Maratha Vidya Prasarak Samaj's

Karmaveer Adv. Baburao Ganapatrao Thakare College Of Engineering Nashik-13.

KBTCOE

(NAAC ACCREDITED INSTITUTE WITH 'A' GRADE)

DEPARTMENT OF ELECTRONICS &TELECOMMUNICATION ENGG.

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Department Vision:-

To recognize as excellent department offering competent technical education to create competent electronics & telecommunication engineers for benefits of common masses.

Department Mission:-

Committed to serve the needs of society through innovative teaching learningprocess, promoting industry- institute interaction to provide competent and cultured electronics and telecommunication engineers.

Greeting,

Department of Electronics and Telecommunication is unveiling technical newsletter "TeChronicle" VOL-1, ISSUE-2 on 19TH August 2019,On the occasion of "MVP-Samaj Din " which we all celebrate in the memories of all the Karmveer who's visionary leadership and great work still inspire us to Indigenous work

INTERACTION WITH VIVEK GOGATE

[Team Editorial]

GOGATE ELECTROSYSTEMS was established in 1996, is a well-recognized Manufacturer, Exporter and Trader of Voltage Stabilizer, Battery Charger, etc. Their products are always on their client's top priority on the bases of impeccability, durability as well as cost effective price range. It is classified as Non-govt company and is registered at Registrar of Companies, Mumbai. Its authorized share capital is about Rs. 1,000,000 They are also the proud winner of NIMA (Nasik Industries & Manufacturers Association)business Excellence Award for the year 2014. (Nasik Industries & Manufacturers Association).

Directors of **Gogate Electrosystems** (Nashik) Private Ltd. Mr. Vivek Gogate is a great personality having 40 years of experience in the field of power electronics and electronic protection relays which have been developed for switchgear industry.He has completed BE (E & Tc) from COEP and MBA in Materials Management. He has been the Chairman of Computer Society of India (CSI), Nashik Chapter, the President, Laghu Udyog Bharati, Nashik and the President of Nashik Industries and Manufacturers Association (NIMA). He is also a recipient of "Outstanding Achievement Award" from the Institution of Engineers.

Mr. Vivek Gogate is a kind of person who always follows principle, ethics and also believes in his commitments.

After completing MBA he got a job in AFCO Company in temperature controller section with salary of Rupees 900 per month. He started his own business in 1979 with an investment of rupees 600 within a small scale area. Initially he started with assembly of relays. Today his company has a man-power of 120 employees. Presently they design 1000KVA stabilizers, Solar MPPT charge controllers, MCBs up to 400A rating, Control relays for HPS and many more.

We came to know that their biggest achievement was when they started designing 1000KVA 1voltage stabilizers as a small company. They have ISO, EHS certification.

Few of the questions while conversing with Vivek sir are.

Student: While recruiting students what do you expect from them? what exactly skilled engineers mean to you?

Vivek Sir: We see that is the student technically sound, his basics and fundamentals should be strong. we don't ask them very high tech questions. We check that are the basic concepts of the student clear or not. We also ask them about their individual vision and their future plans.

Student: how can we fill the gap between college education and practical knowledge required in the industry

Vivek Sir: The reason behind this gap is demand and supply. The demand is less and supply is more. To fill this gap , whichever opportunity we get in the beginning we should take it. And we should decide that in which field we have to work.

Student: why should we join core electronics industry rather than opting for IT?

Vivek Sir: There is equal scope in both sectors. But the IT sector's glamour is different. The setup of IT sector is 10 times superior. The culture of IT sector is different .it has flexi hours etc . On contrary in manufacturing sector there is fix time for everything with lot of opportunities.

NEUROMORPHIC ENGINEERING

[Mr. V. P. Gawai, Assistant Professor]

Neuromorphic Engineering, also known as neuromorphiccomputing is a concept developed by Carver Mead, in the late 1980s, describing the use of very-large-scale integration (VLSI) systems containing electronic analog circuits to mimic neuro-biological architectures present in the nervous system. The implementation of neuromorphic computing on the hardware level can be realized by oxide-based memristors, spintronic memories, threshold switches, and transistors.

