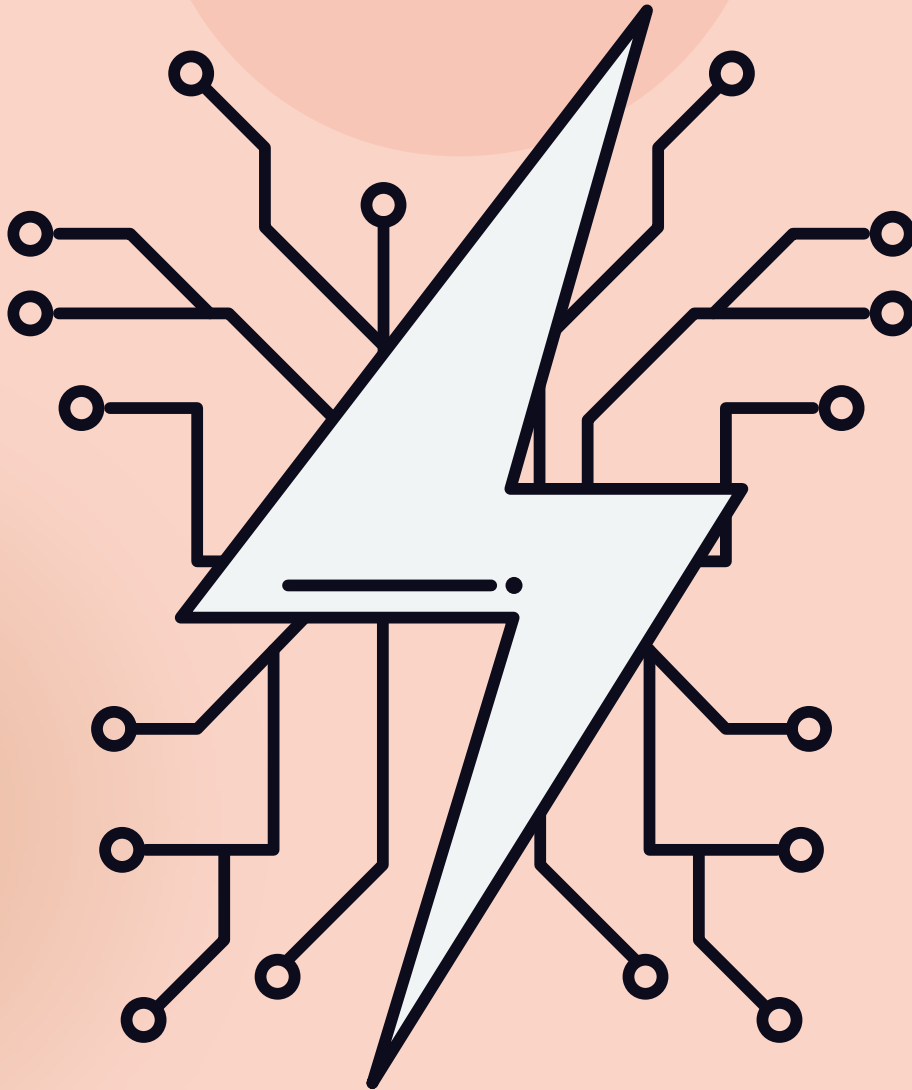# ECE
Techno Digest

Department Of Electronics & Communication Engineering

DR.K.V SUBBA REDDY
INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
NH-44, Kurnool, Andhra Pradesh

TECHNO DIGEST

2021-2022

INSTITUTE VISION

To Be A Global Leader In Imparting Quality Technical Education To Produce Competent, Technically Innovative Engineers Imbibed With Research Aptitude, Entrepreneurship And Social Responsibility.

INSTITUTE MISSION

1. To Nurture The Students With Fundamental Engineering Knowledge Enriched With Technical Skills.

2. To Create Conducive Environment To Nurture Innovation And Interdisciplinary Research.

3. To Develop Professionals Through Innovative Pedagogy Focusing On Individual Growth, Discipline, Integrity, Ethics And Social Responsibility.

