

A.V.C COLLEGE OF ENGINEERING, MANNAMPANDAL, MAYILADUTHURAI



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Department of Electronics and Communication Engineering



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Message from Head of the Department

I congratulate the students who won prizes in various events conducted in the national level symposium .

I expect the students to concentrate on their studies and score good marks in the upcoming exams.

I look ahead from the faculties to coordinate and work together to achieve our goals during the various visits in our department.

Dr.CHITRAVALAVAN
HOD/ECE

“SLOGANS”

“You cannot change your future, but you can change your habits, and surely your habits will change your future.”

- A.P.J. Abdul Kalam

“Doubt kills more dreams than failure ever will.”

- Karim Seddiki

“If You Judge a Fish by Its Ability to Climb a Tree, It Will Live Its Whole Life Believing that It is Stupid.”

- Albert Einstein

Faculty Corner:

- ***Mrs.S.Padmavathi ,AP/ECE***

Future of Digital Agriculture in India

Application of Digital Agriculture

Technological interventions based on remote sensing, soil sensors, unmanned aerial surveying and market insights, etc., permit farmers to gather, visualise and assess crop and soil health conditions at different stages of production, in a convenient and cost-effective approach. They can act as an initial indicator to identify potential challenges and provide options to deal with them in a timely manner.

Artificial Intelligence/Machine Learning (AI/ML) algorithms can generate real-time actionable insights to help improve crop yield, control pests, assist in soil screening, provide actionable data for farmers and reduce their workload.

Blockchain technology offers tamper-proof and precise data about farms, inventories, quick and secure transactions and food tracking. Thus, farmers don't have to be dependent on paperwork or files to record and store important data.

Benefits of Digital Agriculture

Implementing these technological solutions enable reliable management and monitoring of farms. As farmers get a complete digital analysis of farms in real-time, they can act accordingly and don't have to apply excess pesticides, fertilizers and reduce overall water consumption.

Other benefits include: -

- ✚ Increases agriculture productivity and lowers production cost
- ✚ Inhibits soil degradation
- ✚ Lessens chemical application in crop production
- ✚ Promotes effective and efficient use of water resources
- ✚ Uplifts socio-economic statuses of farmers
- ✚ Reduces environmental and ecological impacts
- ✚ Augments worker safety

Implementation of Digital Agriculture in India

The main factor behind the gradual acceptance of digital farming in India is the prominence of segregated small-holder farms in the country, this complicates data gathering. Additionally, limited penetration of mechanisation tools and frequent natural calamities, like droughts, floods and excessive monsoon rains, have negatively impacted the deployment of digital solutions in the sector. Thus, a customised approach would be needed to implement digital agriculture to a typical Indian small farm, this can be later be scaled up and made available to many Indian farms. Following measures could be implemented to make digital agriculture a success in India: -

Student Corner:

Paper Battery-Advantages and Applications

- *Sundar.K, IV ECE*

A paper battery is a thin, flexible energy production and storage device that is formed by combining carbon nanotubes with a conventional sheet of cellulose-based paper. In addition to being disposable, paper batteries may be folded, cut or otherwise shaped for different applications without any loss of integrity or efficiency.

As sensors are increasingly being embedded in everyday objects, there has been a corresponding need for alternative power sources in the Internet of Things (IoT). The high cellulose content and lack of toxic chemicals in paper batteries make them both biocompatible and environmentally friendly, especially when compared to the lithium ion batteries used in many present-day electronic devices.

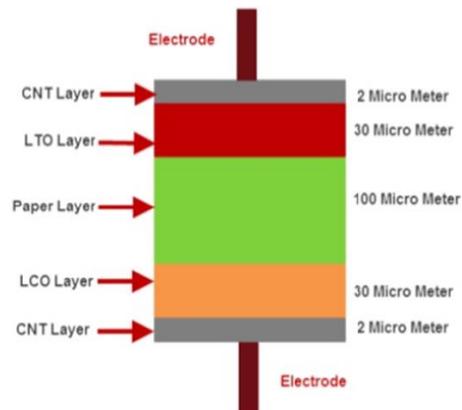
Specialized paper batteries are expected to act as power sources for any number of devices implanted in humans and animals, including RFID tags, drug-delivery systems and pacemakers. In theory, a capacitor introduced into an organism

could be implanted fully dry and then be gradually exposed to bodily fluids over time to generate voltage.

Ten years ago, scientists at Rensselaer Polytechnic Institute and MIT grew nanotubes on a silicon substrate and then impregnated gaps in the matrix with cellulose. When two sheets were combined with the cellulose sides facing inwards, a supercapacitor could be activated with ionic liquid forms, including salt-laden solutions like human saliva, blood, sweat or urine.

