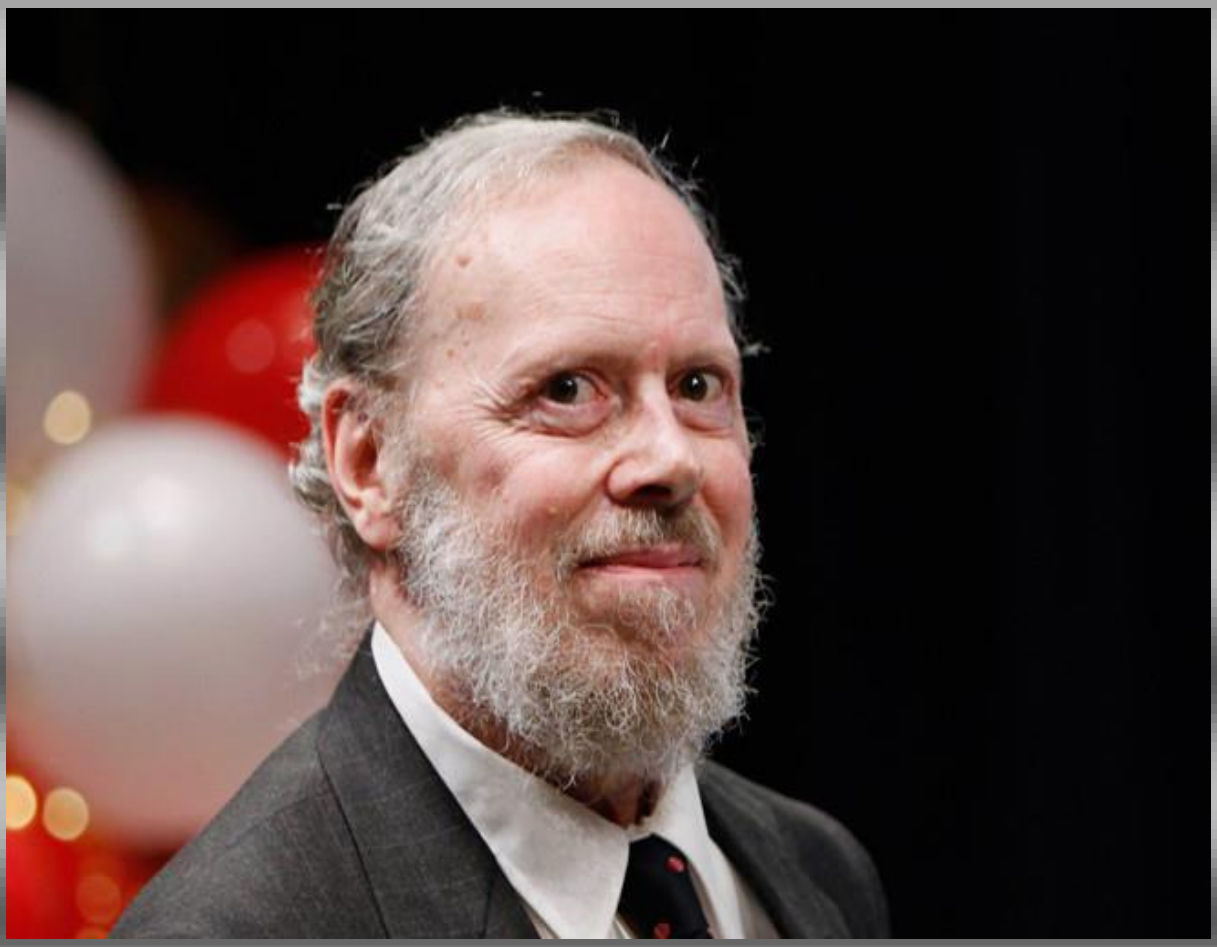
TECHERA 2019



The only way to learn a new programming language is by writing programs in it

- Dennis Ritchie

Madanapalle Institute of Technology & Science
(UGC- Autonomous)

Department of Computer Science & Engineering

MESSAGE FROM THE CORRESPONDENT

I feel exhilarated that the Department of Computer Science &Engineering of MITS is bringing out a magazine called TECHERA from the year 2015. This Magazine brings out the intellectual brilliance in various new techniques introduced in Information Technology industry.

``HARD WORK, SINCERITY, DEDICATION AND ENTHUSIASTIC DEVOTION TO WORK WILL FETCH YOU UNBOUND SUCCESS, MAY THE LORD SHOWER HIS BLESSINGS ON YOU``

I heartily congratulate the students and the staffs of CSE Department and Wish them a grand success.

Dr. N. VijayaBhaskarChoudary
Correspondent

MESSAGE FROM THE CHAIRMAN

Your blessings be bestowed upon us leading into the right path in organizing Magazine "TECHERA"by the Department of Computer Science& Engineering students and faculty of **MITS** and thereby make this magazine a grand success.

Chairman

Sri. N. Krishna Kumar

MESSAGE FROM THE PRINCIPAL

I feel delighted about the magazine “TECHERA” to be hosted by the Department of Computer Science& Engineering of MITS. On this magnanimous occasion, I congratulate all the students and faculty members of department for their great efforts and coordination in bringing out the magazine a great success.

Principal

Dr. C. Yuvaraj

MESSAGE FROM THE HEAD OF THE DEPARTMENT

TECHERA is dedicated for addressing the emerging topics and challenges in the area of technology. **TECHERA** is to create great awareness on new innovative ideas and technologies. I wish the readers of **"TECHERA"** for their support and also can provide the useful feedback to improve the standards of magazine.

Dr. Mahaboob Basha Shaik
Head of the Department
(CSE)

EDITORIAL DESK

The annual release of the department magazine **"TECHERA – 2019",** mark the spirit of exploration among students in an environment of erudition.

This year's edition of "**TECHERA - 2019**" focuses on current trends in Computer Science and Information Technology which are the major rays of hope for developing a new world of science. It is a collection of information and facts, featuring the recent developments of fascinating and conceptual communication.

