Issue No 16

NOV 19

# 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.
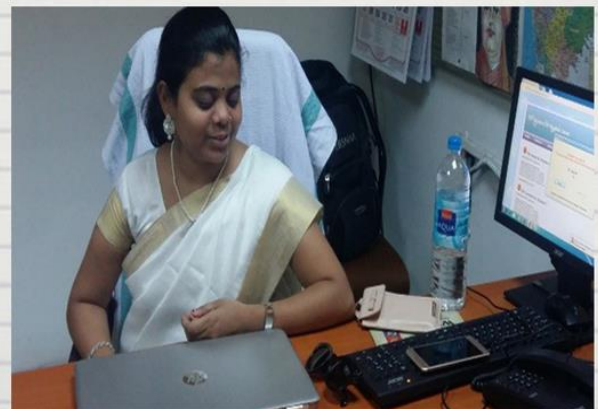
"Success Doesnt give inspiration, the struggle behind it inspires you"

Ms. Pranjal Patil , India's first Visually impaired IAS Officer

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

Project Based Learning

DATE : 18/10/19

**VENUE : Computer Centre (2nd Floor)**

TOPIC : Project Exhibition

IN ASSOCIATION WITH : CSI – UCOE Student Chapter

Computer Engineering Department have implemented Quality Initiative **"Project Based Learning"** in academic year 2019-20. Project based learning is the **skill development program** for students where students can implement their subject knowledge with practical implementation. This was the platform offered to SE and TE students to explore their knowledge by implementing one project in semester apart from their curriculum projects.

Initial stage started with collecting project topics from faculties with scope for college automation. Every faculty have submitted project ideas for SE and TE. **Dr. Jitendra Saturwar** , HOD have assigned **Mrs. Vishakha Shelke** and **Mr. Chinmay Raut** as Project Based Learning coordinators.

Total 23 projects were shortlisted for exhibition. For the Final stage of PBL in this semester computer department **conducted "Project Exhibition of Best projects in PBL"** on 18/10/2019. In the exhibition Every group have given the presentation on their project in Seminar hall E-112 and Project exhibition was arranged in computer center. All faculties from computer department and Other department faculty visited every project in exhibition and given their feedback on work done. Dr. Jitendra Saturwar was judge for the event and top 3 teams were announced based on the evaluation. The winner were felicitated by Campus Director Dr. Jitendra Patil.
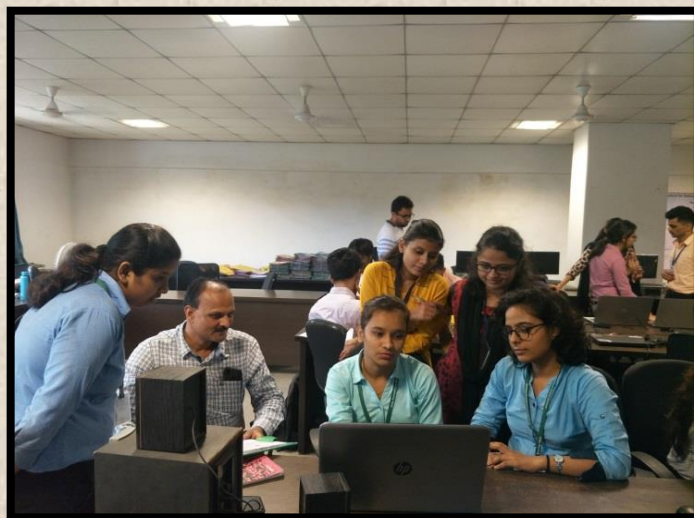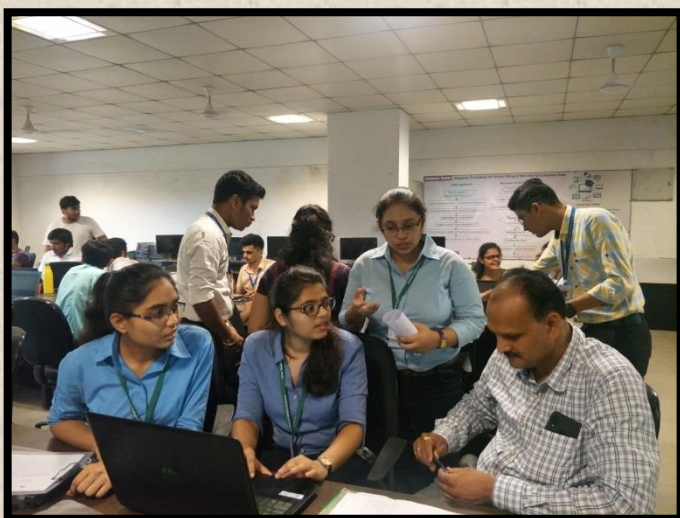
Session on Artificial Intelligence and Soft Computing

