Vidya Vikas Education Trust's

Universal College of Enginering

Approved by AICTE, DTE, Maharashtra State Government and Affiliated to Mumbai University

Accredited with B+ Grade by NAAC | Recognised as a Lingusitic (Gujarati) Minority Institution

COFFEE & CODE;

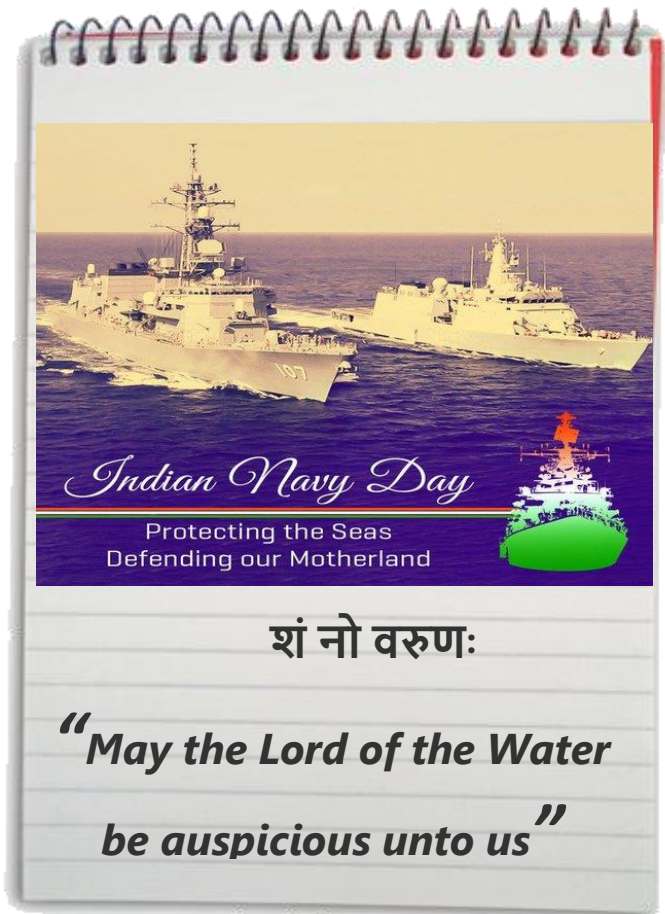An initiative by the Department of Computer Engineering.

CONTENTS

VISION

To be recognized as a department that provides quality technical education and research opportunities that eventually caters to helping and serving the community.

MISSION

• To groom the students to participate in curricular and co-curricular activities by providing efficient resources.

• To motivate the students to solve real-world problems to help the society grow.

• To provide a learning ambience to enhance innovations, team spirit and leadership qualities for students.

Indian Navy Day

Protecting the Seas
Defending our Motherland

शं नो वरुणः

"*May the Lord of the Water be auspicious unto us*"

In Association with

CESA

(Computer Engineering Student Association)

Team	:	Mr. Ayush Shetty,
		Mr. Tejas Gudulekar
Faculty	:	Mr. Sridhar Iyer,
		Mrs. Hezal Lopes,
		Ms. Apurva Chaudhari

Departmental Activities

One Week Faculty Development Program on
"Artificial Intelligence and Deep Learning"
In Association with
Ministry of Electronics & Information Technology (MeitY),
Government of India Electronics & ICT Academy IIT Guwahati, Assam

About E&ICT Academy:

Electronics and ICT Academy is an initiative of Ministry of Electronics & Information Technology (MeitY), Govt. of India for conducting various Faculty/ Research Scholar Development Programme. Academy has planned short term training programmes on fundamental and advanced topics in IT, Electronics & Communication, Product Design, Manufacturing with hands on training and project work using latest software tools and systems. In addition, the Academy will conduct specialized/customized training programmes and research promotion workshops for corporate sector & educational institutions.

Objective of the course:

Course Objective is to provide basic knowledge in Deep Learning and Artificial Intelligence concepts. The programme will focus on practical aspects and include examples which are relevant to the current industry requirements.

Course Program:

FDP is split into three parts:
* Lectures.
* Labs/Hands-on sessions on Python
* Assignments and Project.

Assignments and Projects:

1. Assignments will be of the following type:

* MCQ based questionnaire.
* Programming Assignments

2. At the end of the course "Project" will be assigned to the participants which will be based on the Practical Case Studies.

Course Coordinators from Academy:

* Prof. Ratnajit Bhattacharjee Principal Investigator, E&ICT Academy, IIT Guwahati.
* Dr. Gaurav Trivedi Co-Principal Investigator, E&ICT Academy, IIT Guwahati

Course Outcome:

Getting Started with Machine Learning
* About the dataset Processing
* Regression Techniques for Information Retrieval
* Classification Techniques

Natural Language Processing
* Libraries used for NLP
* Research Trends in NLP
* Application of NLP for real world applications.

Artificial Neural Networks & Deep Leaning
* How do Neural Networks work?
* The Activation Function
* How do Neural Networks learn?
* Gradient Descent, Stochastic Gradient Descent,

Backpropagation Foundations of Neural Networks
* Introduction to deep learning
* Neural networks basics
* Deep neural networks
* Introduction to Tensor flow

Convolutional models
* Convolutional neural networks
* Computer vision applications

Sequence models
* RNN, LSTM, GRU models
* Application to NLP and Speech Recognition

Organising Committee from UCoE

Campus Director
Dr. Jitendra Patil

Head of Department
Dr. Jitendra Saturwar

Course Coordinator
Dr. Dipti Patil
Professor, Dept. of Computer Engineering,
Mobile No.: 8422086604
Email ID : dipti.patil@universal.edu.in

Members from Department of Computer Engg.

Prof. Kanchan Dabre,
Prof. Hezal Lopez
Prof. Sylvia D'Monte
Prof. Chinmay Raut
Prof. Ravi Nagar

Registration Form

Name of Applicant (first, last):...............
....
Fathers Name:........................
....
Mothers Name:........................
Date of Birth (DD/MM/YY):.......................
Gender:...................
Category(General/SC/ST):.......................
Designation:.......................
Highest Qualification:.......................
Name and Address of the Institute/ Organization:.............
....
City/town:.......................
Postal Address:.......................
City/town:.......................
Email:.......................
Landline Number (with STD code):.......................
Mobile Number:.......................
Do you need accommodation? (Yes/No):.......................
Transaction ID:.......................
Transaction Date: ....
Issuing Bank:
....
Signature of the Applicant: ....
I hereby agree to relieve Mr./ Ms./ Dr.......................
in case he/she is selected to attend the programme.
Signature and Seal of the Forwarding Authority.