The editorial team owes its gratitude to all who have made "**TECHARA - 2019",** a scintillating event.

Editors

ABOUT MITS

Madanapalle Institute of Technology & Science is established in 1998 in the picturesque and pleasant environs of Madanapalle and is ideally located on a sprawling 26.17 acre campus on Madanapalle - Anantapur Highway (NH-205) near Angallu, about 10km away from Madanapalle.

MITS, originated under the auspices of RatakondaRanga Reddy Educational Academy under the proactive leadership of and **Dr. N. VijayaBhaskarChoudary, Secretary & Correspondent** and **Sri. N. Krishna Kumar, Chairman** of the Academy.

MITS is governed by a progressive management that never rests on laurels and has been striving conscientiously to develop it as one of the best centers of Academic Excellence in India. The Institution's profile is firmly based on strategies and action plans that match changing demands of the nation and the student's fraternity. MITS enjoys constant support and patronage of NRI's with distinguished academic traditions and vast experience in Engineering & Technology.

ABOUT DEPARTMENT

The Department of Computer Science & Engineering offers 4-year degree, which is established in the year 1998. The course is flexible and has been structured to meet the evolving needs of the IT industry. The Department is offering M. Tech Computer Science & Engineering from the academic year 2007 - 2008. The Department has obtained UGC-Autonomous Status in the year 2014 and is running the Programmes successfully meeting all the requirements. The College Academic Council, Board of Studies of the department strive to provide quality education and most advanced curriculum and syllabus to make the students industry ready and excel in the contemporary business world.

The B.Tech. Programme under Department of Computer Science & Engineering was Accredited by the National Board of Accreditation (NBA) of All India Council for Technical Education (AICTE)

VISION

To excel in technical education and research in area of Computer Science & Engineering and to provide expert, proficient and knowledgeable individuals with high enthusiasm to meet the Societal challenges

MISSION

M1: To provide an open environment to the students and faculty that promotes professional and personal growth.

M2: To impart strong theoretical and practical background across the computer science discipline with an emphasis on software development and research.

M3: To inculcate the skills necessary to continue their education after graduation, as well as for the societal needs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Program Educational Objectives (PEOs) of the department of CSE are given below:

PEO1: Gain Successful Professional career in IT industry as an efficient software engineer.

PEO2: Succeed in Master/Research programmes to gain knowledge on emerging technologies in Computer Science and Engineering.

PEO3: Grow as a responsible computing professional in their own area of interest with intellectual skills and ethics through lifelong learning approach to meet societal needs.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Computer Science and Engineering Graduates will be able to:

PSO1: Apply mathematical foundations, algorithmic principles and computing techniques in the modelling and design of computer - based systems

PSO2: Design and develop software in the areas of relevance under realistic constraints.

PSO3: Analyze real world problems and develop computing solutions by applying concepts of Computer Science.

CONTENT

1. 3D PASSWORD TECHNOLOGY

Definition: A 3D password is a multifactor authentication scheme that combines

Recognition + Recall + Tokens + Biometrics

Now-a-days users are provided with major password stereotypes such as textual passwords, biometrics scanning cards or tokens. Generally, textual passwords follow an encryption algorithm. Biometric scanning is "natural" signature and Cards or Tokens prove your validity. But some people hate the fact to carry around their cards, some refuse to undergo strong IR exposure to their retinas. Mostly textual passwords, nowadays, are kept very simple say a word from the dictionary or their pet names, surnames etc. Years back Klein performed such tests and he could crack 10-15 passwords per day. Now with technology change, fast processors and many tools on the Internet has become a Child's Play.

INTRODUCTION

The 3D passwords which are more customizable and very interesting way of authentication. Now the passwords are based on the fact of Human memory. Generally simple passwords are set so as to quickly recall them. The human memory, in our scheme has to undergo the facts of Recognition, Recalling, Biometrics or Token based authentication. Once implemented and you log in to a secure site, the 3D password GUI opens up. This is an additional textual password which the user can simply put. Once he goes through the first authentication, a 3D virtual room will open on the screen.

Existing system:

- Textual Password
- Graphical password
- Biometrics, Token based

Secure the password

- The 3D password, which are more customizable and very interesting way of authentication.
- The 3D password presents a virtual environment containing various virtual objects.
- The user walks through the environment and interacts with the objects.
- It is the combination and sequence of user interaction that occur in the 3D environment.

About System Description

- The user is presented with this 3D password virtual environment where the user navigates and interacts with various objects.
- The sequence of action and interaction towards the object inside the 3D environment constructs the user 3D password.

For example, the user can enter the virtual environment and type something on a computer that exists in (x1, y1, z1) position, then enter a room that has a fingerprint recognition device that exists in a position (x2, y2, z2) and provide his/her fingerprint. Then, the user can go to the virtual garage, open the car door, and turn on the radio to a specific channel. The combination and the sequence of the previous actions toward the specific objects construct the user's 3D password.

Working of 3D password

3D password key space is determined by the design of 3D virtual environment and type of object selected inside the 3d virtual environment. Now, let us consider G x G x G to be the size of 3D virtual environment space. The virtual objects are distributed with the unique (x,y,z) coordinates in the 3 Dimensional virtual environment[4]. Here we are implementing 3 Dimensional password system to provide the security to the email client system. User need to create the account to access mailing services. User has to fill up his or her profile details like user id, name, address etc. to create the account and has to provide password which will be a 3D password.

Applications

- Critical servers
- Nuclear and military facilities
- Airplanes and jet fighters

- ATMs, desktop computers, and laptops.

Advantages

- 3D Password is multi-feature and multi-password authentication technique.
- 3D password can't be hacked by any other person easily.
- 3D password has no specific size limit and larger password key space and 3D password is easy to be changed.
- This password is better and more secure when compared to existing techniques.