DATE : 10/10/2019

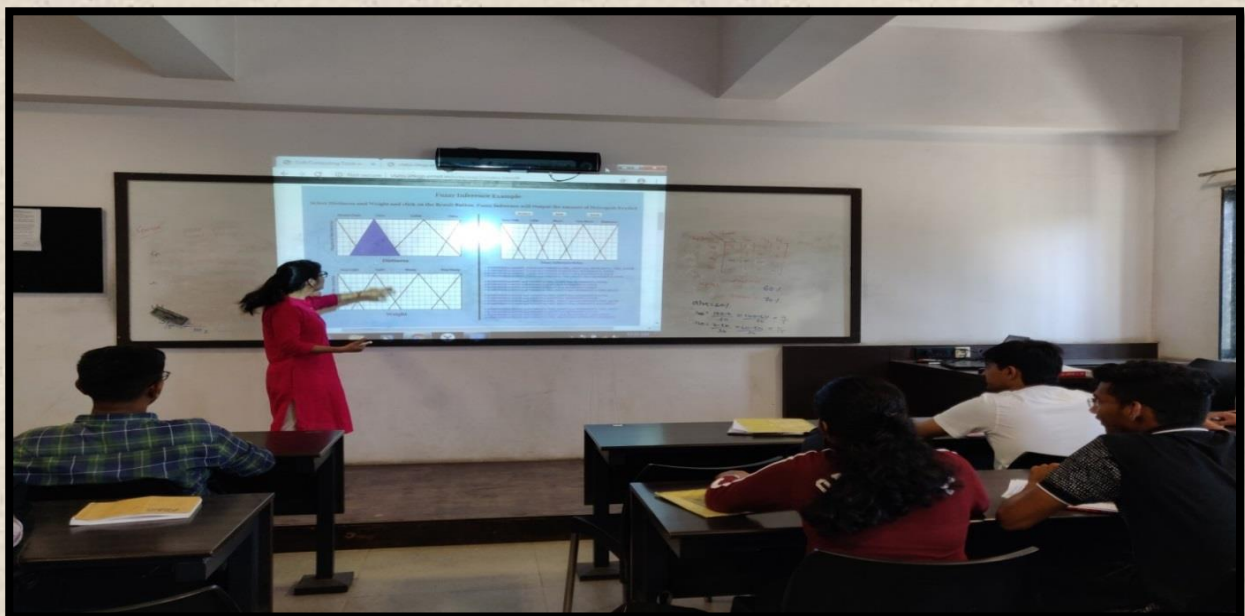VENUE : Seminar Hall (1st Floor)

TIMING : 10-12

TOPIC : Artificial Intelligence & Soft Computing
RESOURCE : Ms. Santoshi Bisht

IN ASSOCIATION WITH : CESA (Computer Engineering Student Association)

Ms. Santoshi Bisht , Teaching Assistant of Mrs. Vishakha Shelke Conducted a session on **"Fuzzy Inference system"** on 10/10/2019 for class B.E Computer Div B from 9 to 10 a.m. Nowdays to compute various numerical simulation studies soft computing tools such as Fuzzy Computing, Neuro-Computing are widely used. Fuzzy inference is the process of formulating the mapping from a given input to an output using fuzzy logic. The mapping then provides a basis from which decisions can be made, or patterns discerned. Fuzzy inference systems have been successfully applied in fields such as automatic control, data classification, decision analysis, expert systems, and computer vision. In this session Santoshi explained the concept with the help of example. She demonstrated the FIS for the example of Washing machine with Virtual lab session. The experiment is performed on the IIT Kharagpur Virtual Lab. The session was interactive and useful for students as they understood the concept of Fuzzy rule based expert system.