Name...

Designation..

Note:

1) The Faculty/Staff are requested to submit the NOC from respective department before attending the session.
2) The Faculty member belonging to SC/ST Category need to carry caste Certificate (both in original & photocopy).
3) The participant need to carry the Institute/Organization valid Identity Card (Both in Original & Photocopy).
4) **Accommodation Details**: Accommodation (on request with nominal price on self paid basis) For details please contact: Dr Dipti Patil, Contact no.: 8422086604.

Programme Duration: 40 Hrs

Affix passport size photograph

Course Coordinators from Academy

- **Prof. Ratnajit Bhattacharjee**
  Principal Investigator, E&ICT Academy, IIT Guwahati.
- **Dr. Gaurav Trivedi**
  Co-Principal Investigator, E&ICT Academy, IIT Guwahati.

Organising Committee from UCoE

Campus Director
- **Dr. Jitendra Patil**

Head of Department
- **Dr. Jitendra Saturwar**

Course Coordinator
- **Dr. Dipti Patil**
  Professor, Dept. of Computer Engineering,
  Mobile No.: 8422086604
  Email ID : dipti.patil@universal.edu.in

Members from Department of Computer Engg.
- **Prof. Kanchan Dabre, (Mob. : 7709058393)**
- **Prof. Hezel Lopez, (Mob : 9970469611)**
- **Prof. Sylvia D'monte, (Mob : 9823516248)**
- **Prof. Chinmay Raut, (Mob : 9960960239)**
- **Prof. Ravi Nagar, (Mob.: 9323312494)**

How to Apply?

Online – The participants may log on to the E&ICT Academy, IIT Guwahati website: http://eict.iitg.ac.in/faculty_development.html and fill up the google doc application form.

Registration Fee Including GST

Registration Fee (Including Course Material, Snacks and Lunch)

- Rs. 2,950/- for Faculty and PhD Research Scholar.
- Rs. 1,475/- for ST/SC Faculty and PhD Research Scholar.
- Rs. 5,900/- for Student, Industry Personnel, & Others (Subjected to Availability of Seat).

NOTE – Registration fee is refundable strictly till the last date of registration.

An Initiative of
Ministry of Electronics & Information Technology (MeitY), Government of India
Electronics & ICT Academy
IIT Guwahati, Assam
One-week Faculty Development Programme on

Artificial Intelligence and Deep Learning
(13 - 17 January, 2020)

Organised in association with

UNIVERSAL

Finland Labs

Universal College of Engineering
&
Support from
Finland Labs

Course Date: 13-17 January, 2020
(Online Registration Link will be open from 05.11.2019)
Last Date of Registration: 30.12.2019
Venue: Universal College of Engineering,
Kaman Bhiwandi Road, Vasai(E)

Objective of the Course

Course Objective is to provide basic knowledge in Deep Learning and Artificial Intelligence concepts. The programme will focus on practical aspects and include examples which are relevant to the current industry requirements.

Course Programme

FDP is split into three parts:
- Lectures.
- Labs/Hands-on sessions daily on Python Programming.
- Assignments and Project.

Assignments & Project

1. Assignments will be of the following type:
   - MCQ based questionnaire.
   - Programming Assignments (Problem statement will be provided.)
2. At the end of the course "Project" will be assigned to the participants which will be based on the Practical Case Studies.

Contact Details

Project Manager,
E&ICT Academy, IIT Guwahati
Email: eictacad@iitg.ac.in, eictacad@gmail.com
eictinfo.iitg@gmail.com
Phone No: +91- 7086502139,
+91-3612583182/2536/2503
(Working Hours 9:30 am to 5:30 pm)
Follow us on: www.facebook.com/eictacadguwahati/

Mode of Payment: Online Only (RTGS/NEFT)

For Online Transfer
Bank Name: State Bank of India
Account Name: IIT Guwahati R and D E and ICT Academy
Account No.: 36071160089
IFSC Code: SBIN0014262
Bank Name: State Bank of India
Bank Address: IIT Guwahati, GHY- 39.

Course Outcome

Getting Started with Machine Learning
- About the dataset Processing
- Regression Techniques for Information Retrieval
- Classification Techniques

Natural Language Processing
- Libraries used for NLP
- Research Trends in NLP
- Application of NLP for real world applications.

Artificial Neural Networks & Deep Leaning
- How do Neural Networks work?
- The Activation Function
- How do Neural Networks learn?
- Gradient Descent, Stochastic Gradient Descent, Backpropagation

Foundations of Neural Networks
- Introduction to deep learning
- Neural networks basics
- Deep neural networks
- Introduction to Tensor flow

Convolutional models
- Convolutional neural networks
- Computer vision applications

Sequence models
- RNN, LSTM, GRU models
- Application to NLP and Speech Recognition

How to Reach UCoE

About E&ICT Academy

Electronics and ICT Academy is an initiative of Ministry of Electronics & Information Technology (MeitY), Govt. of India for conducting various Faculty/ Research Scholar Development Programme.

Academy has planned short term training programmes on fundamental and advanced topics in IT, Electronics & Communication, Product Design, Manufacturing with hands on training and project work using latest software tools and systems.

In addition, the Academy will conduct specialized/customized training programmes and research promotion workshops for corporate sector & educational institutions.

About Universal College of Engineering

Universal College of Engineering (UCoE) was established in 2012 and is a part of Vidya Vikas Education Trusts Technical campus. Accredited with B+ Grade by NAAC. It is located on the Western Express Highway at a distance of just 20mins from Dahisar Check Naka. Apart from the vicinity to the city, UCoE has a vast scenic campus which offers a quiet learning environment away from the pollution and congestion of city. UCoE is affiliated to the University of Mumbai and offers engineering degree courses in Computer, Civil, Electronics, Electronics and Telecommunication and Information Technology.

VISION OF INSTITUTE: To be a forerunner in rendering quality technical education with multifaceted research oriented approach aspiring for excellence of students in the professional and social realm which spans across wide and diverse horizon of opportunities.

