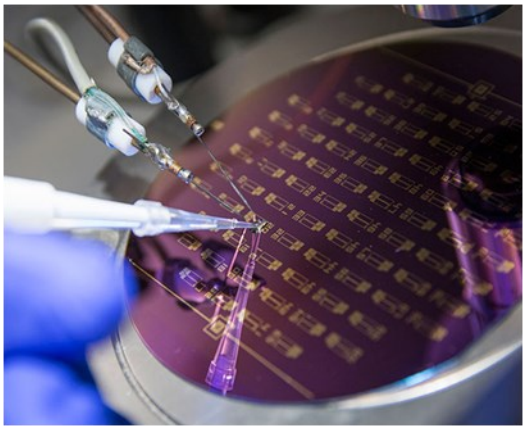


Photo: Worcester Polytechnic Institute

First, the nanotube-based microarrays include both detection and capture technology, unlike traditional microfluidics, which only capture. Second, the nanotube microarray allows for a wide variety of antibodies so that it can attract and identify different types of cells that may need to be fought in different ways.
Another one of the advantages of this approach over other microfluidics is that it can capture exosomes, which are produced by cancer cells and carry the same markers.

These highly elusive 3-nanometer structures are too small to be captured with other types of liquid biopsy devices, such as microfluidics, due to shear forces that can potentially destroy them. The chip is currently the only device that can potentially capture circulating tumor cells and exosomes directly on the chip, which should increase its ability to detect metastasis. This is important because research is showing that tiny proteins excreted with exosomes can actually suppress cancer drug delivery and hinder treatment. The technology is being ready for commercialization delineated by stages of cancer to move the technology along further in its development.

SOURCE:IEEE SPECTRUM

Pushpika,
III year

CREATIVE CORNER

மிகுதி

அன்பின் மிகுதி வெறுப்பு
அறிவின் மிகுதி அடக்கம்
ஆற்றலின் மிகுதி படைப்பு
கோபத்தின் மிகுதி அழுகை
எதிர்ப்பார்ப்பின் மிகுதி ஏமாற்றம்
சோர்வின் மிகுதி கலக்கம்
சோம்பலின் மிகுதி இழப்பு
அமைதியின் மிகுதி ஆன்மீகம்
பேச்சின் மிகுதி சண்டை
உறவின் மிகுதி பிரிவு
பழக்கத்தின் மிகுதி நட்பு
எண்ணங்களின் மிகுதி சந்தேகம்
பயத்தின் மிகுதி தவறு
உழைப்பின் மிகுதி உயர்வு
மிகுதியான யாவும் தரமற்றதல்ல
தகுதியான மிகுதியை மதியால்
தொட்டு விதியை வெல்லலாம்

-Madhumithra S.K.
IV Year

Violation of Volition

She chose to believe
A country still bound
In profane clouds of thought
A repulsive onslaught

The vicious few who roam
Tainted with gluttony exposed
Disgrace the race of men
Virtuous few put to shame

Unsuspectingly she ventured
The foray of the vile
Intense agony convulsed
The unclad damsel in distress

Animals devouring her pain
Destroying the trust she held
Her beliefs now shattered
The country woke to reality

A nation laden with respect
For goddesses uncountable
State of women thrown to harsh lights
A long stupor stirred

Delhi doesn't stand alone
The dark road down shame
Traverses the subcontinent, scorching
Toddlers, teens and women alike

Killed before she is born
Scandalized for her glory
No safe have assured
In womb or land

Provoking clothes they claimed
Reason enough to slaughter
Culturally lacking they pointed
Vermin cowering from crime

She fought strong and hard
For a cause now heard
A ringing chord she set
Alighting millions to join

She left before she saw
Justice for her torment
Let her cry now thrive
Until safety assured

For laws unwritten we fight
For nights unsafe we fear
From men gone wrong we flee
For the nation to pull through we hope

For the war must be won
We must now build a world
Where daughters roam the night
And sons don't cast their sight
For what this country stood
Integrity, Chastity and Faith.