Disadvantages

- 3D scheme is expensive when compared to others.
- Requires computer expertise and Difficult for blind people to use this technology
- Lot of program coding is necessary.
- Lot of time and memory consuming and Shoulder-suffering attack is still active and can disturb this scheme.

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1. https://devyanibajadeja.wordpress.com/3d-password/
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3. https://pdfs.semanticscholar.org/fb2d/7ce708530b4cff41d3e300ed6e529aac8686.pdf

Article by

17691a0593

Mulaguri Pooja Chowdary

2. BLUE BRAIN

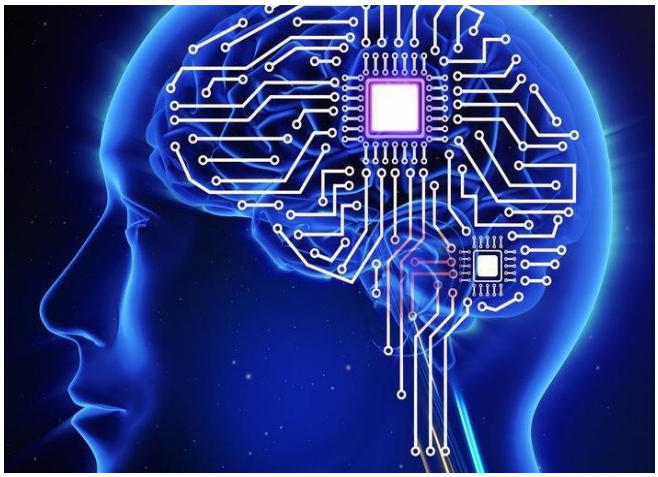
Introduction

"Blue brain" is the name of the world's first virtual brain. That means a machine that can function as human brain. Today scientists are in research to create an artificial brain that can think, response, take decision, and keep anything in memory. The main aim is to upload human brain into machine. So that man can think, take decision without any effort. After the death of the body the virtual brain will act as the man.

The blue brain makes use of the Blue Gene supercomputer developed by IBM to carry out simulations. Hence, the project is named the "Blue Brain". The project was founded by Henry Markram at the Ecole Polytechnique Federale de Lausanne (EPFL) in Lausanne, Switzerland way back in May 2005. So, even after the death of a person we will not loose the knowledge, intelligence, personalities, feelings and memories of that man that can be used for the development of the human society. No one has ever understood the complexity of human brain. It is complex than any circuitry in the world. IBM is now in research to create a virtual brain. The EPFL Blue Gene was the 8th fastest supercomputer in the world.

Uploading human brain

First, it is helpful to describe the basic manners in which a person may be uploaded into a computer. Raymond Kurzweil recently provided an interesting paper on this topic. In it, he describes both invasive and non-invasive techniques. The most promising is the use of very small robots called Nanobots. These robots will be small enough to travel throughout our circulatory systems. Travelling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system. They will



able to provide an interface with computers that is as close as our mind can be while we still reside in our biological form. Nanobots could also carefully scan the structure of our brain, providing a complete readout of the connections between each neuron. They would also record the current state of the brain. This information, when entered into a computer, could then continue to function as us.

Advantages

- Even after the death of a person his intelligence can be used.
- This could boost study of animal behavior. That means by interpretation of the electric impulses from the brain of the animals, their thought process can be understood easily.
- It would allow the deaf to hear via direct nerve stimulation, and also be helpful for many psychological diseases.
- We could make use of the information of the brain that was uploaded into the computer and use it to provide a solution to mental disorder.

Disadvantages

- There could be new types of threats, this technology would bring.
- Increases the dependency on computer systems.
- Computer viruses will pose an increasingly critical threat. Data could be manipulated and used in wrong way.
- This may lead to human cloning and we cannot imagine how big this threat would be against nature.

Conclusion

The blue brain project, if implemented successfully, would indeed change many things around us and it will boost the area of research and technology. Certain research and development take decades or even centuries to complete, so the knowledge and efforts of a scientist can be preserved and used further in his absence. At the same time, it is not an easy task to replicate the convoluted brain system into a computer. It may take several years to decades to accomplish this.

Article by

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3. Blue Eyes Technology

Introduction

Imagine yourself in the world were humans interact with computers. You are sitting in front of your computer and what if a computer starts interacting with you as like human beings interact with each other? The imagination itself is woo!!!you can listen, talk and interact with it. It has ability to understand what you're talking by the special techniques like face recognition and speech recognition through cameras and microphones. It also understands your emotions through mouse and some input devices. It verifies your identity, feels your presence and starts interacting with you. Researchers are attempting to add more capabilities to computers that will allow them to interact with humans, recognize human presents, talk, listen, or even guess their feelings and also track their ideas.

Etymology of Blue Eyes Technology

Did you ever think of a computer that understands our feelings, emotions like as to calm down us when we are angry and cheer up with us in our happiness as well? It sounds great right? And yes, in order to bring it to the real world we have come up with a New Technology called The Blue Eyes Technology.

The term Blue Eyes refers to

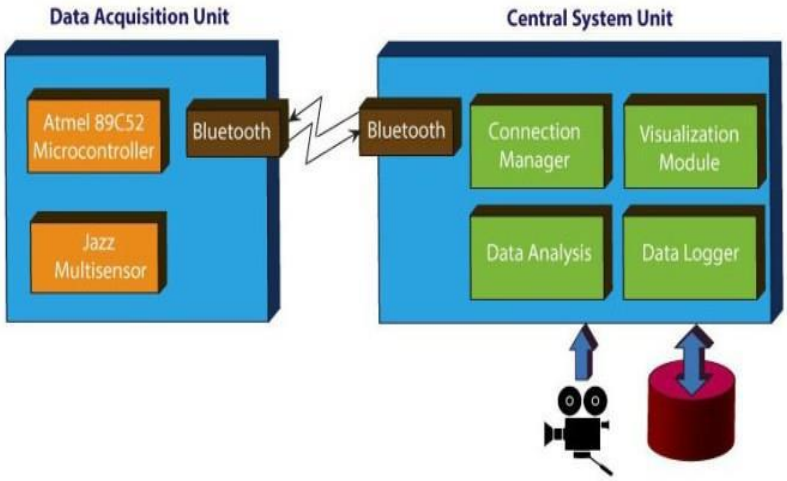
"**BLUE: Bluetooth that enables efficient wireless communication.**

EYE: Eye movement enables us to obtain a lot of interesting and important information."