Address of UCoE

Universal College of Engineering,
Near Bhajansons Dairy & Shankeshwar
Punayadham Jain Temple, Next to Kaman River,
Kaman Bhiwandi Road, Vasai(E)

For details of the programme and course contents etc., please log on to Electronics and ICT Academy website:
http://eict.iitg.ac.in/index.html

## Water-Resistant Smartphone Technologies

ABSTRACT:

Smartphone manufacturers have begun to market their products as water-resistant to gain market share. However, many consumers report that these smart phones are not actually waterproof as many of the advertisements suggest, and water damage is not included in the warranty policy. To understand how companies are attempting to protect their smart phones against water damage, this paper evaluates three popular smart phones (iPhone 7 Plus, Samsung S7 Edge, and Huawei P9 Lite).

The phones were disassembled to assess the use of gaskets, glues, and other adhesives and emerging high-end technologies including water-resistant coatings and breathable fabric membranes. In addition, failure causes of water-resistant smart phones are discussed in terms of limitations of the ingress protection tests within the International Electro technical Commission 60529 standard. Warranty issues are then presented and recommendations are given.

Almost 2.4 billion people used smart phones in 2017, and the number of Smartphone users is expected to increase to more than one-third of the global population by the end of 2020. Consumers are so addicted to their smart phones that it is estimated that 61% have used their mobile phone in the washroom (bathroom/toilet) and 9% have dropped a phone in a toilet.

According to the International Data Corporation (IDC), in 2016, contact with water was the second-largest cause of damaged smart phones in the world, topped only by shattered screens from mechanical impacts (e.g., dropping the phone) . Therefore, besides longer battery life and a shatterproof screen, water resistance has become a key Smartphone feature in demand by smart phone users.

Longer battery life	47%
Shatterproof screen	21%
Water resistance	16%
Best camera available	12%
Hands free technology	4%
Others	1%
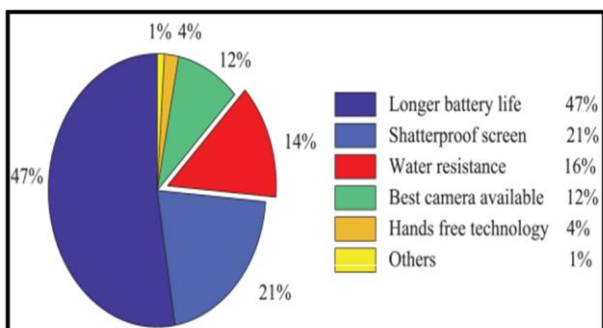
Advertisements from companies such as Apple, Samsung, and Huawei suggest that their smart phones are waterproof. For example, Apple's official website declares that their latest iPhones are splash-, water-, and dust-resistant , and television and online commercials show water splashing on the iPhones . Samsung's official website notes that their latest smart phones are dust- and water-resistant.

Similarly, Huawei's commercials also indicate that their smart phones can survive water-related activities . In fact, although the smart phone manufacturers state that their smart phones are "water-resistant", their commercials suggest that they are "waterproof", and most consumers do not distinguish between the terms "waterproof" and "water-resistant".

A product is water-resistant if it can resist the penetration of water to some degree. The term "waterproof" indicates that the enclosure of the device is completely impermeable to water . Since only hermetically sealed products may be truly waterproof, and to avoid disputes and ambiguities for watches, "waterproof" was replaced by "water-resistant" in the International Organization for Standardization (ISO) 2281:1990 standard in 1990 .

Since then, only the term "water-resistant" has been used to describe electrical devices and the water resistance test standards set forth by the ISO and IEC (International Electro technical Commission) . However, this creates new concerns because the expectations of what the term "water-resistant" means vary widely. Furthermore, as a relatively new electronic product, mobile/smart phones are not covered by a specific water resistance standard but are often considered to fit under the standards for the water resistance of watches and other electronic devices.

Samsung advertises its Galaxy smart phones are water-resistant and feature an IP68 rating. The official website [10] of the Galaxy S7 states: "With the Galaxy S7 and S7 edge, you don't have to worry about putting your phone down on wet surfaces. You can carry on using it even after dropping it in water. You can play games by the pool, post selfies at the beach and call for a cab in the rain.

They've been awarded the IP (Ingress Protection) rating of 68." Furthermore, Samsung commercials show people snorkeling and surfing with an S7 Phone, dunking an S7 phone in a fish tank, dropping an S7 phone under a garden hose, and with water spray directly onto an S7 phone. However, some Samsung Galaxy S7 Edge users claimed their smart phones were damaged after being dipped in a couple of inches of water for less than 1 min.

STANDARDS AND WATER RESISTANCE RATINGS:

To distinguish various levels or degrees of water protection, companies often use standards , although there is no standard specifically for smartphones. An ingress protection (IP) code, a part of the IEC 60529:2013 standard, is the typical method to rate the ability of electrical equipment with a rated voltage not exceeding 72.5 kV to withstand water (as well as solid foreign objects) through its case openings and electrical enclosures . The IEC's IP code covers a broad range of industrial electrical products such as smart wristbands, computers, smartphones, and digital cameras, whereas the ISO has also published an IP code in the ISO 20653:2013 standard that specifically covers electrical equipment for road vehicles.

As there is no water protection test standard specifically for mobile (smart) phones, most smartphone manufacturers use IEC 60529:2013 to test and specify for water resistance. The degree of protection in the standard is specified by an IP code (Ingress Protection Rating), which consists of the letters IP followed by two digits and a supplementary letter . The first number represents the degree of protection against the entry of foreign solid objects, including fingers and dust. These protection levels range from 0 to 6.

As there is no water protection test standard specifically for mobile (smart) phones, most smartphone manufacturers use IEC 60529:2013 to test and specify for water resistance. The degree of protection in the standard is specified by an IP code (Ingress Protection Rating), which consists of the letters IP followed by two digits and a supplementary letter . The first number represents the degree of protection against the entry of foreign solid objects, including fingers and dust. These protection levels range from 0 to 6.