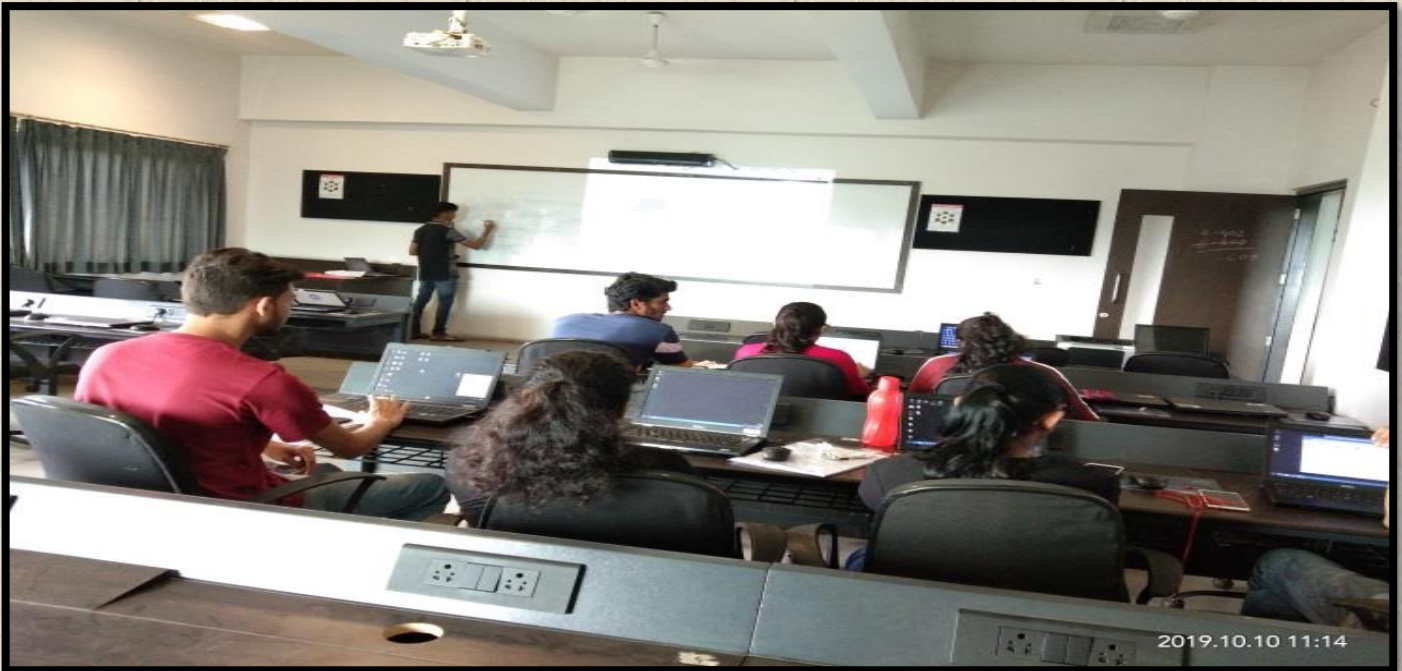# Session on Artificial Intelligence and Soft Computing

DATE : 10/10/19

VENUE : 316

TOPIC : AISC

RESOURCE : Mr.Amit Gupta

IN ASSOCIATION WITH : CESA (Computer Engineering Student Association)

Department of computer engineering in Universal College has taken Initiated TA Ra and GA activity. As a part of this activity Mr. Amit Gupta student of BE computer had conducted a session on Virtual Lab on Soft computing and Artificial Intelligence under the guidance of Mentor Mrs. Kanchan Dabre.

This virtual lab jas been designed and Initiated by IIT Gharakpur, has virtual representation of complex neural network and fuzzy logic concepts.Under this session different learning algorithms such as perceptron learning, multilayer feedforward network, fuzzy relations and fuzzy controllers were explained effectively through simulation to final year students on 10th oct 2019.

Around 25 interested students participated in this virtual session and got benefited by visualizing complex concept through simulator.

Session on Firebase

DATE : 03/10/19

**VENUE :** Computer Center

TOPIC : Firebase

**RESOURCE :** Mr. Shubham Shirke

IN ASSOCIATION WITH : IEEE and CESA

A 2 hour introductory workshop session on **firebase** was conducted by **Third year computer student Mr.Shubham Shirke** under IEEE and CESA student association.

Firebase is a mobile and web application development platform developed by Firebase, in 2011, then acquired by Google in 2014. Firebase's first product was the Firebase Real-time Database, an API that synchronizes application data across iOS, Android, and Web devices, and stores it on Firebase's cloud. The product assists software developers in building real-time, collaborative applications.

Firebase provides a realtime database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firebase's cloud. The company provides client libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C, Swift and Node.js applications. The database is also accessible through a REST API and bindings for several JavaScript frameworks such as AngularJS, React, Ember.js and Backbone.js. The REST API uses the Server-Sent Events protocol, which is an API for creating HTTP connections for receiving push notifications from a server. Developers using the realtime database can secure their data by using