-Deepika Raman
IV Year

UPCOMING ACTIVITIES

SSN

NATIONAL LEVEL SEMINAR
ON
STATISTICAL METHODS FOR BIO-SIGNAL AND IMAGE PROCESSING

(22-24 TH Feb, 2017)

Organized by

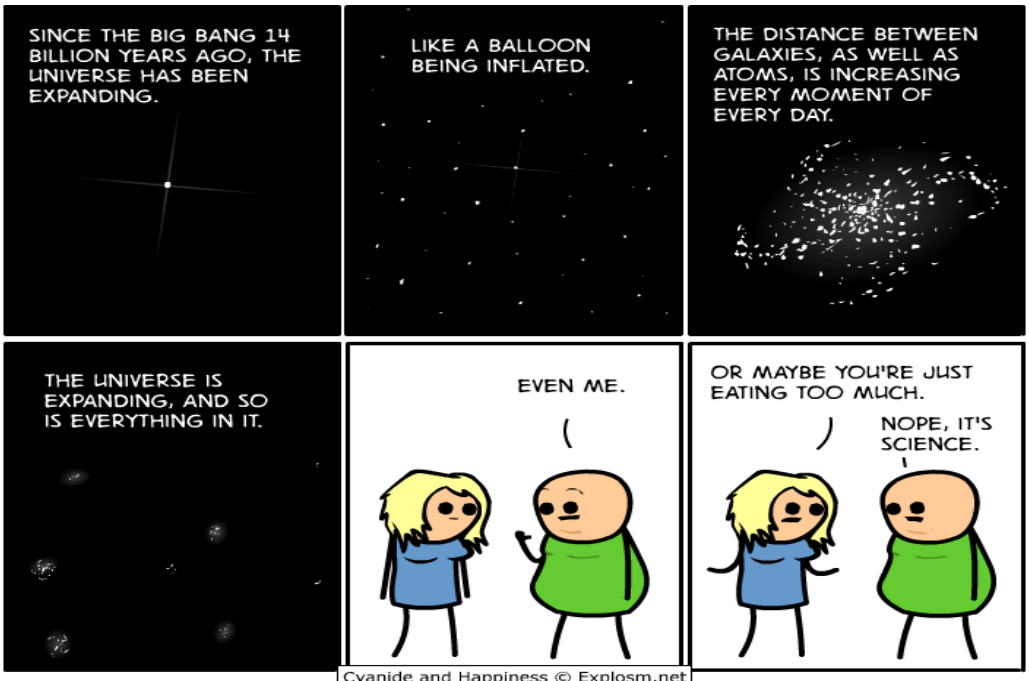
DEPARTMENT OF BIOMEDICAL ENGINEERING

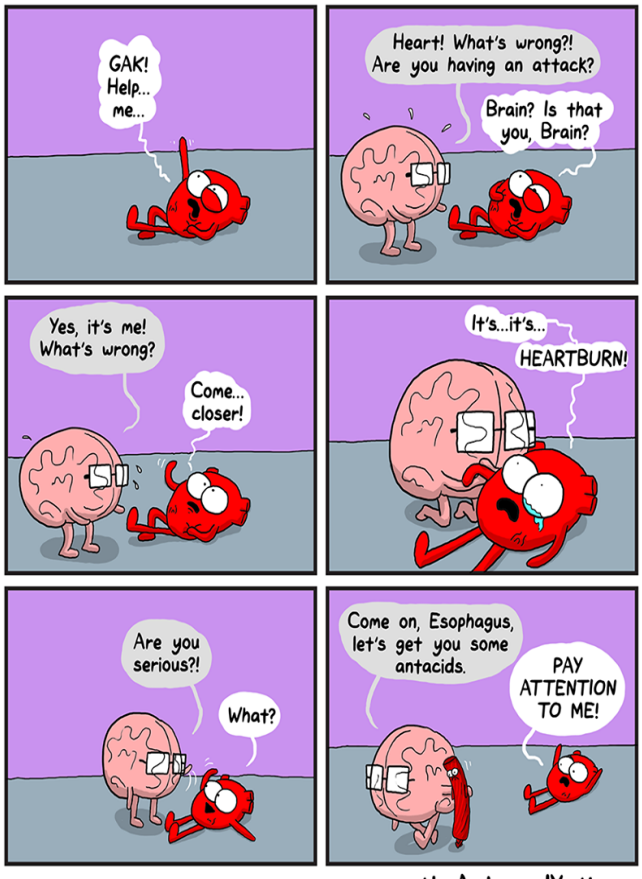
in association with

CENTER FOR HEALTH CARE TECHNOLOGIES

SSN COLLEGE OF ENGINEERING,
RAJIV GANDHI SALAI (OMR),
KALAVAKKAM - 603 110,
TAMIL NADU, INDIA.

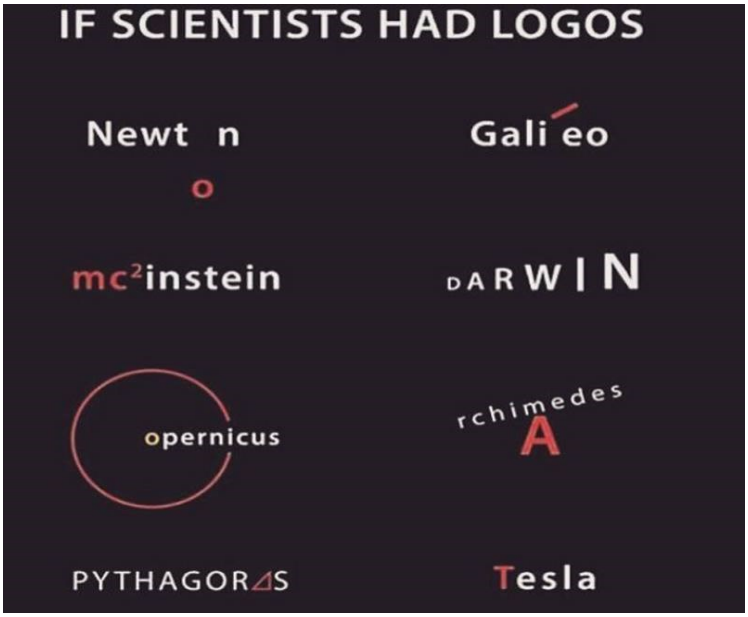
www.ssn.edu.in


SINCE THE BIG BANG 14 BILLION YEARS AGO, THE UNIVERSE HAS BEEN EXPANDING.
LIKE A BALLOON BEING INFLATED.
THE DISTANCE BETWEEN GALAXIES, AS WELL AS ATOMS, IS INCREASING EVERY MOMENT OF EVERY DAY.
THE UNIVERSE IS EXPANDING, AND SO IS EVERYTHING IN IT.
EVEN ME.
(
OR MAYBE YOU'RE JUST EATING TOO MUCH.
)
NOPE, IT'S SCIENCE.
Cyanide and Happiness © Explosm.net


GAK! Help... me...
Heart! What's wrong?! Are you having an attack?
Brain? Is that you, Brain?
Yes, it's me! What's wrong?
Come... closer!
It's...it's...
HEARTBURN!
Are you serious?!
What?
Come on, Esophagus, let's get you some antacids.
PAY ATTENTION TO ME!
theAwkwardYeti.com

COMIC ZONE


UNEARTHEDCOMICS.COM 2015 ©SARA ZIMMERMAN
How's my time?
It took you 365 days again.
Sweet! At least I keep beating Mars.


IF SCIENTISTS HAD LOGOS
Newt n
o
Gali eo
mc²instein
DARWIN
opernicus
rchimedes
A
PYTHAGORAS
Tesla