WATER PROTECTION METHODS IN POPULAR SMARTPHONES

To assess the various methods that manufacturers are employing to make their smart phones water-resistant, we disassembled three popular smart phones: Apple iPhone 7 Plus, Samsung Galaxy S7 Edge, and Huawei P9 Lite The Apple iPhone 7 Plus has an IP67 rating and the Samsung Galaxy S7 Edge has an IP68 rating Huawei does not publish the water resistance rating for its P9 Lite, but it claims to have a nano-coating technology made by P2i and some traditional physical sealants to protect the smart phone from water Some water resistance tests suggest that the P9 Lite may be able to survive water immersion to a limited extent.
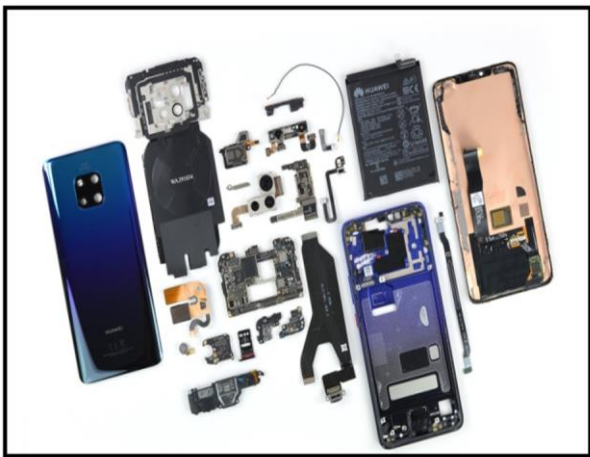
The key water ingress points for smart phones are shown in Figure 7. The touch screen, the main enclosure, and the rear case form the entire enclosure of the smart phone. The touch screens of all three smart phones are made of glass. The main enclosure and rear case of the iPhone 7 Plus are integrated and made of metal. The main enclosure and rear case of the Galaxy S7 Edge are made of metal and glass, respectively. The main enclosure and rear case of the P9 Lite are made of metal and plastic, respectively.

Glass, metal, and plastic can "deter" water from entering the interior of the smart phone, although plastic can allow moisture to enter through diffusion. The connections between the touch screen and the main enclosure and between the main enclosure and the rear case should be sealed to prevent water from entering the smart phone. In addition, the entire enclosure is equipped with functional components (i.e., buttons (home, volume, mute switch, and power), SIM card tray, camera, flash, headset jack, and USB port) and openings (i.e., vent hole and sound guide holes for the microphone and speaker).

WARRANTIES

Although manufacturers have declared their smart phones are water-resistant and can withstand water at depths of up to 1 m (for IP67) or 1.5 m (for IP68) for 30 min, many smart phones are reported as damaged after being dropped into water for a few minutes . However, Apple and Sony explicitly claim that liquid damage is not covered under their warranty. Samsung and Huawei also state that their standard limited warranty does not cover the damage resulting from exposure to water or liquid containing water.

Many Smartphone manufacturers, such as Apple, have employed liquid contact indicators (LCIs) to determine if there was some water ingress. If there is contact with water, the indicator activates and changes color. Unfortunately, these indicators can be set off by high humidity and condensation (e.g., going from inside an air-conditioned office to outside when it is hot and humid), and from normal use such as washing dishes, walking in the rain, or exercising.

CONCLUSIONS AND RECOMMENDATIONS

Based on our study, several recommendations are given. **First,** manufacturers should stop the false and misleading advertisements regarding water resistance, or at least honor their warranty if a product was subjected to water damage under normal use conditions. The manufacturers only test their products under IEC 60529:2013 standard in the laboratory and do not consider the real-world conditions. Manufacturers should also develop more suitable experimental standards of water resistance specifically for smart phones. The test conditions within the standard should reflect user habits, e.g., accidental or intentional immersion in a wash basin, swimming pool, toilet, or bathtub. **Second,** manufacturers should add a label that explains the product's level of water resistance in addition to citing the IP code. The IPX7 and IPX8 codes do not guarantee that the smart phone will still work properly after it has actually fallen into water. The current test conditions of IPX7 and IPX8 within the IEC 60529:2013 standard are only suitable for laboratory conditions rather than real-use conditions. For example, Samsung Galaxy S7 Edge features an IP rating of 68 and is water-resistant in up to 1.5 m of water for up to 30 min. Samsung should inform consumers that the waterproof depth and duration may not be achieved in real life usage. **Third,** smart phone manufacturers should inform consumers in the user's manual and on their official website that the water-resistance technologies they use will degrade even under normal use.

Source : https://ieeexplore.ieee.org/document/8671469

Bot Can Beat Humans In Multiplayer Hidden-Role Games

MIT researchers have developed a BOT equipped with artificial intelligence that can beat human players in tricky online multiplayer games where player roles and motives are kept secret.

Many gaming bots have been built to keep up with human players. Earlier this year, a team from Carnegie Mellon University developed the world's first bot that can beat professionals in multiplayer poker. DeepMind's AlphaGo made headlines in 2016 for besting a professional Go player. At the Conference on Neural Information Processing Systems next month, the researchers will present DeepRole, the first gaming bot that can win online multiplayer games in which the participants' team allegiances are initially unclear. The bot is designed with novel "deductive reasoning" added into an AI algorithm commonly used for playing poker. This helps it reason about partially observable actions, to determine the probability that a given player is a teammate or opponent. In doing so, it quickly learns whom to ally with and which actions to take to ensure its team's victory.

The researchers pitted DeepRole against human players in more than 4,000 rounds of the online game "The Resistance: Avalon." In this game, players try to deduce their peers' secret roles as the game progresses, while simultaneously hiding their own roles. As both a teammate and an opponent, DeepRole consistently outperformed human players. "If you replace a human teammate with a bot, you can expect a higher win rate for your team. Bots are better partners," says first author Jack Serrino '18, who majored in electrical engineering and computer science at MIT and is an avid online "Avalon" player. "Humans learn from and cooperate with others, and that enables us to achieve together things that none of us can achieve alone," says co-author Max Kleiman-Weiner, "Games like 'Avalon' better mimic the dynamic social settings humans experience in everyday life.

In "Avalon," three players are randomly and secretly assigned to a "resistance" team and two players to a "spy" team. Both spy players know all players' roles. During each round, one player proposes a subset of two or three players to execute a mission. All players simultaneously and publicly vote to approve or disapprove the subset. If a majority approve, the subset secretly determines whether the mission will succeed or fail. If two "succeeds" are chosen, the mission succeeds; if one "fail" is selected, the mission fails. Resistance players must always choose to succeed, but spy players may choose either outcome. The resistance team wins after three successful missions; the spy team wins after three failed missions.