Overview of Blue Eyes Technology

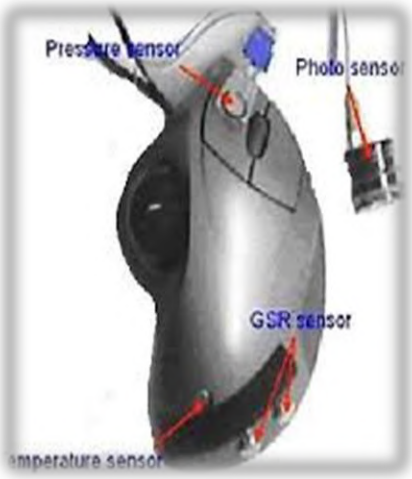
Blue Eyes system consists of a mobile measuring device called Data Acquisition Unit (DAU) and a central analytical system called Central System Unit (CSU) interconnected by Bluetooth. DAU collects information from the sensor and sends it over the Bluetooth and delivers the messages sent from CSU to the operator. CSU buffers incoming sensor data and provides visualization interface.

- Bluetooth technology provide a means for creating a Personal Area network linking the operators and central linking system.
- Blue Eyes system monitors the status of the operator's visual attention through measurement of saccadic activity (movement of both eyes between two or more phases of fixation in the same direction). The system checks parameters like Heart beat rate and Blood Oxygenation against abnormal and triggers user defined alarms.



Technology Used

One of the important input device used in blue eyes technology is Emotion Mouse. It is built with a bundle of sensors in it. Each sensor detects a particular emotion.



- It is the simplest way as people spend approximately 1/3rd of their total computer time touching input device.
- Physiological data is obtained and emotional state is determined.
- A user model will be built that reflects the personality of user.
- It is user friendly.

Pros and Cons of Blue Eyes Technology

Pros

- Physiological condition monitoring
- Reduces manual work
- Increase efficiency

Cons

- Not 100% accurate

- System is bulky, needs minimization.
- expensive

Conclusion

In future, ordinary household devices such as televisions, refrigerators, and ovens may be able to do their jobs when we look at them and speak to them. Provide more delicate and user-friendly facilities in computing devices. Gap between electronic and physical world will be reduced. The computers can be run using implicit commands instead of the explicit commands. The day is not far when this technology will push its way into your household, making you lazier. The blue eyes technology is meant to be a stress reliever, driven by the advanced technology of studying the facial expressions for judgment of the intensity of stress handled. These new possibilities can cover areas such as industry, transportation, military command centres or operation theatres.

"If you want to build something great, you should focus on what the change is that you want to make in the world." —Mark Zuckerberg

Article by
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4. BRAIN - A NEW WORLD

"The similarities between humans and computers are more numerous than the differences", P. A. Scott said.

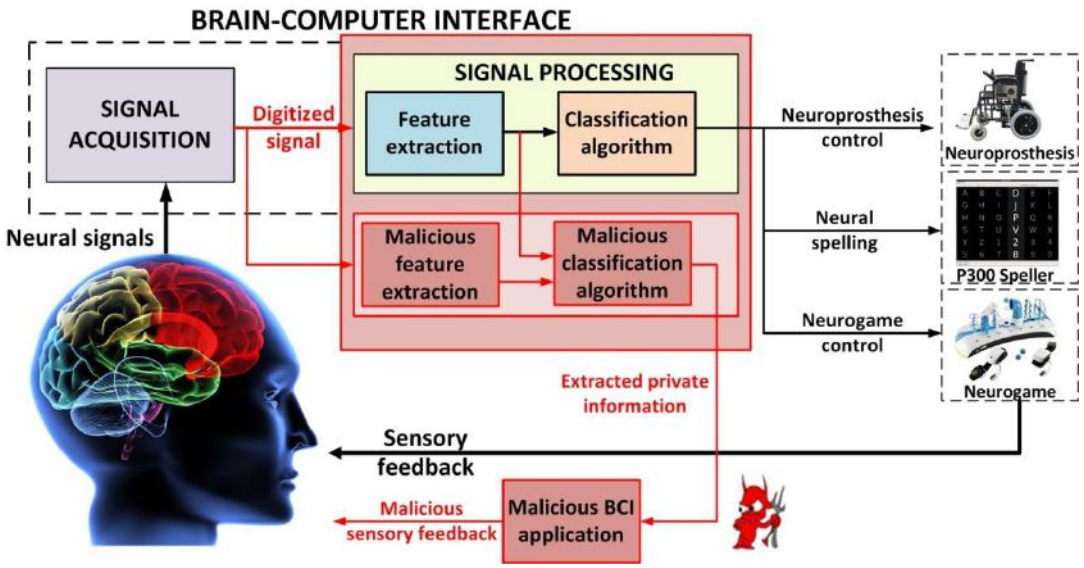
The thinking ability of our brain takes us into another level. There is a real danger that computers will develop intelligence and take over. We urgently need to develop direct connections to the brain so that computers can add to human intelligence rather than to be in opposition. The hallmark of intelligence is the ability to learn. As decades of research have shown, our brains exhibit a high degree of “plasticity", meaning that neurons can rewire their connections in response to new stimuli. Using a brain-computer interface, scientists are beginning to learn" why learning is hard".