Firebase Predictions
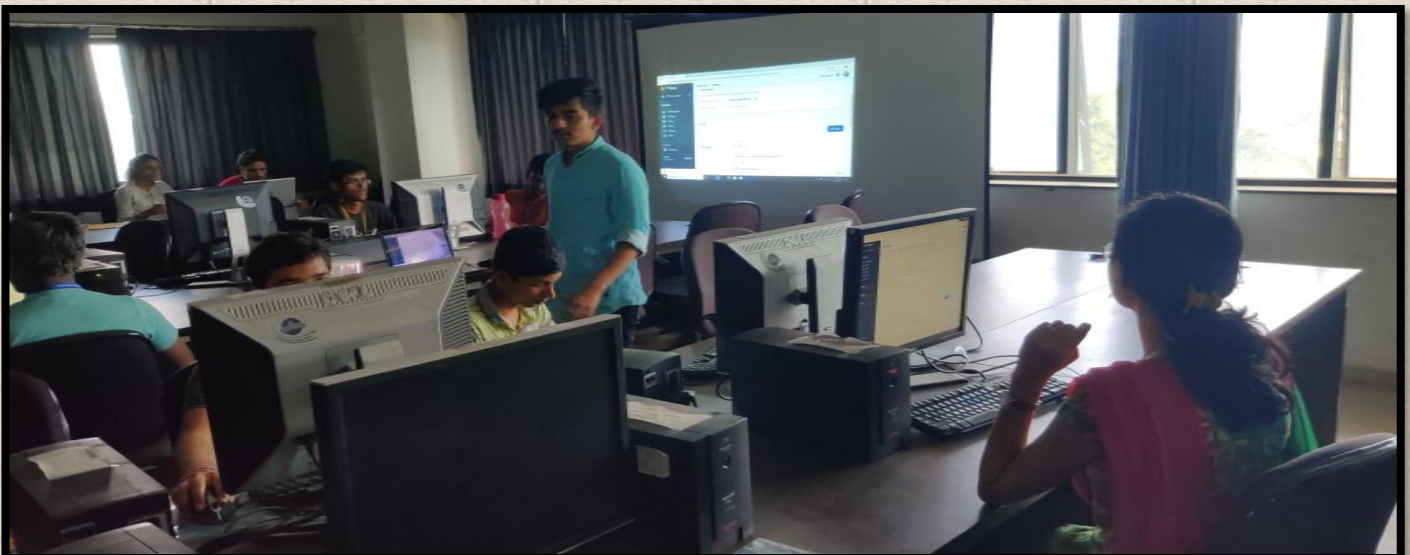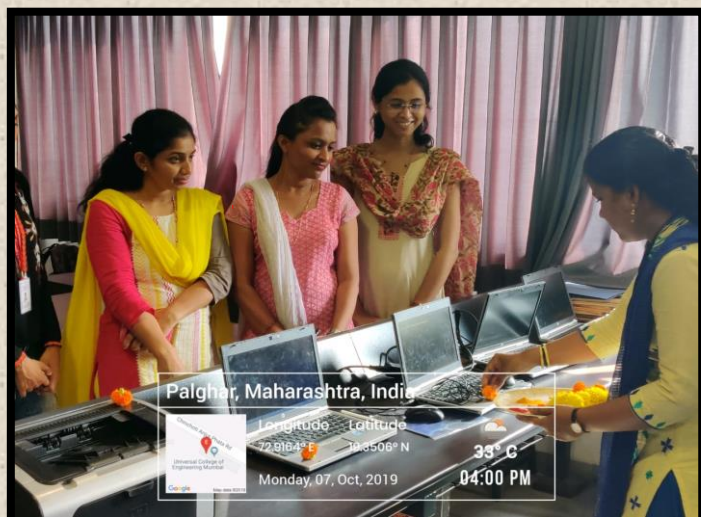
Ayudha Pooja

Ayudha Puja is a part of the Navratri festival, a Hindu festival which is traditionally celebrated in India. It is also called **"Astra Puja",** the synonym for Ayudha Puja. In simple terms, it means **"Worship of Instruments".** It is celebrated in Tamil Nadu as Ayudha Pujai, in Telangana and Andhra Pradesh as Aayudha Pooja, in Kerala as Ayudha Puja ,**"Shastra Puja"** in Maharashtra.

The festival falls on the tenth day of the bright half of Moon's cycle of 15 days (as per Almanac) in the month of September/October, and is popularly a part of the Dasara (well known as deepavali in TamilNadu) or Navaratri or Durga Puja or Golu festival.

On the tenth day of the Dasara festival, weapons and tools are worshipped. In Karnataka, the celebration is for killing of the demon king Mahishasura by goddess Durga. After slaying of the demon king, the weapons were kept out for worship. While Navaratri festival is observed all over the country but in South Indian states, where it is widely celebrated as Ayudha Puja, there are slight variations of worship procedure.

The principal Shakti goddesses worshiped during the Ayudha puja are Saraswati (the Goddess of wisdom, arts and literature), Lakshmi (the goddess of wealth) and Parvati (the divine mother), apart from various types of equipment; it is on this occasion when weapons are worshipped by soldiers and tools are revered by artisans. The Puja is considered a meaningful custom, which focuses specific attention to one's profession and its related tools and connotes that a divine force is working behind it to perform well and for getting the proper reward. All the tools, machines, vehicles and other devices are then painted or well polished after which they are smeared with turmeric paste, sandalwood paste (in the form of a Tilak (insignia or mark)) and Kumkum (vermillion). contemplation.