Winning the game basically comes down to deducing who is resistance or spy, and voting for your collaborators. But that's actually more computationally complex than playing chess and poker. "It's a game of imperfect information,".
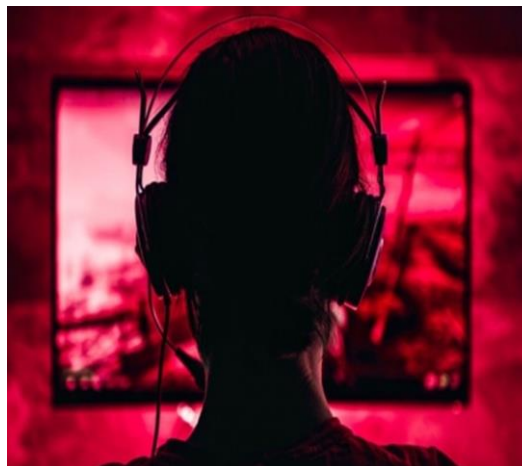
"You're not even sure who you're against when you start, so there's an additional discovery phase of finding whom to cooperate with."

DeepRole uses a game-planning algorithm called "counterfactual regret minimization" (CFR) — which learns to play a game by repeatedly playing against itself — augmented with deductive reasoning. At each point in a game, CFR looks ahead to create a decision "game tree" of lines and nodes describing the potential future actions of each player. Game trees represent all possible actions (lines) each player can take at each future decision point. In playing out potentially billions of game simulations, CFR notes which actions had increased or decreased its chances of winning, and iteratively revises its strategy to include more good decisions. Eventually, it plans an optimal strategy that, at worst, ties against any opponent. CFR works well for games like poker, with public actions — such as betting money and folding a hand — but it struggles when actions are secret.

The bot is trained by playing against itself as both resistance and spy. When playing an online game, it uses its game tree to estimate what each player is going to do. The game tree represents a strategy that gives each player the highest likelihood to win as an assigned role.

The tree's nodes contain "counterfactual values," which are basically estimates for a payoff that player receives if they play that given strategy. At each mission, the bot looks at how each person played in comparison to the game tree. If, throughout the game, a player makes enough decisions that are inconsistent with the bot's expectations, then the player is probably playing as the other role. Eventually, the bot assigns a high probability for each player's role. These probabilities are used to update the bot's strategy to increase its chances of victory.

Simultaneously, it uses this same technique to estimate how a third-person observer might interpret its own actions. This helps it estimate how other players may react, helping it make more intelligent decisions. "If it's on a two-player mission that fails, the other players know one player is a spy. The bot probably won't propose the same team on future missions, since it knows the other players think it's bad," Serrino says.

Source : http://news.mit.edu/2019/deeprole-ai-beat-humans-role-games-1120

Self-Transforming Robot Blocks Jump, Spin, Flip, And Identify Each Other

Developed at MIT's Computer Science and Artificial Intelligence Laboratory, robots can self-assemble to form various structures with applications including inspection.

Swarms of simple, interacting robots have the potential to unlock stealthy abilities for accomplishing complex tasks. Getting these robots to achieve a true hive-like mind of coordination, though, has proved to be a hurdle.
In an effort to change this, a team from MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) came up with a surprisingly simple scheme: self-assembling robotic cubes that can climb over and around one another, leap through the air, and roll across the ground.

Six years after the project's first iteration, the robots can now "communicate" with each other using a barcode-like system on each face of the block that allows the modules to identify each other. The autonomous fleet of 16 blocks can now accomplish simple tasks or behaviors, such as forming a line, following arrows, or tracking light.

Inside each modular "M-Block" is a flywheel that moves at 20,000 revolutions per minute, using angular momentum when the flywheel is braked. On each edge and every face are permanent magnets that let any two cubes attach to each other.

While the cubes can't be manipulated quite as easily as, say, those from the video game "Minecraft," the team envisions strong applications in inspection, and eventually disaster response. Imagine a burning building where a staircase has disappeared. In the future, you can envision simply throwing M-Blocks on the ground, and watching them build out a temporary staircase for climbing up to the roof, or down to the basement to rescue victims.

"M stands for motion, magnet, and magic," says MIT Professor and CSAIL Director Daniela Rus. "'Motion,' because the cubes can move by jumping. 'Magnet,' because the cubes can connect to other cubes using magnets, and once connected they can move together and connect to assemble structures. 'Magic,' because we don't see any moving parts, and the cube appears to be driven by magic."

While the mechanism is quite intricate on the inside, the exterior is just the opposite, which enables more robust connections. Beyond inspection and rescue, the researchers also imagine using the blocks for things like gaming, manufacturing, and health care.

"The unique thing about our approach is that it's inexpensive, robust, and potentially easier to scale to a million modules," says CSAIL PhD student John Romanishin, lead author on a new paper about the system. "M-Blocks can move in a general way.

Other robotic systems have much more complicated movement mechanisms that require many steps, but our system is more scalable."

Romanishin wrote the paper alongside Rus and undergraduate student John Mamish of the University of Michigan. They will present the paper on M-blocks at IEEE's International Conference on Intelligent Robots and Systems in November in Macau.

Previous modular robot systems typically tackle movement using unit modules with small robotic arms known as external actuators. These systems require a lot of coordination for even the simplest movements, with multiple commands for one jump or hop.

On the communication side, other attempts have involved the use of infrared light or radio waves, which can quickly get clunky: If you have lots of robots in a small area and they're all trying to send each other signals, it opens up a messy channel of conflict and confusion.
When a system uses radio signals to communicate, the signals can interfere with each other when there are many radios in a small volume.

Back in 2013, the team built out their mechanism for M-Blocks. They created six-faced cubes that move about using something called "inertial forces." This means that, instead of using moving arms that help connect the structures, the blocks have a mass inside of them which they "throw" against the side of the module, which causes the block to rotate and move. Each module can move in four cardinal directions when placed on any one of the six faces, which results in 24 different movement directions. Without little arms and appendages sticking out of the blocks, it's a lot easier for them to stay free of damage and avoid collisions.