The brain doesn’t easily let go of what it already knows. The brain’s adaptability can sometimes seem endless. But observations of the brain during learning suggest that its networks of neurons can be surprisingly inflexible and inefficient.

"You can imagine the challenge of trying to dig through all this data to see what the brain is doing,” Byron Yu, a biomedical engineer and neuroscientist at Carnegie Mellon and one of the leaders of the research said. “Our eyes are not well-trained to pick up on subtle patterns here.” But advanced statistical analytics built into the chip can do this, and the patterns can be used to identify the neural activity associated with a test subject’s intent to make specific movements. The system can distinguish, for

example, between a subject wanting to reach an arm to the left, to the right, up or down.

Researchers can then use the output of a BCI to translate the neural activity for specific movements into directional controls for a cursor on a computer screen.



BCI creates a new non-muscular channel for relaying a person's intentions to external devices such as computers. A BCI is an artificial intelligence system that can recognize a certain set of patterns in brain signals following five consecutive stages: signal acquisition, preprocessing or signal enhancement, feature extraction, classification, and the control interface. The signal acquisition stage captures the brain signals and may also perform noise reduction and artifact processing. The preprocessing stage prepares the signals in a suitable form for further processing. The feature extraction stage identifies discriminative information in the brain signals that have been recorded. Once measured, the signal is mapped onto a vector containing effective and discriminate features from the observed signals. The extraction of this interesting information is a very challenging task. Brain signals are mixed with other signals coming from a finite set of brain activities that overlap in both time and space. Moreover, the signal is not usually stationary and may also be distorted by artifacts such as electromyography (EMG) or electrooculography (EOG). The feature vector must also be of a low dimension, in order to reduce feature extraction stage complexity, but without relevant information loss. The classification stage classifies the signals taking the feature vectors into account. The choice of

good discriminative features is therefore essential to achieve effective pattern recognition, in order to decipher the user's intentions. Finally, the control interface stage translates the classified signals into meaningful commands for any connected device, such as a wheelchair or a computer.

Brain-computer interfaces (BCIs) represent a direct communication link between the brain and an external device. Recent experimental results show how electroencephalographic (EEG) signals, recorded from consumer-grade BCI devices, can be used to extract private information about a user.

"Sometimes dreams are all that separate us from the machines"

Reference

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Article by

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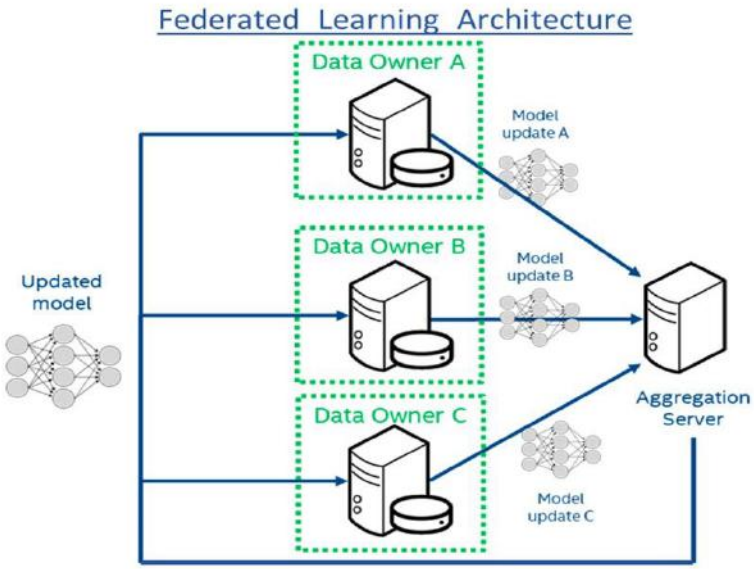
17699A0555

5. FEDERATED LEARNING

The future of Machine Learning is Decentralization

Decentralized Machine Learning is called as Federated Learning. It is a Machine Learning technique where training data is distributed over a large number of clients each with unreliable and relatively slow network connections. It was found by google in 2016 in a research paper. The goal of Federated Learning is to enable the edge devices (such as mobile phones, IOT devices and etc.) to do state of the art machine learning without centralizing data and with privacy by default.

Federated Computation is a Map-Reduce for decentralized data with privacy preserving aggregation built-in. The data is generated at the edge devices. The Data enables better products and smarter models.



The device downloads the current model from the server, improves it by learning from data on our edge devices, and then summarizes the changes as a small focused update. Only this update to the models is sent to the cloud (server), using encrypted communication, where it is immediately averaged with other. All training data remains on our device and no individual updates are stored in cloud. Transferring the data from edge devices to server (cloud) need lot of resources, so without transferring our model will be trained.

Tensor Flow Federated

TFF is an open source frame work provided by google to develop federated learning algorithms.

Advantages

- Limited communication
- Intermittent compute node availability
- Intermittent data availability
- No personal data ever leaves the local device

	Centralized Learning	Edge computing	Federated Learning
Privacy	✗	✗	✓
Bandwith	✗	✓	✓
Latency	✗	✓	✓
Cost / Feasability	✓	✗	✓

Applications

- *Google Gboard* is an application of federated learning. It is used for providing more privacy for users.
- An IOT project in Lenovo AI innovation center uses federated learning that simulates a sensor in a manufacturing setting. A biometric pressure sensor that detects pressure within a tube and data will be tracked. Local models will be built and then combined for predictions.

Challenges

- Training data is stored across a massively distributed network of devices
- Unreliable connectivity with devices and unbalanced results from clients with large deltas vs. clients with small deltas
- Dynamic Data Availability time zones affect when the data is available to be collected

Article by

K. HIMA BINDU

17699A0519

6. MACHINE LEARNING

In machine learning, a computer first learns to perform a task by studying a training set of examples. The computer then performs the same task with data it hasn't encountered before.

Arthur Samuel, a pioneer in the field of artificial intelligence and computer gaming, coined the term **"Machine Learning"**. He defined machine learning as – **"Field of study that gives computers the capability to learn without being explicitly programmed"**.