Recently, researchers at the State University of New York printed thin layers of metals and polymers onto a paper surface that contains freeze-dried exoelectrogens, a type of bacteria that can transfer electrons outside the bacteria's cellular walls. Any type of bio-liquid can be used to revive the exoelectrogens and activate the paper battery by allowing bacteria to pass through cell membranes and make contact with external electrodes.

STRUCTURE OF PAPER BATTERY



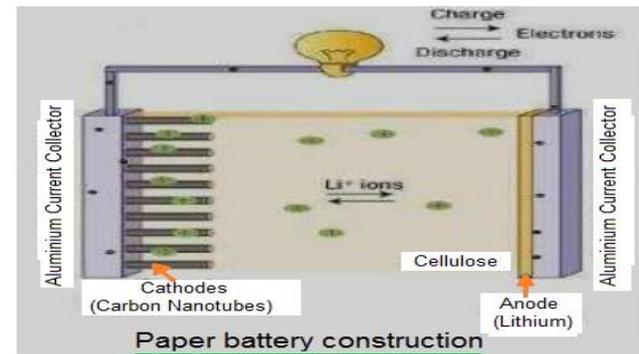
Paper battery Construction / Paper battery working operation

The device **paper battery** is formed by combining carbon nanotubes with sheet of cellulose based paper. This device combines two discrete components as mentioned.

➡ Paper Battery = Carbon Nanotubes + Paper (Cellulose)

Cellulose is complex organic substance. This is found in paper as well as pulp. This substance is not digestible by the human beings.

A Carbon NanoTubes is very tiny cylinder formed from single sheet of carbon atoms rolled into single tiny cylinder. They are stronger than steel. They conduct better compare to any semiconductors. They can be used as single-walled or multi-walled.



Paper battery is made of following:

- carbon nanotubes (CNT) acts as cathode
- Lithium metal (Li^+) acts as anode
- Electrolytes including bio-electrolytes such as sweat, blood and urine.
- cellulose based paper acts as separator

Following steps are followed during the **construction** of paper battery:

- First, common paper of desired size is used.
- Special ink with desired substrate is spread over this paper using conformal coating.
- Once the solvent is dried out, high contact surface area is formed between nanotubes and paper using strong capillary force.
- Now thin layer of lithium film is laminated on exposed part of

cellulose surface. This will complete construction of the paper battery.

- Once the battery is made, anode and cathode terminals are connected with aluminium current collectors in order to provide interfacing with external loads.

- Paper battery is different in construction to standard battery, but working wise it is similar to the electro-chemical battery.

Properties of cellulose include bio-degradable, high tensile strength, bio-compatible, low shear strength, easy to reuse and recycle, non-toxic, excellent absorption capacity etc.

Properties of carbon nanotubes include very light and flexible, good electrical conductivity, low mass density, high packing density, high tensile strength, low resistance etc.

Paper battery Advantages

Following are the **advantages** of Paper Battery:

- The properties of cellulose and carbon nanotubes as outlined above are the great benefits in paper battery design and development.
- It is bio-compatible and hence they can easily adopted by our immune system.

- They can be re-used and re-cycled by using techniques of existing paper recycling.

- The paper batteries are rechargeable using all electrolytes.

- It is durable and operates in wide temperature range.

- There is no leakage problem as no leaky fluids are used in its design.

- It does not overheat even under extreme conditions due to low resistance characteristics.

- Flexible and light in weight.

- Paper battery with desired shapes and sizes can be manufactured.

- Output voltage is customizable due to the fact that CNT (carbon nanotubes) concentration can be varied and stacking/slicing can be changed.

Paper battery Disadvantages

Following are the **disadvantages** of Paper Battery:

- This type of batteries can be torn easily as they have low shear strength.

- The methods (e.g. arc discharge, CVD, ablation, electrolysis) used in carbon nanotubes manufacturing are expensive and less efficient.

- They are harmful to human being when inhaled.

Paper battery Applications

Following are the **applications** of Paper Battery:

- It can be used in electronics for charging various devices e.g. laptop, cameras, mobile phones, calculators etc.
- It can be used in wireless devices e.g. mouse, keyboard, speakers, bluetooth headsets etc.
- It can be used in medical applications such as artificial tissues, cosmetics, glucose meters, sugar meters etc.
- It can be used in aircrafts and automobiles as hybrid car batteries, guided missiles etc.

This **Paper battery tutorial** is useful for beginners as well as advanced enthusiasts.