In one experiment, the team had the modules turn into a line from a random structure, and they watched if the modules could determine the specific way that they were connected to each other. If they weren't, they'd have to pick a direction and roll that way until they ended up on the end of the line. Essentially, the blocks used the configuration of how they're connected to each other in order to guide the motion that they choose to move — and 90 percent of the M-Blocks succeeded in getting into a line.The team notes that building out the electronics was very challenging, especially when trying to fit intricate hardware inside such a small package. To make the M-Block swarms a larger reality, the team wants just that — more and more robots to make bigger swarms with stronger capabilities for various structures. The project was supported, in part, by the National Science Foundation and Amazon Robotics.

Source : http://news.mit.edu/2019/self-transforming-robot-blocks-jump-spin-flip-identify-each-other-1030

Supercomputer Analyzes Web Traffic Across Entire Internet

Modeling web traffic could aid cybersecurity, computing infrastructure design, Internet policy, and more.

Using a supercomputing system, MIT researchers have developed a model that captures what web traffic looks like around the world on a given day, which can be used as a measurement tool for internet research and many other applications. Understanding web traffic patterns at such a large scale, the researchers say, is useful for informing internet policy, identifying and preventing outages, defending against cyberattacks, and designing more efficient computing infrastructure. A paper describing the approach was presented at the recent IEEE High Performance Extreme Computing Conference.

For their work, the researchers gathered the largest publicly available internet traffic dataset, comprising 50 billion data packets exchanged in different locations across the globe over a period of several years. They ran the data through a novel "neural network" pipeline operating across 10,000 processors of the MIT SuperCloud, a system that combines computing resources from the MIT Lincoln Laboratory and across the Institute. That pipeline automatically trained a model that captures the relationship for all links in the dataset — from common pings to giants like Google and Facebook, to rare links that only briefly connect yet seem to have some impact on web traffic.

The model can take any massive network dataset and generate some statistical measurements about how all connections in the network affect each other. That can be used to reveal insights about peer-to-peer filesharing, nefarious IP addresses and spamming behavior, the distribution of attacks in critical sectors, and traffic bottlenecks to better allocate computing resources and keep data flowing. In concept, the work is similar to measuring the cosmic microwave background of space, the near-uniform radio waves traveling around our universe that have been an important source of information to study phenomena in outer space. "We built an accurate model for measuring the background of the virtual universe of the Internet," says Jeremy Kepner, a researcher at the MIT Lincoln Laboratory Supercomputing Center and an astronomer by training. "If you want to detect any variance or anomalies, you have to have a good model of the background."

Joining Kepner on the paper are: Kenjiro Cho of the Internet Initiative Japan; KC Claffy of the Center for Applied Internet Data Analysis at the University of California at San Diego. Vijay Gadepally and Peter Michaleas of Lincoln Laboratory's Supercomputing Center; and Lauren Milechin, a researcher in MIT's Department of Earth, Atmospheric and Planetary Sciences.

Breaking up data
In internet research, experts study anomalies in web traffic that may indicate, for instance, cyber threats. To do so, it helps to first understand what normal traffic looks like.
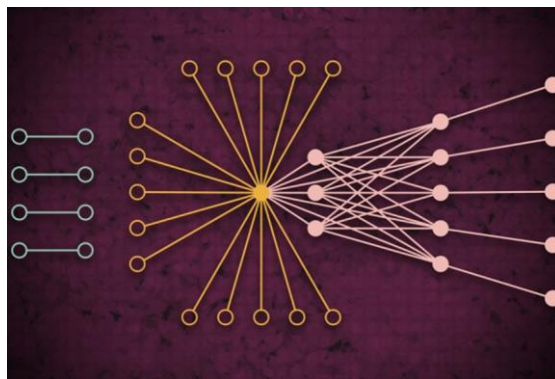
But capturing that has remained challenging. Traditional "traffic-analysis" models can only analyze small samples of data packets exchanged between sources and destinations limited by location. That reduces the model's accuracy.

The researchers weren't specifically looking to tackle this traffic-analysis issue. But they had been developing new techniques that could be used on the MIT SuperCloud to process massive network matrices. Internet traffic was the perfect test case.

Networks are usually studied in the form of graphs, with actors represented by nodes, and links representing connections between the nodes. With internet traffic, the nodes vary in sizes and location. Large supernodes are popular hubs, such as Google or Facebook. Leaf nodes spread out from that supernode and have multiple connections to each other and the supernode. Located outside that "core" of supernodes and leaf nodes are isolated nodes and links, which connect to each other only rarely.

Capturing the full extent of those graphs is infeasible for traditional models. "You can't touch that data without access to a supercomputer," Kepner says.

In partnership with the Widely Integrated Distributed Environment (WIDE) project, founded by several Japanese universities, and the Center for Applied Internet Data Analysis (CAIDA), in California, the MIT researchers captured the world's largest packet-capture dataset for internet traffic. The anonymized dataset contains nearly 50 billion unique source and destination data points between consumers and various apps and services during random days across various locations over Japan and the U.S., dating back to 2015.

Before they could train any model on that data, they needed to do some extensive preprocessing. To do so, they utilized software they created previously, called Dynamic Distributed Dimensional Data Mode (D4M), which uses some averaging techniques to efficiently compute and sort "hypersparse data" that contains far more empty space than data points. The researchers broke the data into units of about 100,000 packets across 10,000 MIT SuperCloud processors. This generated more compact matrices of billions of rows and columns of interactions between sources and destinations.

But the vast majority of cells in this hypersparse dataset were still empty. To process the matrices, the team ran a neural network on the same 10,000 cores. Behind the scenes, a trial-and-error technique started fitting models to the entirety of the data, creating a probability distribution of potentially accurate models.

Then, it used a modified error-correction technique to further refine the parameters of each model to capture as much data as possible. Traditionally, error-correcting techniques in machine learning will try to reduce the significance of any outlying data in order to make the model fit a normal probability distribution, which makes it more accurate overall. But the researchers used some math tricks to ensure the model still saw all outlying data — such as isolated links — as significant to the overall measurements.

In the end, the neural network essentially generates a simple model, with only two parameters, that describes the internet traffic dataset, "from really popular nodes to isolated nodes, and the complete spectrum of everything in between," Kepner says.

Using supercomputing resources to efficiently process a "firehose stream of traffic" to identify meaningful patterns and web activity is "groundbreaking" work, says David Bader, a distinguished professor of computer science and director of the Institute for Data Science at the New Jersey Institute of Technology.

"A grand challenge in cybersecurity is to understand the global-scale trends in Internet traffic for purposes, such as detecting nefarious sources, identifying significant flow aggregation, and vaccinating against computer viruses. [This research group has] successfully tackled this problem and presented deep analysis of global network traffic," he says.