4. To Foster Industry-Institution Partnerships Leading To Skill Development And Entrepreneurship.

ECE DEPARTMENT VISION:

To Strive Towards Excellence In Electronics And Communication Engineering Through Teaching, Experimental Learning And Research To Meet Industrial And Societal Needs

.

ECE DEPARTMENT MISSION:

M1: To Provide Appropriate Facilities And Environment For Effective Teaching- Learning Process.

M2: To Create Interdisciplinary Research Ambience To Nurture Innovative And Research Skills.

M3:: To Incorporate Interpersonal Skills, Professional Integrity, Ethics And Societal Responsibility.

M4: To Imbibe Entrepreneurship Skills And Leadership Qualities.

About ECE Department :

The Department Of Electronics And Communication Engineering Has Been Playing A Vital Role In Producing Quality Engineers Ever Since It Was Established In The Year 2007. The Department Runs One Under Graduate Program And Two Post Graduate Programs To Cater To The Ever – Changing Needs Of Technical Excellence In All Areas Of Electronics And Communication Engineering Such As VLSI & Embedded Systems, Telecommunications, Signal Processing Etc. The Intake For Under Graduate Program (B. Tech) Is 120. The Department Also Offers Post Graduation Programs With Specialization In Digital Electronics And Communication Systems (DECS) With An Intake Of 18 And VLSI & Embedded Systems Design With An Intake Of 24.

The Department Headed By The Professors, Associate Professors, Assistant Professors Who Are Experts In Their Respective Disciplines. The Department Has Got Every Facility To Groom The Students As Per The Demands Of The Industries And Mncs. The Department Has Highly Modernized Laboratories With Sophisticated Equipment, Which Improves The Practical Working Competency In The Students And The Confidence.

The Department Aims At Educating And Training Students With Sound Knowledge And Awareness In The Latest Trends In Electronics And Communication Engineering. The Regular Interaction Session With Eminent Professors From Reputed Universities Create Awareness In The Student About The Latest Developments In The Field Of Science And Technology. This Helps Students To Fix Up Their Right Goals For Their Bright Future.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO1: Graduates Of The Program Will Have Strong Fundamental Knowledge In Electronics And Communication Engineering, Analytical, Critical Reasoning And Problem-Solving Skills To Develop Innovative Solutions (Continuing Education).

PEO2: Graduates Of The Program Will Be Professionally Progress In Electronics, Communication, Signal Processing, VLSI, Embedded Systems And Related Areas With An Inclination Towards R&D And Lifelong Learning (Excellence In Career).

PEO3: Graduates Of The Program Will Have Entrepreneurship Skills, Leadership Qualities To Work With Diversified Teams In Multidisciplinary Environment (Leadership And Multi-Disciplinary).

PEO4: Graduates Of The Program Will Be Professionally Deft And Intellectually Adept To Develop Solutions To Complex Engineering Problems With Professional Ethics And Societal Responsibility (Contribution To Society).

PROGRAM SPECIFIC OUT COMES (PSOS)

PSO1: Design Problems Related To Electronics, Communications, Signal Processing, VLSI And Embedded Systems.

PSO2: Analyze And Solve The Complex Communication Engineering Problems In Architecture Design And Computer Networking.

PSO3: An Ability To Use Modern Software Tools To Analyze, Synthesize And Evaluate VLSI And Communication Engineering Systems For Multidisciplinary Tasks.

ACKNOWLEDGEMENT

We Extend Our Sincere Thanks To

Honorable Chairman
Dr.K.V.SUBBA REDDY

Secretary & Correspondent
SMT.S.VIJAYALAKSHMAMMA

Principal
Dr.J.KHANNA KUMAR

HOD
Dr.M.V. SRUTHI

All Our Staff Members For Their Humble
Co- Operation And Involvement In Their Creation Of Bytes,
For The Year   2021-2022

MESSAGE FROM THE CHAIRMAN

It's Been A Real Pleasure To Know That The Department Of ECE Is Hosting Their First Ever National Level Technical Symposium "TECHNO CHRONICAL", AND I' Am Glad To Hear That It Is Being Organized   Wholly For The Students With Guidance Of The Staff Members. Such Combined Effort Is Always Encouraged   And Bring Out Good Results.