Basic Difference in ML and Traditional programming?

Traditional programming: We feed in DATA(input)+PRO-GRAM(logic), run it on machine and get output.

Machine Learning: We feed in DATA(input)+output, run it on machine during training and the machine create its own program (logic), which can be evaluated while testing.

Machine Learning is the discipline of learning to improve performance measure task in the future, using the experience of the task in the past. This includes making accurate predictions, completing a task, etc. The learning always requires some observations or data points. Below mentioned are some of the Machine Learning use cases:

1. Recognizing and finding faces in images.
2. Classifying articles in categories like sports, politics, entertainment, etc.
3. Recognizing handwritten characters using the images of the letters.
4. Natural Language Processing
5. Medical Diagnosis of Diseases using image and other sensor based data
6. Classifying articles in categories like sports, politics, entertainment, etc.
7. Recognizing handwritten characters using the images of the letters.
8. Natural Language Processing
9. Medical Diagnosis of Diseases using image and other sensor based data

What is Learning for a Machine?

A machine is said to be learning from Past Experiences with respect to some class of Tasks, if it's Performance in a given Task improves with the Experience.

Types of learning

1. Supervised Learning
2. Unsupervised Learning
3. Semi-Supervised
4. Reinforcement

Supervised Learning: Under the paradigm of supervised Learning, the program is trained on asset of data point which are pre-defined training examples. This is done to facilitate the program to find a better prediction on a new test data set.

In the majority of supervised learning applications, the ultimate goal is to develop a finely tuned predictor function.

There are two categories of supervised learning:

- Classification task
- Regression Task

Classification: Imagine you want to predict the gender of a customer for a commercial. You will start gathering data on the height, weight, job, salary etc., from your customer database. You know the gender of each of your customer, it can only be male or female. The objective of the classifier will be to assign a probability of being a male female based on information.

Regression: When the output is a continuous value, the task is a regression. For instance, a financial analyst may need to forecast the value of a stock based on a range of feature like equity, previous stock performances. The system will be trained to estimate the price of the stocks with the lowest possible error.

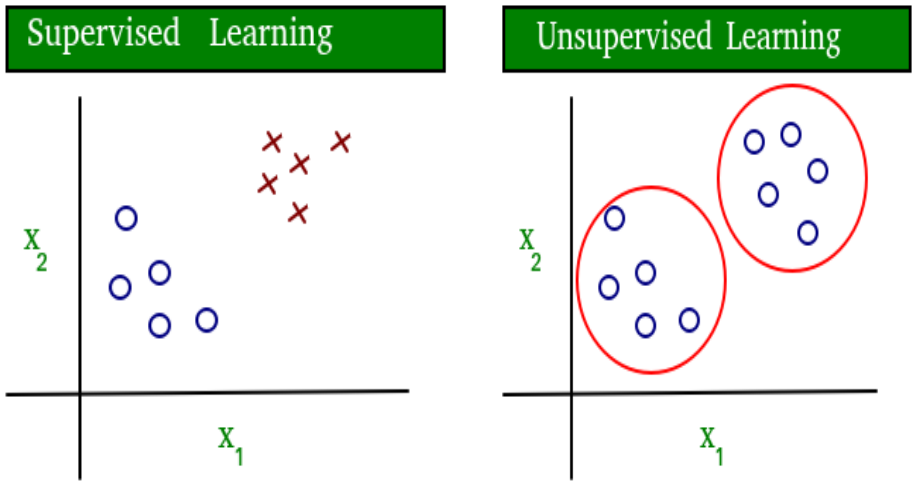
Unsupervised machine learning

The program is given a bunch of data and must find patterns and relationships therein. In unsupervised learning, an algorithm explores input data without being given an explicit output variable (eg: explores customer demographic data to identify patterns).

- **Clustering:** You ask the computer to separate similar data into clusters, this is essential in research and science.

- **High Dimension Visualization:** Use the computer to help us visualize high dimension data.
- **Generative Models:** After a model captures the probability distribution of your input data, it will be able to generate more data. This can be very useful to make your classifier more robust.

- A simple diagram which clears the concept of supervised and unsupervised learning is shown below:



Semi-supervised learning:

Problems where you have a large amount of input data and only some of the data is labeled, are called semi-supervised learning problems. These problems sit in between both supervised and unsupervised learning. For example, a photo archive where only some of the images are labeled, (e.g. dog, cat, person) and the majority are unlabeled.

Reinforcement learning:

A computer program interacts with a dynamic environment in which it must perform a certain goal (such as driving a vehicle or playing a game against an opponent). The program is provided feedback in terms of rewards and punishments as it navigates its problem space.

Applications of Machine Learning

- Marketing and sales
- Optimization of technical processes
- Monitoring and surveillance
- Driverless Vehicles and household robots

Reference:

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Article by

Y.Hithaishi

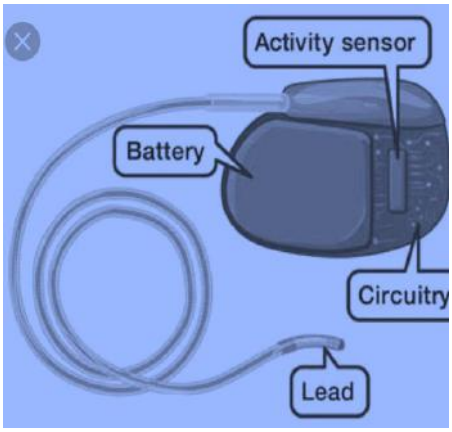
17699A0520

7. PACEMAKER

"Death is not the greatest loss in life. The greatest loss is what dies inside us while we live. Take care of your body because it's the only place you have to live. And that can happen with PACEMAKER".

What is a Pacemaker?