The researchers are now reaching out to the scientific community to find their next application for the model. Experts, for instance, could examine the significance of the isolated links the researchers found in their experiments that are rare but seem to impact web traffic in the core nodes.

Beyond the internet, the neural network pipeline can be used to analyze any hypersparse network, such as biological and social networks. "We've now given the scientific community a fantastic tool for people who want to build more robust networks or detect anomalies of networks," Kepner says. "Those anomalies can be just normal behaviors of what users do, or it could be people doing things you don't want."

Source: http://news.mit.edu/2019/supercomputer-analyzes-web-traffic-across-entire-internet-1028

Alan Turing: visionary, war hero and the only choice for the £50 note

The Bank of England has decided that the next prominent figure to feature on the £50 note should be a scientist and have put the call out for nominations from the general public. For me, there is one scientist who stands out above all the rest. Sir Alan Turing.

Turing, is probably best-known for his pioneering codebreaking work during World War II (featured in the Hollywood blockbuster The Imitation Game). Turing made the first breakthroughs into the German naval Enigma code, which eased the passage of allied ships across the Atlantic. He was also instrumental in creating a machine called the Bombe, an early forerunner of modern-day computers that could routinely crack Enigma. Turing's war work, for which he was awarded the OBE, saved countless lives and is conjectured to have significantly shortened the war.

Astonishingly, this was perhaps not even Turing's most influential contribution to modern civilisation, and was certainly not his first. When he was at Cambridge, in 1936, Turing tackled a famous, and unresolved, mathematics challenge known as the "decision problem". In resolving the problem, Turing proposed a universal machine that could decide whether any given mathematical problem was provable or not.

In the universal machine, Turing introduced the idea of the stored programme computer years before such machines existed. Over a decade later, electronic technology had become sufficiently advanced to allow Turing's ideas to make the leap from his brilliant mind into the real world. Although no one person can claim to have invented the computer, the descendants of Turing's theoretical machine sit in billions of offices, homes and pockets around the world.

THE MATHS OF LIFE

During his short academic career, Turing made towering contributions to a diverse range of areas, from pure mathematics to the theory of artificial intelligence. In 1952, aged 40, Turing wrote a lesser-known paper in a new area, which was no less brilliant than his preceding work. In The Chemical Basis of Morphogenesis, Turing proposed a mechanism by which patterns might form in the early embryo known as "diffusion-driven instability".The same mechanism, he realised, might account for a multitude of patterns in nature including those seen on animal coats, suggesting a mechanism for how the leopard got its spots. In particular, Turing's theory predicts that animals can have spotty bodies and stripy tails, but not the other way around, a prediction that is borne out in many species of animals.

Turing's idea of using mathematics to untangle the secrets of life were highly influential in the development of the relatively new field of science called "mathematical biology". At the heart of this rapidly growing subject is the attempt to represent biological systems of interest mathematically or computationally using models.Today, Turing's legacy - the idea of taking a quantitative approach to biology - is helping to unravel some of life's most enigmatic mysteries. Mathematical biologists are attempting to understand how things can go wrong during the development of an embryo and to suggest the best way to tackle outbreaks of deadly diseases like Ebola.

On June 7, 1954, Turing died of cyanide poisoning. Next to his bed lay a half-eaten apple. It was speculated (since Snow White was one of Turing's favourite fairy tales) that he had laced the fruit with cyanide before consuming his own "poisoned apple". The inquest into his death recorded a verdict of suicide.

Source: https://theconversation.com/alan-turing-visionary-war-hero-and-the-only-choice-for-the-50-note-

Heroes of the Indian Navy You Should Know About

Indian Navy MARCOS

The 26/11 Mumbai attacks were witness to raw courage on the part of eight Indian Navy Marine Commandos (MARCOS), who became the gamechangers in a battle that was being won by a group of terrorists creating havoc in India's commercial hub. The MARCOS are among the fittest Indian special forces, usually deployed for the safety of oil installations or to counter pirates on the high seas. One hundred and sixty five persons died in the 26/11 attacks. But for the timely intervention of the Indian Navy Marine Commandos (MARCOS), the toll could have been far higher. It was the single most heroic act on the night of the 26/11 attacks.

## Cdr Milind Mohan Mokashi

Cdr. Mokashi received the Shaurya Chakra for his outstanding efforts to evacuate thousands of Indian and foreign nationals from war-ravaged Yemen during Operation Rahat in 2015. He was the Commanding Officer of INS Sumitra. Heavily armed Houthi rebels were patrolling the harbour in boats when Mokashi's ship entered Aden Harbour on the night of March 31. Additionally, there were air strikes by the Saudi-led coalition against the rebels.

The officer immediately deployed armed boats manned by sailors in close proximity of the ship and, braving the heavy firing and shelling, took charge of the situation to ensure the safe embarkation of evacuees amid heavy cross firing.

Vice Admiral Krishnan

Vice-Admiral Krishnan, Flag Officer Commanding, Eastern Naval Command, used a highly creative strategy in the 1971 war with Pakistan. Krishnan was concerned about one of India's greatest and most formidable carriers, INS Vikrant, being threatened by the presence of Pakistan's destructive Ghazi submarine in the Bay of Bengal. So he decided to deceive the Pakistani Navy into believing that INS Vikrant was in the port of Vizag by getting an ageing destroyer INS Rajput to pretend to be Vikrant by sailing it out of Vizag and generating heavy wireless traffic.

He even tricked his own navy in Chennai by falsely informing them that INS Vikrant would arrive in Vizag and ordering huge rations to indicate that the fleet was in the harbour. The Pakistanis fell for the trap. Ghazi was ordered to change directions and move to Vizag. Within a few days it was hit by an explosion and destroyed. In the meantime, INS Vikrant had been safely stationed in Andaman. Soon after the sinking of Ghazi, Vikrant launched its first air strikes that stunned the Pakistani army in East Pakistan.
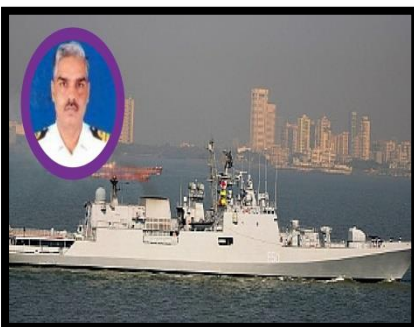
Captain Pradeep Singh

Captain Pradeep Singh is the recipient of the Nao Sena Medal for Gallantry for his meticulous planning of one of the most daring operations during Operation Rahat in 2015. As the commander of INS Tarkash, his actions led to the safe evacuation of around 600 people of 18 different nationalities from Al Hodeidah and Aden harbours in the face of great hostility and backdrop of violence. He also evacuated 10 nurses who were stuck in heavy crossfiring, as well as the body of the first Indian casualty in the Yemen conflict.