The Department Of "Electronics And Communication Engineering" Has Always Conducted Activities Which Helps In Development Of Students Into Leaders, I Hope "TECHNO CHRONICAL"21-22 Is A Huge Success And Adds A New Star In The History Of The Department.

With Regards
Dr. K.V. Subba Reddy ,Founder–Chairman,
Dr.K.V.Subba Reddy Institute Of Technology,
Kurnool-518218,

MESSAGE FROM THE CORRESPONDENT

I Feel Very Proud That The Department Of ECE Is Organizing Nation Level Technical Symposium" TECHNO CHRONICAL"On2021The 21st Century Is Advancing Rapidly By Multipronged Scientific Inventions And Discoveries In That The Electronics And Communication Engineering Is Playing They It All Role In All Scientific Developments. The Has Com That Without Electronics And Communication Engineering Nothing Is Going To Move I This Universe. In This Perspective The Contribution. The Development Of Society By This Departments Vital In All Sphere Of Life. I Heartily Wish The Staff And Students Of The Department In Their Endeavor To Bring In A House Magazine Which Will Otherwise Contribute To The Highest Learning Of This Magnificent Engineering.

With Regards

Secretary &Correspondent
SMT.S.VIJAYALAKSHMAMMA,
Dr. K.V.Subbareddy Institute Of Technology,
Kurnool- 518218

MESSAGE FROM THE PRINCIPAL

Dear Friends, Greetings From DR.KVSRIT, Kurnool. Engineering Is A Human Activity Aimed At Creating New Artifacts, Algorithms, Processes And Systems That Serve Humans. An Engineer Seeks To Create What Never Did Exist. It Is A Privilege In Any One's Career To Embark On Engineering Education. At Dr.K.V, Subba Reddy Institute Of Technology, Our Vision Is "To Be A Global Leader In Imparting Quality Technical Education To Produce Competent, Technically Innovative Engineers Imbibed With Research Aptitude, Entrepreneurship And Social Responsibility. On The Academic Front, We Have Provided The Best Quality Class Rooms, Laboratories, And Library Facilities.

With Regards
Dr.J.Kannakumar,
Principal
Dr.K.V.Subbareddy Institute of Technology,
Kurnool- 518218,

MESSAGE FROM THE HOD

The Department Of Electronics And Communication Engineering Believe In Imparting Excellence In Education By Keeping Our Students In Pace With Industry Demands. The Department Is Equipped With Best Lab Facilities Having Latest Software And Hardware To Provide Industry-Oriented Knowledge To Our Students. The Department Consists Of Highly, Energetic, Dynamic, Well-Experienced, Qualified As Well As Young Faculty Members Who Also Work As Mentors To Turn Students To Professionals By Grooming Their Technical Skills As Well As Their Innovative Capabilities.

With Regards

Dr.M.V. Sruthi,

ECE-HOD

Dr.K.V.Subbareddy Institute Of Technology,

Kurnool- 518218,

ABOUT DRKVSRIT:

Dr. K. V .Subba Reddy Institute Of Technology Is Promoted By Vaibhav Educational Society (VES) With The Motto Of "Work Is Worship". Its Prime Objective Is To Offer Quality Education For The Betterment Of Society. It Persistently Seeks And Adopts Innovative Methods To Improve The Quality Of Higher Education On A Consistent Basis. The Campus Has A Cosmopolitan Atmosphere Of Attracting Students From All Corners Of Andhra Pradesh. Faculty Are Continuously Encouraged To Conduct Research, Pursue Higher Education And Nurture The Students. Our Memoranda Of Understanding With Various Industries Are Our Major Strength. Many Of Our Students, Who Pursue Their Jobs In Various Industries Bring High Quality To Their Work And Add Value And Esteem To Their Organizations. With Steady Steps, We Continue Our March Forward.