A key aspect of neuromorphic engineering is understanding how the morphology of individual neurons, circuits, applications,and overall architectures creates desirable computations, affects how information is represented, influences robustness to damage, incorporates learning and development, adapts to local change(plasticity), and facilitates evolutionary change. Neuromorphic engineering is an interdisciplinary subject that takes inspiration from biology, physics, mathematics, computer science, and electronic engineering to design artificial neural systems, such as vision systems, head-eye systems, auditory processors, and autonomous robots, whose physical architecture and design principles are based on those of biological nervous systems.

As early as 2006, researchers at Georgia Tech published a field programmable neural array. This chip was the first in a line of increasingly complex arrays of floating gate transistors that allowed programmability of charge on the gates of MOSFETs to model the channel-ion characteristics of neurons in the brain and was one of the first cases of a silicon programmable array of neurons.

In November 2011, a group of MIT researchers created a computer chip that mimics the analog, ion-based communication in a synapse between two neurons using 400 transistors and standard CMOS manufacturing techniques. In June 2012, spintronic researchers at Purdue presented a paper on the design of a neuromorphic chip using lateral spin valves and memristors. They argue that the architecture works similarly to neurons and can therefore be used to test methods of reproducing the brain's processing. In addition, these chips are significantly more energy-efficient than conventional ones.

Research at HP Labs on Mott memristors has shown that while they can be non-volatile, the volatile behavior exhibited at temperatures significantly below the phase transition temperature can be exploited to fabricate a neuristor, a biologically-inspired device that mimics behavior found in neurons. In September 2013, they presented models and simulations that show how the spiking behavior of these neuristors can be used to form the components required for a Turing machine.

A memristor is a hypothetical non-linear passive two-terminal electrical component relating electric charge and magnetic flux linkage. It was envisioned, and its name coined, in 1971 by circuit theorist Leon Chua. The memristor's electrical resistance is not constant but depends on the history of current that had previously flowed through the device, i.e., its present resistance depends on how much electric charge has flowed in what direction through it in the past; the device remembers its history—the so-called non-volatility property. When the electric power supply is turned off, the memristor remembers its most recent resistance until it is turned on again.

A research project with implications for neuromorphic engineering is the Human Brain Project that is attempting to simulate a complete human brain in a supercomputer using biological data. It is made up of a group of researchers in neuroscience, medicine, and computing. Henry Markram, the project's co-director, has stated that the project proposes to establish a foundation to explore and understand the brain and its diseases, and to use that knowledge to build new computing technologies. The three primary goals of the project are to better understand how the pieces of the brain fit and work together, to understand how to objectively diagnose and treat brain diseases, and to use the understanding of the human brain to develop neuromorphic computers. That the simulation of a complete human brain will require a supercomputer a thousand times more powerful than today's encourages the current focus on neuromorphic computers. $1.3 billion has been allocated to the project by The European Commission.

Intel disclosed its neuromorphic research chip, called "Loihi", in October 2017. The chip uses an asynchronous spiking neural network (SNN) to implement adaptive self-modifying event-driven fine-grained parallel computations used to implement learning and inference with high efficiency.

Ownership and Property Rights

There is significant legal debate around property rights and artificial intelligence. In *Acohs Pty Ltd v. Ucorp Pty Ltd*, Justice Christopher Jessup of the Federal Court of Australia found that the source code for Material Safety Data Sheets could not be copyrighted as it was generated by a software interface rather than a human author. The same question may apply to neuromorphic systems: if a neuromorphic system successfully mimics a human brain and produces a piece of original work, who, if anyone, should be able to claim ownership of the work?