Second Officer Kalyani Sen

The Women's Royal Indian Naval Service was established as part of the The Royal Indian Navy (RIN) during World War II. Although the women did not serve on board the ships, this did give them a role in the navy. The first Indian service woman who visited the UK was second officer Kalyani Sen. Sen went there to make a comparative study of training and administration in the Women's Royal Naval Service.

Captain Rajesh Dhankhar

Captain Rajesh Dhankhar received the Nao Sena Medal for Gallantry for saving hundreds of lives amidst heavy shelling in war-torn Yemen as a part of Ops Rahat. Undeterred by the dangerous security scenario ashore, the officer led his team from the front and fought hard to evacuate stranded personnel even during dark hours. This Commanding Officer of INS Mumbai was responsible for the safe evacuation of 441 Indians and foreign nationals.

Commodore Babru Bhan Yadav

Commodore Babru Bhan Yadav led a brilliant missile attack against Pakistan's port city of Karachi in the 1971 Bangladesh Liberation War. One of the highest decorated officers of the Indian navy, he was the first to be awarded the Maha Vir Chakra in 1972.

Commodore Yadav's citation reads that he displayed great leadership in the "offensive sweep on the enemy coast off Karachi, deep into the enemy harbour where he encountered two groups of large enemy warships, despite the threat of air, surface and submarine attack." The mission was code named Operation Trident.
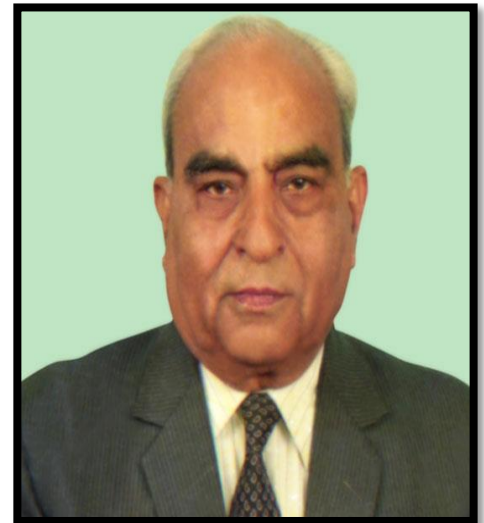
Kunhali Marakkar

The Kunhali Marakkar or Kunjali Marakkar was the title given to the Muslim naval chief of the Zamorin, the Hindu king of Calicut in present day Kerala during the 16th century. There were four major Kunhalis who played a part in the Zamorin's naval wars with the Portugese from 1502 to 1600. Of the four Marakkars, Kunjali Marakkar II is the most famous. The Marakkars are credited with organizing the first naval defence of the Indian coast.

Indian Navy Day, Celebrated on 4th of December

In India, the Navy Day is celebrated on 4th December every year. It is celebrated to commemorate the courageous attack on the Karachi harbour during the Indo-Pakistan war of 1971 by the Indian Naval Missile. Let us study more about Indian Navy Day through this article.

Indian Navy Day is celebrated by several nations to recognize their navy. It is celebrated on 4th December every year in India, in remembrance to the start of Operation Trident during the Indo-Pakistani War of 1971. The Operation Trident emerged in the first use of anti-ship missiles in the area.

Navy Day in India is celebrated every year to recognize the splendour, great achievements and role of the naval force to the nation. Indian Navy is the marine branch of the India's armed forces. This is led by the President of India as a Commander-in-Chief of the Indian Navy. Chhatarpati Shivaji Bhosle, the Maratha emperor of the 17th century is considered as the "Father of the Indian Navy".

Indian Navy plays a significant role in securing the marine borders of the nation as well as accelerating the international relations of India through various means like seaport visits, joint ventures, patriotic missions, calamity relief and many others. Modern day Indian Navy has been transformed in order to improve the position of navy to the Indian Ocean area. Do you know that the Indian Navy has 67,000 employees and 295 naval arsenals. It is considered the most powerful force in South Asia. There are three divisions in the Indian Armed Forces: Indian Army, Navy and Air Force. Indian Army protects our land, Navy water and the Air Force protects us in the sky.

How Indian Navy Day is celebrated?

On 4th December in remembrance of the daredevil attack on the naval base of Pakistan, at Karachi. The Western Naval Command of the Indian Navy with headquarters in Mumbai celebrated this great occasion by bringing together their ships and sailors.

The eastern Naval Command at Visakhapatnam plans all the activities and events which are to be conducted on the Navy Day celebrations. It starts with wreath laying ceremony at the war memorial (at RK Beach) and is followed by the practical demonstration to show the energy and skills of the naval submarines, ships, aircrafts and other forces. Numerous aircrafts are displayed by flying over the RK Beach which are made clean to keep away the birds in order to continue with smooth operations of the aircraft.

Reason for Navy Day Celebration

In India, the Navy Day is celebrated to remember and recognize the courageous attack on the Karachi border during the 1971 Indo-Pakistan war on 4th December. The theme which is usually used is "Safe Seas and Secure Coasts for a strong Nation". During this day, the warships and aircrafts of the Indian naval are accessible to the visitors. The Military Photo Exhibition is organized by the journalists of the Ernakulum in the naval festival.

The Naval Institute of Aeronautical Technology (NIAT) conducts a community service from 24th to 26th November at Good Hope Old Age Home, Fort Kochi. In this the students take part to entertain the Naval Doctors. Navy Ball, Navy Queen and some other contests are also held in navy fest.

So, now you may come to know about the Navy Day and why it is celebrated on 4 December every year.

Scan Here for our previous edition

You can also send your articles to the following email id's:
codecoffeeucoe@gmail.com , sridhar.iyer@universal.edu.in ,
hezal.lopes@universal.edu.in , apurva.chaudhari@universal.edu.in