Questions on Microprocessors

- *Sangeetha M,III ECE*

1. What is Microprocessor?
 - a) A multipurpose PLD that accepts binary data as input
 - b) A multipurpose PLD that accepts an integer as input
 - c) A multipurpose PLD that accepts whole numbers as input
 - d) A multipurpose PLD that accepts prime numbers as input
2. Which of the following is correct about 8086 microprocessor?
 - a) Intel's first x86 processor
 - b) Motrola's first x86 processor
 - c) STMICROELECTRONICS's first x86 processor
 - d) NanoXplore x86 processor
3. Which of the following is a type of microprocessor?
 - a) CISC
 - b) RISC
 - c) EPIC
 - d) All of the mentioned
4. The microprocessor of a computer can operate on any information if it is present in _____ only.
 - a) Program Counter
 - b) Flag
 - c) Main Memory
 - d) Secondary Memory
5. Which of the following technology was used by Intel to design its first 8-bit microprocessor?
 - a) NMOS
 - b) HMOS
 - c) PMOS
 - d) TTL
6. Which of the following addressing method does the instruction, MOV AX,[BX] represent?
 - a) register indirect addressing mode
 - b) direct addressing mode
 - c) register addressing mode
 - d) register relative addressing mode

7. What is the word length of an 8-bit microprocessor?

- a) 8-bits – 64 bits
- b) 4-bits – 32 bits
- c) 8-bits – 16 bits
- d) 8-bits – 32 bits

8. In 8-bit microprocessor, how many opcodes are present?

- a) 246
- b) 278
- c) 250
- d) 256

9. Which of the following is not true about the address bus?

- a) It consists of control PIN 21 to 28
- b) It is a bidirectional bus
- c) It is 16 bits in length
- d) Lower address bus lines ($AD_0 - AD_7$) are called “Line number”

10. Which of the following is true about microprocessors?

- a) It has an internal memory
- b) It has interfacing circuits
- c) It contains ALU, CU, and registers
- d) It uses Harvard architecture

5. c) PMOS

6. a) register indirect addressing mode

7. a) 8-bits – 64 bits

8. a) 246

9. b) It is a bidirectional bus

10. c) It contains ALU, CU, and registers

LOGIC PUZZLES

- K.Muhil,III ECE

1. Parking problems: The probability of finding the parking slot occupied is $1/3$. You find it empty for 9 consecutive days.

Find the probability that it will be empty on the 10th day.

Answer: $1/3$

2. Losing your marbles: Imagine that you have three boxes, one containing two black marbles, one containing two white marbles, and the third, one black marble and one white marble.

The boxes were labeled for their contents - BB, WW, BW - but someone has switched the labels so that every box is now incorrectly labeled. You are allowed to take one marble at a time out of any box, without looking inside, and by this process of sampling, you need to determine the contents of all three

Answers:

- 1. a) A multipurpose PLD that accepts binary data as input
- 2. a) Intel's first x86 processor
- 3. d) All of the mentioned
- 4. c) Main Memory

boxes. What is the smallest number of drawings needed to do this?

Answer: 1

3. The toss of a coin: You toss two coins. If you get heads with the first coin, you stop. If you get tails, you toss it again. The second coin is tossed regardless. What is the ratio of heads to tails?

Answer: 1 to 1

4. Plant your flag: If you have a square room with no roof, and you had four flagpoles you had to plant on the walls so that each flagpole touched two walls, how would you do it?

Answer: Put them in the corners dummy

5. Weighing things up: Given 9 balls, all of which weigh the same except for one, what is the minimum of weighings necessary to find the ball with the different weight?

Answer: 2

Editors Desk

Yoga can support the healing process and help the person experience symptoms with more centeredness and less distress.

- Yoga improves strength, balance and flexibility.
- Yoga helps with back pain relief.
- Yoga can ease arthritis symptoms.
- Yoga benefits heart health.
- Yoga relaxes you, to help you sleep better.

Send your suggestions to:

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- 3.U.Bragathishwari,III ECE
- 4.B.Abimanyu,III ECE

Vision of the Institute

To blossom into a cynosure of technological innovations

Mission of the Institute

To participate in the noble cause of nation building by offering professional education, research and training in engineering and technology especially to the rural based poor Students

Department Vision

To create globally competent engineers in Electronics and Communication Engineering to meet the industrial progress for betterment of the society

Department Mission

1. To create an academic ambience for quality education in the field of Electronics and Communication Engineering
2. To make the best use of modern tools and software for teaching and research activities
3. To promote industry-institution interaction for skill-based learning of students from rural society
4. To inculcate moral and ethical values with a sense of professionalism.

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To enable graduates to pursue research, or have a successful career in academia or industries associated with Electronics and Communication Engineering, or as entrepreneurs.

PEO2: To provide students with strong foundational concepts and also advanced techniques and tools in order to enable them to build solutions or systems of varying complexity.

PEO3: To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods

including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.

2. To apply design principles and best practices for developing quality products for scientific and business applications.

3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.