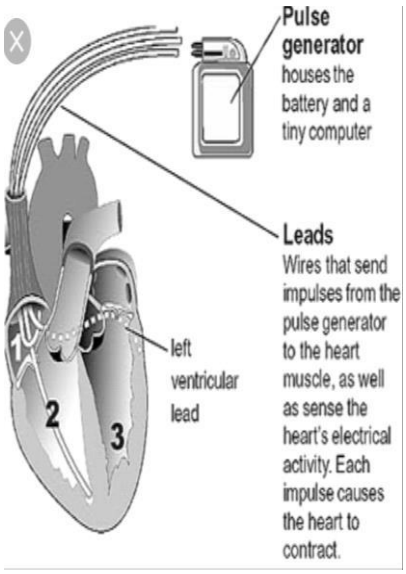
A Pacemaker is a small battery operated device that's placed under your skin (near your collarbone) to help you heart beat at a normal rate and rhythm. Your healthcare provider may decide you need a Pacemaker if you have one or more of these problems:

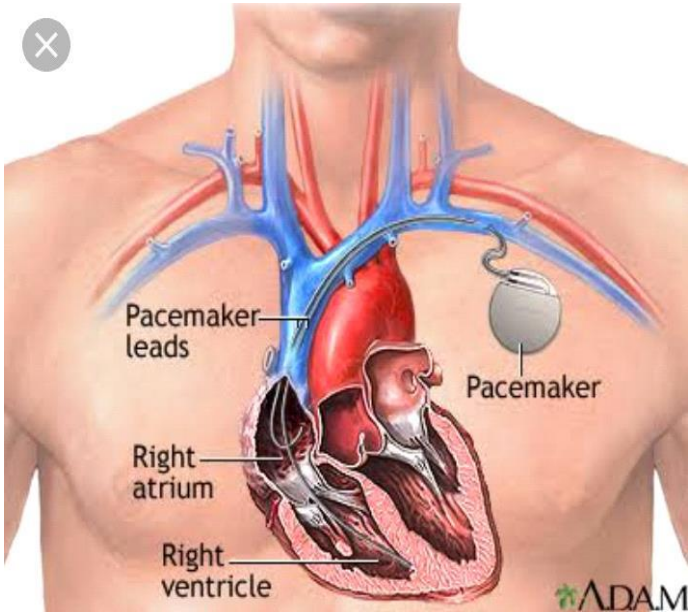


1. Your heart rate is too slow or too fast.
2. your heartbeat isn't regular.
3. you're often very tired, or having breathing problem, dizzy.

How does Pacemaker works?

Tiny wires (called as leads) that connect your heart to the pacemaker tell the pacemaker if your heart rate is too slow or too fast or the beating rate of your heart is irregular. The pacemaker then sends signals back to your heart to correct the rate or rythm, which will make the heart patient feel better.





Mostly this pacemaker will be very much helpful for heart patients who suffer from heart attacks as the pacemaker keeps on absorbing the working of the heart and if the heartbeat goes down then the pacemaker provides the current required for the heart to beat as regular with this the life time of the

patient can be saved. People ending their life at a tender age can be lived for a long time with the help of pacemaker that is placed under your skin nearer to your heart.

How is the pacemaker placed under your skin?

After you receive medication to numb your skin, your cardiologist will make a 2-4 inch (5-10cm) incision, usually on the left side of your chest. Doctor will place the pacemaker under your skin, places one or more leads into a vein that's connected to your heart, and close the skin over the pacemaker. The procedure usually takes 1 to 2 hours, and most patients go home within 1 day. After the procedure, the pacemaker site may be slightly bruised, swollen, and tender. Your cardiologist will give you medication for any discomfort. Once the site heals completely, you won't be aware that you have a pacemaker.

The pacemaker runs on a battery. Depending on the type of pacemaker you have, the battery lasts for 5-10 years. Your cardiologist will tell you when you need a new battery.

How this pacemaker can be hacked?

A pacemaker placed in the heart can be hacked. As the pacemaker is similar like mobile phone device and this pacemaker also contains network and can be hacked. There after this pacemaker can be kept under our control. If the device(pacemaker)is hacked then the hacker will decide how much current to be passed and this may lead the person (patient) for death.

Conclusion

By regulating the heart's rhythm, A pacemaker can often eliminate the symptoms of bradycardia. This means individuals often have more energy and less shortness of breath. The life time of a heart patient can be increased and can be very much helpful for the person for living a longer life before ending the life with heart attacks at a small age.

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8. DIGITAL TWIN

In day-to-day life, people use so many gadgets which are high-priced and hard to maintained. In this complex situation an idea about Digital Twins is arise.

What is Digital Twins?

The term Digital Twin was coined by Dr.Michael Grieves. In his vision, he presented how these virtual representations could form tighter loop between design and execution.

Digital Twin refers to a Digital replica of physical assets processes , people, places, systems and devices that can be used for various purposes.

The Digital representation provides both the elements and the Dynamics of how an Internet-of-Things device operates and lives throughout its life cycle.

It simple elaborate as “Using a digital copy of the physical system to perform real-time optimization.”

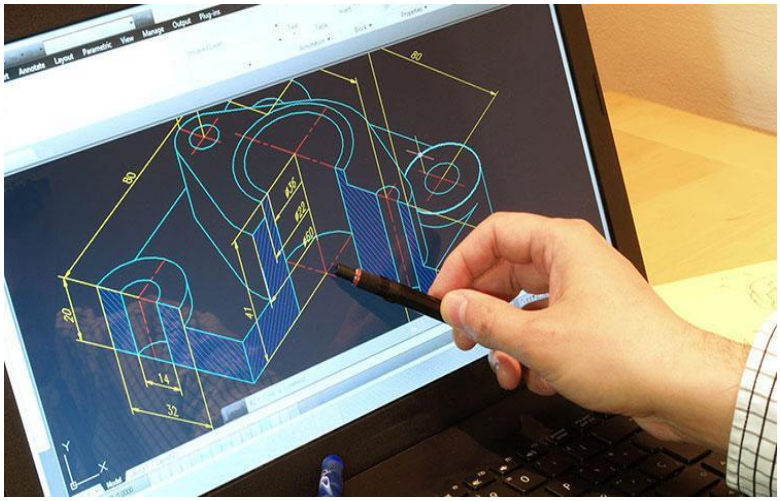
Types of Digital Twin

It contains Three types of digital-twin, namely

- Product
- Production and
- Performance

The combination and integration of the three Digital Twin as they evolve together is known as the Digital-Thread. The term “Thread” is used because it is woven into, and brings together data from, all stages of the product and production life cycles.