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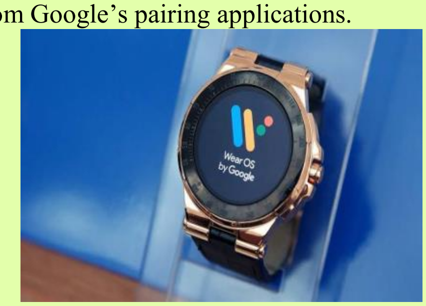
THE WEARABLE OPERATING SYSTEM

[Himanshu P. Bhamare,S.E. E&TC]

Every major hardware manufacturer is clamouring for its share of the smart watches action. This year alone Motorola, LG, and Apple joined the fray, yet a true leader in wearable has yet to emerge. Instead of stepping into the hardware battle, Google leveraged what it knows best: code. In the past, each smart watch ran its own proprietary operating system (OS), limiting the number of apps and functionality available to users.

androidwear

Wear OS also known as Wear OS by Google and previously called Android Wear, is a version of Google's Android Operating System design for other smart watches and other wearable. By pairing with mobile phones running Android version 4.3 or newer or IOS version 8.2 or newer with limited support from Google's pairing applications.



Developer	Google
Written in	C(core), C++, java
OS Family	Unix
Initial release	March 18, 2014
Latest release	Wear OS 2.7 based on Android 7.1.1/8.0/9.9/June 19
Platforms	32-bit ARM, MIPS, x86
Kernel type	Monolithic(Modified Linux Kernel)
Default user interface	Graphical(multi touch)
license	Apache License2.0, Linux kernel patches under GPLv2

FEATURES

- Options include a screen always on feature and "tilt to wake up screen "setting to light the screen automatically.
- Users can find directions by voice from the phone, choose transport mode, including bike and start journey.
- Via Google fit and similar applications, wear OS supports ride and run tracking. On device sporting the needed sensor, heart activity can be sampled automatically through the or on demand. Step counting, calorie expenditure, etc. are also monitored. These features work within the Fit ecosystem, allowing integration with companion devices and applications.
- The watch reinforces achievements with cards noting goal attainment, when a goal is near, summaries of heart, and body activity.
- Users can use their Wear OS watch to control their phone. Music can be requested. The screen then shows a card for play-control, volume, skip, media images, allowing music to be controlled from the wrist with the user free to move.
- Starting with version 2.16 users can swipe right to bring up an assistant page with useful information similar to android phones.

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- https://wearos.google.com/#hands-free-help

WHAT CAN BE DONE WITH NANOTECHNOLOGY TODAY?

[Rutuja S. Rajole,T.E. E&TC]

Nanosensors are nanoscale devices that measure physical quantities and convert those quantities to signal that can be detected and analyzed .Sensors share the some basic workflow : a selective binding of analyte, signal generation from the interaction of the Nanosensors with the bio-element and processing of the signal into useful metrics.

Characteristics

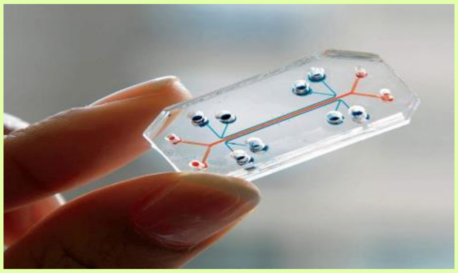
- Nanosensors can have increased specificity because they operate at a similar scale as a natural biological process.
- Nanosensors can also potentially be integrated with nanoelectronics to add native processing capability to the nanosensors.
- One dimentional nanomaterials such as nanowires and nanotubes are well suited for use in nanosensors, as compared to bulk or thin- film planar devices
- Nanosensors are suitable for high-throughput applications in addition to their sensitivity and specificity.
- Nanosensors provide real time monitoring compared to traditional detection methods such as chromatography and spectroscopy.

Mechanisms of operations

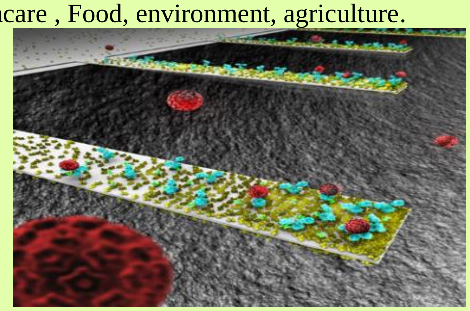
There are many mechanisms by which a recognition event can be transduced into a measurable signal. Electrochemical nanosensors are based on detecting a resistance change in the nanomaterials upon binding of an analyte, due to changes in scattering or to the depletion or accumulation of charge carriers. One possibility is to use nanowires such as carbon nanotubes, conductive polymers, or metal oxide nanowires as gates in field-effect transistors. Photonic devices can also be used as nanosensors to quantify concentrations of clinically relevant samples. A principle of operation is based on the chemical modulation of hydrogel film volume that incorporates a Bragg grating.