HISTORY Of DRKVSRIT

Established In 2007, DRKVSRIT Is Affiliated To Jawaharlal Nehru Technological University (JNTU), Ananthapuramu, And Is Approved By The All India Council For Technical Education (AICTE), New Delhi. The College Is Headed By Its Founder And Chairman, Dr. K. V. Subba Reddy. In Recognition Of His Outstanding Service To India In Offering Quality Education, He Is Conferred With Jewel Of India Award By Indian Solidarity Council On 13th March 2006. He Is Also Conferred Life Time Achievement Gold Medal Award By International Institute Of Education And Management On 13th March 2016. Smt. Vijaya Lakshmamma Is The Secretary And Correspondent. Dr.J.KANNA KUMAR Is The Principal.

TECHNICAL MAGAZINE 2021-22

DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

TABLE OF CONTENTS

1. 45NM TECHNOLOGY FOR DESIGN & ANALYSIS OF LOW POWER 10T SRAM

Mr.S.M.Subahan, Assistant
Professor
Department Of ECE

A New 10T Static Random-Access Memory Cell Having Decoupled 5T Write Port With Single Bit Line And Single Ended Read-Bit Line (RBL) With 5T Read Port For Low Power Operation. The RBL Is Pre-Charged Up To Cell's Supply Voltage, And Is Allowed To Charge And Discharge According To The Stored Data Bit. A Read-Enable (RE) Signal Is Used To Drive Read Port Inverter, Which Connects The RBL To The Virtual Power Rails Through A Transmission Gate During The Read Operation. RBL Remains At VDD Or Increases Toward The VDD Level For A Read-1, And Ground Or Discharges Toward The Ground Level For A Read-0. Read-Enable (RE) Signal Is Kept At Low Level during the Write and the Hold Mode, and Connected To High Level Only During The Read Operation. The 10T Cell In A Commercial 45 Nm Technology Provides 420mv Read Static Noise Margin, And Reduces The Write Power Dissipation By 30.47% And Read Power Dissipation By 23.6% Than That Of 6T.

INTRODUCTION

Requirement Of Fast And Low Power Primary Memory For All Battery-Operated Devices Is Increasing Very Rapidly. So We Need SRAM's which Are Faster and Dissipate Less Power. Hence, Power Dissipation Has Become A First Class Design Constraint, As Static Random Access Memory (SRAM) Is The Most Important Digital Macro And Its Portion On A System-On-Chip (Soc) Is Ever Increasing. Reducing The SRAM Power Dissipation Will Lower The Whole System Power Dissipation And Soc Reliability Will Increase. Supply voltage Reduction Is One Of The Straight Forward Way To Reduce The Power Consumption Because Reducing Supply Voltage Improves Dynamic And Leakage Power Significantly.

Although The Six Transistor (6T) SRAM Cell Is Mostly Used Standard In Industry, It Has Many Limitations Like Poor Read Stability, Read-Static Noise Margin (RSNM) Degradation. In Past Decades, Many Efforts Have Been Taken To Model A Stable SRAM For Low Power Systems. Researchers Have Presented Many Configurations For SRAM And Adopted Different Methods Which Include Negative Bit Line Voltage, Write Back Schemes, Dual Rail Supply Power, Isolating Read Path From Storage Node Whereas They All Have Two Complementary Bit Lines Which Consumes More Power During Switching.

The SRAM Cell Single Ended (SE) 8T, 9T, 10T And Differential 7T, 8T, 9T And 10T Eliminates The Stability Problem By Separating The Storage Nodes From The Bit-Lines Yet Leakage Power Is High. Furthermore, To Reduce Power There Are Many 5T – 10T SRAM Cell shave Been Explored. They Use Single Bit Lines To Reduce Power And To Minimize The Area. A 10T Cell In Uses Virtual Ground Rail For Read Port To Achieve Lower BL Leakage And Differential Used Row-By-Row Dynamic Control Of Cell Supply Voltage And Negative Word Line Voltage For 2 Orders Of Magnitude Reduction In Leakage Currents. We Present Single Bit-Line (BL) 5T For Write Operation And. A 5T Read Port Is Designed To Employ VDD Pre-Charge And Charge Recycling Technique For Low Power Read Operation The Proposed Technique. Read BL (RBL) Is Charged And Discharged Through The Read Port According To Stored Bit. Read Port Is Activated By Read Activate Line (RA) and Virtual Power Rails That Run Horizontal And Are Shared By The Cells Of A Word. So RBL Leakage Is Reduced Due To dynamic Control Of Read Port.