How Digital twin Technology works



Digital Twin integrate Internet-of-Things, Artificial-Intelligence, Machine Learning and Software analytics with spatial-network graphs to create living digital Simulation models that update and change as their physical counterparts change.

A Digital-Twin continuously learns and updates itself from multiple sources to represent its near real-time status, working condition or position. This learning system, learns from itself, using sensor data that conveys various aspects of its operating condition 'from human-experts'.

The Digital Twin fits into the model as a computer representation of a product. A sensors connected to the physical product collect data and send it back to the digital-twin, and their interaction helps optimize the "product's performance" via "maintenance regime".

Birth of Digital-Twin Technology

NASA was the first to give birth to digital twin technology. The argument was how can one possibly mend or update or check on a machine in outer space where it is practically impossible to be physically present at any given point if time.

Hence they develop a virtual replica which can work from the desired place and can fetch real-time data.

Challenges the digital-twin solves

Some of the challenges solved by digital-twin are:

- *Monitoring:*
  A digital-twin merges live data from its physical counterpart with an interactive visual interface. This offer an unsurpassed level of monitoring.
- *Maintenance:*
  Digital-Twin solutions take maintenance from a reactive to a predictive approach. Repairs are only performed when needed and components are not switched out unnecessarily.
- *Training:*
  Digital-twin is an excellent tool for professional training due to its visual interface and the fact that it mirrors real-life scenarios from the production floor.
- *Communication:*
  It helps employees to share knowledge about production issues like automatic alerts about predicted failures or quality deviations can be viewed by all the relevant personnel. Tips and advice can be shared, including highly specific technical details thanks to visual nature of the "twin".

Applications

Role of Digital-twin in Aviation:

Many aerospace companies have begun to utilise digital-twins to accomplish the goal of reducing unplanned downtime for engines and other systems. By using this technology, not only do they receive advance warning and predictions, but also get a plan of actions based on simulated scenarios that take into account the weather conditions, the performance of the asset, and several ator variables. This has proved effective and has helped airlines to keep aircrafts in service for longer durations.

With the help of digital twins, they can do proactive and predictive maintenance to increase platform operational availability and efficiency, extend its useful life cycle and reduce its life cycle cost.

Moreover, these digital twins are capable of mitigating damage or degradation by activating self-healing mechanisms or by recommending changes in the mission profile to decrease loadings, thereby increasing both the life-span and the probability of mission success.

Advantages of Digital Twin

- ★ Increased reliability of equipment and production lines
- ★ Improved OEE through reduced downtime and improved "performance".
- ★ Improved productivity and reduced risk in various areas including product availability, marketplace reputation, and more
- ★ Lower maintenance costs by predicting maintenance issues before break-downs occurs.
- ★ Faster production times and more efficient supply and delivery chains.
- ★ Improve product quality, and enhanced insight into the performance of your products, in multiple real-time applications and environments.

Disadvantages

- ★ Improve product quality, and enhanced insight into the performance of your products, in multiple real-time applications and environments.
- ★ Dependent on internet connectivity.
- ★ Security is stake.
- ★ Digital twins concept is based on 3D CAD models and not on 2D drawings.
- ★ The challenges here involve globalisation and new manufacturing techniques. Managing all these design data for Digital-Twin amongst partners and suppliers as the physical product evolves will be a challenge.

Conclusion

In these current technological situations, there has been an unexpected progress in the technologies and capabilities of both the physical product and virtual product the digital-twin .

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9. WHY TO LEARN CODING?

Before knowing about the importance of coding, what is coding?

Coding is the process of using a programming language to get a computer to behave how you want it to. There are many types of programming languages according to the needs.

Learning coding empowers you to do many things you wouldn't otherwise be able to do. There are many benefits of coding. Among them-

Make Your Own Website

It's incredible to think how much the world has changed since 1991, when the World Wide Web first started. The web has taken over our lives and it's showing no sign of stopping. Who knows where the web will take us in the future? Perhaps in another 10 years every person will have their own website. If one thing's certain, it's that a website is a very valuable thing to have these days.

If you own a business, a web browser is a must. If you don't, you still might want a personal blog site to sell your skills to prospective employees.

Become a Career Coder

For your career, the humble computer programmer is quite possibly one of the most underrated professions out there. The demand for coders far exceeds the supply, so you'll have no troubles finding a job. And because the supply of coders around the world is so low, the pay is quite attractive too.

Google and Facebook employees, for instance, are paid a base salary of ~$125K.

Start a Business

Let us assume you have got an idea for a web business. You want to create the next Facebook. But you're short on cash, and being able to hire a team of coders is a pie in sky. Why not learn code and build the product yourself? It's a path that many entrepreneurs are choosing to go down. They've started off with virtually no coding knowledge and have gone on to build their own small software business.

Example of business you can do through coding-selling software, selling mobile apps, e-commerce etc.

Understand How Computers Work

This is probably the biggest benefit of all, and the one that will apply to you no matter who you are or why you are interested in learning code. Have you ever got a doubt how all the technologies are working?

You will be able to discover ways in which coding can help you in your everyday life or job. You may decide to write your own scripts, to perform routine tasks like sending emails, handling data, editing text or doing calculations.

Understanding how software and coding works is definitely valuable for anyone, in any walk of life.

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