Currently the applications of nanosensors in the market include:

- Defense and Military
- To make strong lightweight equipment ranging from tennis racquets to windmill blades



- In sunscreens to provide protection from UV rays without producing a thick white residue
- In wound dressings to rapidly stop bleeding in trauma patients
- In plastic food packaging to keep oxygen out so the food spoils at a much slower rate
- Healthcare , Food, environment, agriculture.



Nanocantilevers: These devices are being used to develop sensors that can detect single molecules. These sensors take advantage of the fact that the nanocantilever oscillates at a resonance frequency that changes if a molecule lands on the cantilever, changing its weight. Coating a cantilever with molecules, such as antibodies, that bond to a particular bacteria or virus determines what bacteria or virus will bond to the cantilever.

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- https://www.azonano.com/article.aspx?ArticleID=1735

QUANTUM COMPUTING

[Pratik Pawar & Rutuja Kakulte, TE, E & TC]

Introduction

Quantum information processing is the result of using the physical reality that quantum theory tells us about for the purposes of performing tasks that were previously thought impossible or infeasible. Devices that perform quantum information processing are known as quantum computers. In this article we examine how quantum computers can be used to solve certain problems more efficiently than can be done with classical computers, and also how this can be done reliably even when there is a possibility for errors to occur.

Concept

Quantum computing is the use of quantum-mechanical phenomena such as **superposition** and **entanglement** to perform computation. A quantum computer is used to perform such computation, which can be implemented theoretically or physically.

The field of quantum computing is actually a sub-field of quantum information science, which includes quantum cryptography and quantum communication. Quantum Computing was started in the early 1980s when Richard Feynman and Yuri Manin expressed the idea that a quantum computer had the potential to simulate things that a classical computer could not. In 1994, Peter Shor published an algorithm that is able to efficiently solve some problems that are used in asymmetric cryptography that are considered hard for classical computers.

Qubits instead of Bits

Quantum computers use **Quantum logic gates** to do computation. Both approaches use **Quantum bits or Qubits**. Qubit are fundamental to quantum computing and are somewhat analogous to bits in a classical computer. Qubits can be in a 1 or 0 quantum state. But they can also be in a superposition of the 1 and 0 states. However, when qubits are measured the result is always either a 0 or a 1; the probabilities of the two outcomes depends on the quantum state they were in.

Quantum Superposition

Quantum superposition is a fundamental principle of quantum mechanics. It states that, much like waves in classical physics, any two (or more) quantum states can be added together ("superposed") and the result will be another valid quantum state; and conversely, that every quantum state can be represented as a sum of two or more other distinct states. Mathematically, it refers to a property of solutions to the Schrödinger equation; since the Schrödinger equation is linear, any linear combination of solutions will also be a solution.

Quantum Entanglement

Quantum entanglement is a physical phenomenon that occurs when pairs or groups of particles are generated, interact ,or share spatial proximity in ways such that the quantum state of each particle cannot be described independently of the state of the others ,even when the particles are separated by a large distance.

Advantages

- They have high processing speed compared with classical computers.
- They have ability to perform multitasking to give better result.

Disadvantages

- Hard to control quantum particles.
- Difficult to build.
- Expensive.
- Complex hardware schemes like superconductors.

Applications

- Cryptography
- Medicine & Materials
- Machine learning
- Searching big data

Reference :-

- https://en.wikipedia.org/wiki/Quantum_computing
- https://www.research.ibm.com

Website :www.kbtcoe.org
Email Id:- techronicle.etc@gmail.com