Our Department also celebrated this festival with great zeal and enthusiasm. We worshipped all our laboratories and equipment by offering our prayers and applying a symbolic Tilak on them.
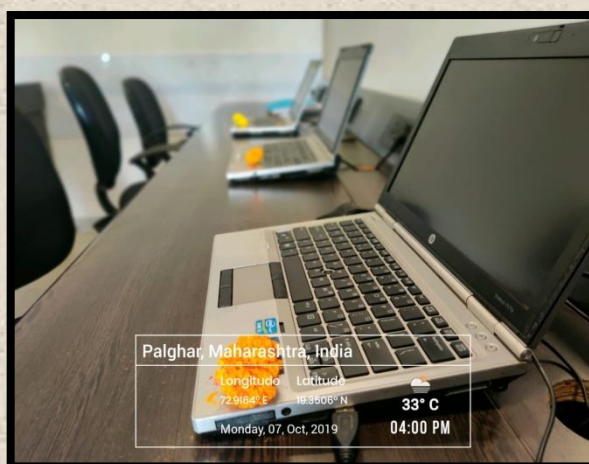
Solar Workshop

Around 125 students in Vidya Vikas Education Trust's Universal College of Engineering were taught to make Solar Lamps at a Workshop organized by The Unnat Bharat Abhiyan (UBT) where students were given Hands on experience on assembling a Solar Lamp.

The Workshop was conducted on 2nd October, 2019 to commemorate 150 years of Mahatma Gandhi Jayanti all over the world in 180 countries, targeting 1 million students who will be 'solar ambassador' of the world.
The Workshop was conceptualized by IIT Mumbai under Unnat Bharat Abhiyan (UBT) of Government of India.
Eight teaching faculties of Universal College of Engineering acted as Trainers to teach students assembling of Lamps.

Among 125 students seven students of Department of Information Technology actively participated in the Workshop. Innovation Cell under Department of Electronics and Telecommunication extended their support in conducting the workshop successfully.

Atmospheric Water Generation can address Water Scarcity

One of the great challenges of our time is the limited access to fresh water globally. Due to climate change and growing pollutions, natural fresh water is not always available, leading to water shortages and the need for people in some communities to travel long distances for clean water simply to survive. To help address this crisis, a team from Texas State University analyzed atmospheric water generation (AWG) as a possible solution. While it's not a new method, its low cost brought it to the team's attention.

"Past research focused on methods of atmospheric water generation, but little has been done to show its financial viability," said Dr. Bahram Asiabanpour of the research team. "This study demonstrated that it is a cost-effective way to produce portable water."
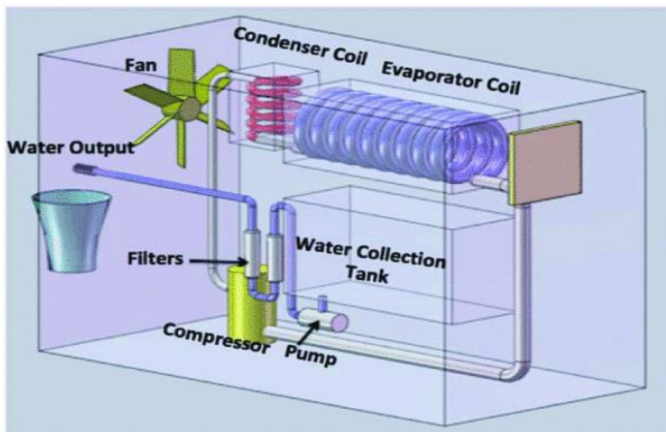

Figure 1: Commercial AWG System Diagram

To analyze AWG and its production costs, the team utilized a commercial system (which can be seen below in Figure 1) for a 10-day trial. AWG systems extract moisture from the air, filter it, and collect it for use. The system used in this particular study included a fan, a condenser coil, a pump, and multiple states of filters. It also offered both hot and cold water options. In the study, the system ran nonstop outdoors in a shaded, non-enclosed area during summer.The AWG's production costs were compared to the costs of two other water sources – standard 12 oz bottles available in vending machines and water available for purchase in one-gallon containers at grocery stores. The net present value of costs (initial, consumables, and energy) were also taken into account for financial assessments.