CONVENTIONAL 6T SRAM

In SRAM There Are Three Mode Of Operation I.E. Write, Read, Hold. Basically, Cross-Coupled Inverters With Positive Feedback Are Used To Store Single Bit Data In Complementary Mode. In Conventional 6T SRAM As Shown In Fig. 1, For Write Operation BL Is Charged '1'or Down To '0' Regarding The Data To Be Stored. BLB Is Charged By Inverted Voltage Of The Bit-Line (BL). To Write '1' BL Is Charged To Vdd

And WL Is Made High Such That The Current Passes Through M3 And M4 Transistors And '1' Gets Stored In Node Q Through M3 Andm4 And '0' Stored In The Node QB, Which Makes The Transistors M1 And M6 ON. To Write '0' BL Is Retained At Ground And BLB Id Charged To Vdd So That '0' Is Stored At Q And '1' At QB. During Read Phase BL and BLB Are Pre-Charged To Vdd and Then WL Is Made High Such That the Transistor M3 and M4 Turns ON. For Read '1' BLB Gets Discharged To Ground through the M6 Transistor. BL Is Not Discharged And Remains In Vdd Since The M5 Transistor Is OFF. And It Is Read Through The Sense Amplifiers.
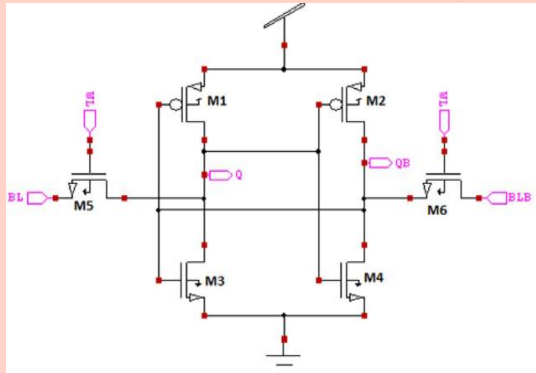

Fig.1. Circuit Diagram Of 6T SRAM

DESIGN OF LOW POWER 10T SRAM

For Read Stability, High SNM And Low Power, We Proposed A New 10T SRAM As Shown In Figure. This New 10T SRAM Has Single Bit-Line (BL), Word Line (WL), Read Port Consists Of An INV P1-N1 Driven By Node Read Access (RA), And A Transmission Gate (TG) P2-N2. The Output (H) Of the INV Is Connected to RBL during the Read Operation through TG, Which Is Controlled By (Read) Control signals. Furthermore, Read Port Is Powered By Virtual Power Rails. Use Of TG Is To Improve The Efficiency Of Read-Operation, As The Single NMOS Could Not Charge Well The RBL Through P1
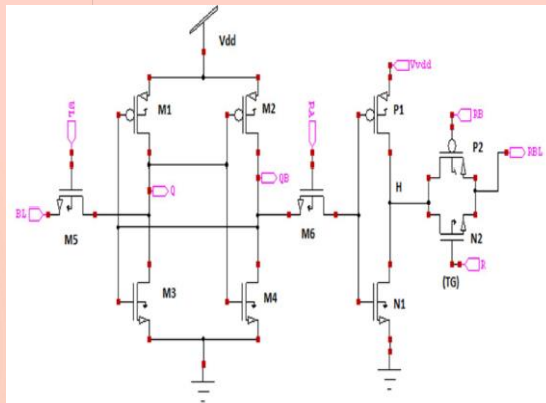

Fig 2. Circuit Diagram Of Proposed 10T SRAM

A. Write Operation

To Write Data In Sram BL Is Charged Correspondingly And Then WL Is Loaded To Vdd. Strong Access Transistor N3 Allows Bit Line To Overpower The Cell, So That Required Data Will Be Written Into The Cell. During Write Operation RA Will Be Kept At Logic '0' I.E.In-Active.