Day	Water (L)	Energy (KWH)	Avg. Temp (F)	High Temp	Low Temp	Avg. Hum. (%)	High Hum. (%)	Low Hum. (%)
1	4.385	6.26	83	98	68	50.5	88	22
2	5.88	7.38	82.1	97	65	49.1	78	28
3	11.34	12.67	82.5	98	68	63.4	93	25
4	11.25	10.54	84.85	98	77	68.8	94	39
5	11.85	11.63	84.7	98	73	65.9	96	37
6	11.75	10.97	85.7	98	77	65.7	90	33
7	11.625	10.91	81.7	97	75	73.5	94	35
8	11.6	10.75	83.6	96	74	70.3	94	41
9	11.075	10.8	86.25	97	78	64.6	90	36
10	13.8	10.68	80.4	92	73	81.3	100	53

Figure 2: 10-Day AWG System Trial Results

In Figure 2, the amount of water collected from the AWG system's 10-day trial can be seen, as well as the amount of power it used in different temperatures and humidity levels. Though the system generated about 20% less water than originally predicted, the team was still able to find evidence of its cost effectiveness.

Based on these results, the team could compare the AWG system's costs with both bottled water and gallons of water. Water generation, labor, transportation, and cooling costs were all accounted for. It was determined that the AWG system's breakeven point was only 72 days compared to bottled water, while the breakeven point compared to gallons of water was roughly 3.5 years. Financial analysis for both situations can be seen in Figure 3.
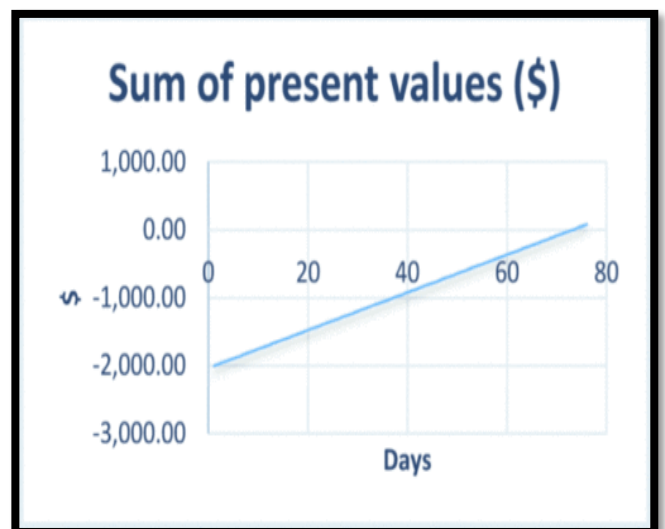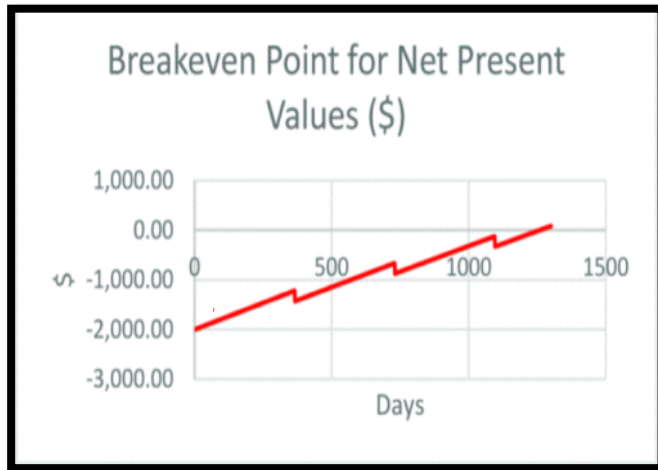
Figure 3: Financial Analysis of Bottled Water and Gallons of Water

To ensure a full financial analysis could be completed, the team also examined the impact of interest rates. While interest rates did not affect the breakeven point of bottled water, higher rates did push the breakeven point for gallons of water out even further.

While the amount of water produced over the 10-day period was lower than anticipated, the team was able to prove that AWG systems running 24 hours a day are more cost-effective than bottled water after only a few months. They do acknowledge that much more research needs to be done to better understand AWG performance in different temperatures and seasons. However, they do believe this is a great start to finding and implementing ways to produce clean, affordable water.

"AWG has the potential to become a new source of fresh water for locations with the right conditions," said Dr. Asiabanpour. "Data is available for engineering, science, and finance researchers to identify the right locations and conditions to create an optimal system."

SOURCE : https://bit.ly/2VxWyPp

Facing Virtual Reality: Improving VR with Brain-Based Computer Interfaces

As virtual reality (VR) capabilities continue to expand, researchers hope to create a more real-world experience by connecting VR directly to the brain. Through Brain-based Computer Interface (BCI), VR could become a more natural experience for users, with the potential to significantly impact a variety of fields, from video game technology to medicine.

As VR grows in popularity, researchers are trying to further understand its benefits and potential impacts on the way we live our lives. Its increasing capabilities, processing speeds and hardware developments have made VR more useful, affordable and responsive. However, many believe VR still isn't reaching its full potential. According to researchers from Pace University, connecting to the brain could revolutionize VR development.

BCI involves connecting a person's brain to a computer through sensors that transmit brain waves. These sensors allow the computer to receive direction from the fingers, voice, eye gaze, skin, head and body position of a connected user.
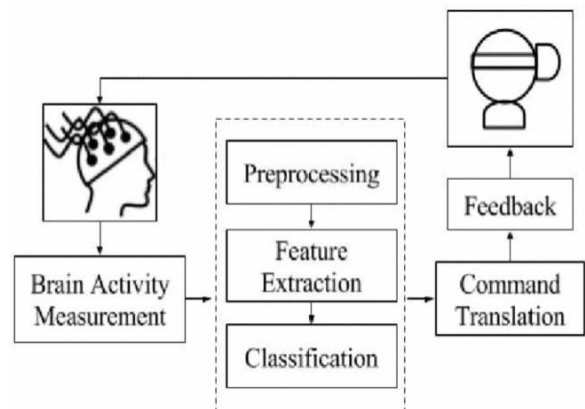

Figure 1: Model of the on-line BCI

Current BCI systems use real-time Electroencephalography (EEG) to quickly process and translate brain waves into control signals for the VR software. After preprocessing these signals, the system classifies the extracted features before translating these signals into commands in the VR simulation.

"The combination of BCIs and VR could provide a seamless interface between the real-time virtual environment and the user," said Sukun Li, UX/UI

research fellow at Pace University. "The computer could be more intelligent to understand users' affective status and deliver seamless feedback. This feedback between the virtual devices and a human user could have a more satisfying immersive experience and more direct communication."

By incorporating BCI, developers hope to fill the "3 Is" of VR: immersion, interaction and imagination. Right now, there is a gap in sustaining continuous immersion because current technology prevents VR from creating a more lifelike experience. Researchers hope to fill that gap with BCI VR devices.

"The aim of BCI VR is to find the most natural and most straightforward way of human-computer interaction," Avery Leider, research fellow at Pace University said. "The seamless user interaction is a crucial issue in video games for game performance and guiding simulations of transcranial simulations. BCI VR could help provide the necessary interaction in a virtual environment."

Going forward the researchers expect improvements to be made in the comfort and connections of current BCI VR devices. EEG signals tend to make a lot of noise and require high temporal precision, so researchers are experimenting with ways to filter the noise and make it easier for the devices to process signals from users.

In addition, researchers and engineers hope to begin testing artificial intelligence techniques with the BCI VR system. By pairing the two, the researchers believe they can improve medical research by creating more accurate simulations of the human brain for analysis and exploration.

Whether it is for entertainment or medical use, the combination of BCI and VR is set to have a significant impact on society. As BCI VR technology is improved, it is likely these systems will soon be standards in homes and hospitals.

SOURCE : https://bit.ly/2VxWyPp

Robots quickly teaches itself to walk using Reinforced Learning

A team of researchers from the University of Southern California's Valero Lab built a relatively simple robotic limb that accomplished something simply amazing: The 3-tendon, 2-joint robotic leg taught itself how to move. Yes, autonomous learning via trial and error. The team was led by Professor Francisco Valero-Cuevas and doctoral student Ali Marjaninejad. Their research was featured on the cover of the March issue of *Nature Machine Intelligence*.

Image Credit: USC.

The robotic limb is not programmed for a specific task. It learns autonomously first by modeling its own dynamic properties and then using a form of artificial intelligence (AI) known as reinforcement learning.

Instead of weeks upon weeks of coding, the robotic leg is able to teach itself to move in just minutes.

Inspired by nature

Roboticists have long been inspired by nature, since, let's face it, Mother Nature has spent a long time perfecting her designs. Today, we see robots that walk like spiders and underwater robots inspired by sea snakes.

Bioinspiration also affects the way robots "think," thanks to AI that mimics the way living organisms' nervous systems process information.

For example, artificial neural networks (ANNs) have been used to copy an insect's brain structure to improve computer recognition of handwritten numbers.

For this project, the design took its cues from nature, both for the physical design of the leg and for the AI that helped the leg "learn" to walk. For the physical design, this robotic leg used a tendon architecture, much like the muscle and tendon structure that powers animals' movements.

The AI also took its inspiration from nature, using an ANN to help the robot learn how to control its movements. Reinforcement learning then utilized the understanding of the dynamics to accomplish the goal of walking on a treadmill.

Reinforcement learning and "motor babbling"

By combining motor babbling with reinforcement learning, the system attempts random motions and learns the properties of the system through the results of the motions.

For this research, the team began by letting the system play at random, or motor babble, to learn the properties of the limb and its dynamics.

In an interview with *PC Magazine*, Marjaninejad stated, "We then give [the system] a reward every time it approaches good performance of a given task. In this case, moving the treadmill forward. This is called reinforcement learning as it is similar to the way animals respond to positive reinforcement."

The resulting algorithm is called G2P, (general to particular). It replicates the "general" problem that biological nervous systems face when controlling limbs by learning from the movement that occurs when a tendon moves the limb.

It is followed by reinforcement (rewarding) the behaviour that is "particular" to the task. In this case, the task is successfully moving the treadmill.

The system creates a "general" understanding of its dynamics through motor babbling and then masters a desired "particular" task by learning from every experience, or G2P.

The results are impressive. The G2P algorithm can learn a new walking task by itself after only 5 minutes of unstructured play and then adapt to other tasks without any additional programming.

The ANN uses the results from the motor babbling to create an inverse map between inputs (movement kinematics) and outputs (motor activations).

The ANN updates the model based on each attempt made during the reinforcement learning phase to hone-in on the desired results. It remembers the best result each time, and if a new input creates a better result, it overwrites the model with the new settings.
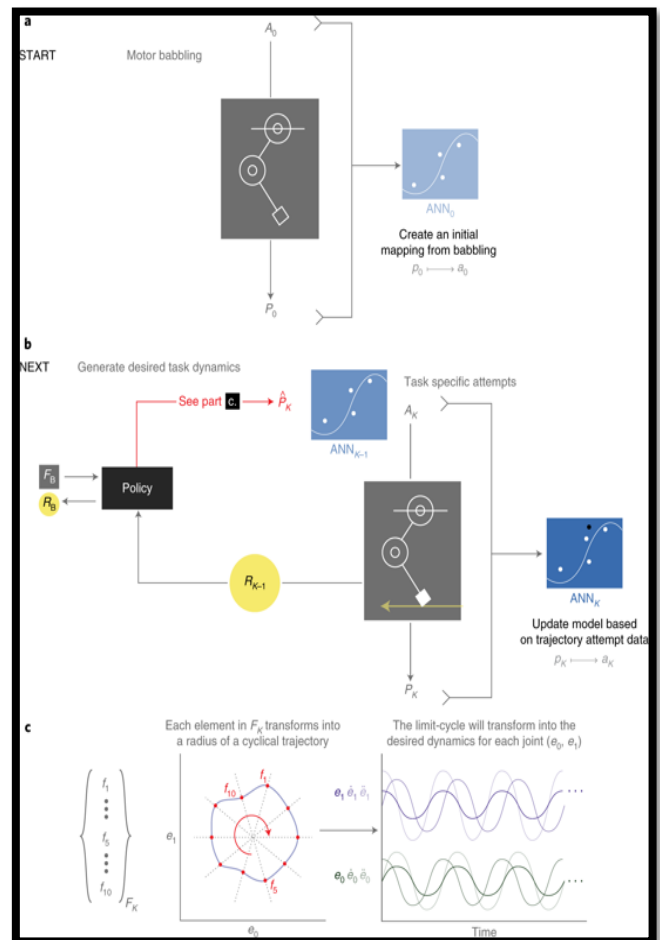
The G2P algorithm. Image Credit: Marjaninejad, et al.

First Visually Challenged Woman IAS Officer.

The loss of vision at the age of six did not deter the youngster from Ulhasnagar, Maharashtra, from pursuing her civil service dream.

Pranjal Patil, the young woman who battled great odds to become the country's first visually challenged woman IAS officer, took over as Sub-Collector in Thiruvananthapuram, on Monday. *"We should never be defeated, and never give up,"* said Ms. Patil, 31, who assumed charge in the presence of District Collector K. Gopalakrishnan and staff at the District Collectorate, adding that she felt "extremely glad and proud to be in Thiruvananthapuram."

Ms. Patil opted to spend her first day in Thiruvananthapuram, familiarising herself with the new environment. She said she expected a lot of support from the public and the Collectorate staff. After securing the 124th rank in the 2017 Civil Services Exams, she was posted as Assistant Collector in Ernakulam, Kerala, in 2018.

The loss of vision at the age of six did not deter the youngster from Ulhasnagar, Maharashtra, from pursuing her civil service dream. In 2016, she cracked the Union Public Services Examination on her first attempt with a rank of 773. Ironically, she was refused a job in the Indian Railway Accounts Service on the grounds that she was visually challenged.

In her second attempt the very next year, she improved her ranking. Her appointment as Assistant Collector in Ernakulam had grabbed headlines. *"With our efforts, we all will get that one big breakthrough that we want. I expect a lot of support from the people of Thiruvananthapuram and the staff here to be able to work for the people,"* she said, after signing the Report of Transfer of Charge to take over from Sam Cleetus, the Deputy Collector (Land Acquisition), who had been holding charge of Sub-Collector.

"Don't give up. Keep trying. You will get that one break that you require"- Ms. Pranjal Patil