B. Read Operation

In Proposed 10T SRAM, RBL Is Pre-Charged To Vdd. For The Read Operation, RA Is High So That INV P1-N1 Is Driven By QB And R Kept High And RB Low And Thus The TG Is Activated To Connect RBL To The Node H. If QB Is 0, Then N1 Is OFF And P1 Connects Node H To The VVDD, Which Is High For The Read Operation. Thus, The No Current Will Flow From VVDD (Having Value Of Vdd) To RBL (Which Is Pre-Charged To Vdd) Through P1-TG. Hence, The RBL Voltage Remains At Vdd Level. Now, For A Read-0 Operation (I.E., QB=1), P1 Is Turned OFF And N1 Connects Node H To The GND. Thus, The Read Current

Flows From RBL (Having Value Vdd) To The GND Through TG-N1, And Hence RBL Voltage Decreases.

2. DEPLOYING TECHNOLOGY IN SPACE

Mrs. A.N.Naga Jyothi,
Assistant Professor
Department Of ECE

When Selecting And Using Electronic Components In Space They Will Need To Be Reliable And Capable Of Surviving The Harsh Conditions They'll Experience Over An Extended Period Of Time. In Space, Components Need To Be Able To Overcome Vibration Imposed By The Launch Vehicle And Any Further Large Shocks That Could Occur In The Satellite's Body Structure.

Pyrotechnic Shock, For Example, Is The Response Of A Structure To High Frequency, High Magnitude Stress Waves That Can Spread Throughout A Structure As A Result Of An Explosive Charge, Like The Ones Used In A Satellite Ejection Or When The Stages Of A Multistage Rocket Are Separating. This Can Lead To Damaged Circuit Boards, Electrical Components Shorting As Well As A Range Of Other Issues.

Temperature Extremes Are Another Challenge For Designers With Geostationary Orbiting Satellites Facing Much Greater Temperature Variations Than A Satellite In Low Earth Orbit (LEO).

How You Dissipate The Heat Generated By The Electronics Is Crucial As Electronic Devices Can Be Degraded By Sustained High Temperatures. The Vacuum Of Space Is Also A Favorable Environment For Tin Whiskers, So Materials Will Be A Concern As Some Are Responsible For The Spontaneous Growth Of Whiskers That Can Cause Electrical Shorts.

Space Imaging

Teledyne E2v Has Been Responsible For Delivering Three Variants Of Its CCD314 Image Sensors For The Sentinel-5/UVNS Instrument, Which Will Be Launched Onboard Second Generation Metop (Metop-SG) Satellites. "This Is A Collaborative Program Between The European Space Agency, ESA And EUMETSAT, And Comprises Of Three Flight Sets Of Two Low Earth Polar-Orbiting Satellites With Complimentary Payloads, Metopsg-A And Metopsg-B," Explains Paul Jerram, The Company's Chief Engineer In Space Imaging. Space Imaging Is At The Heart Of The Work That Teledyne E2v Carries Out At Its Facility In Chelmsford, Essex. "We Currently Employ 200 People and Supply Devices to All the World's Space Agencies," Says Jerram.

"The Sentinel-5/UVNS Instrumentation Is Focused On The Global Monitoring Of Key Air Quality Trace Gases And Aerosols As A Part Of The Copernicus Program," Explains Jerram. "It Uses Our Custom CCD Image Sensors Which Have Been Optimized For Different Wavelengths, And Have Been Built Around A

Proprietary Enhanced Quantum Efficiency Backside Thinning Process," According To Jerram.

These Image Sensors Include A Graded Anti-Reflective Coating Unique To Teledyne E2v, And Sit At The Heart Of The Sentinel-5/UVNS Instrument, Which Is A High-Resolution Spectrometer Operating In The Ultraviolet To Near-Infrared Range.

"These Ccds Are Essential To The Mission's Goals Of Monitoring Air Quality And Supporting Climate Modeling By Measuring Atmospheric Trace Gases Such As Ozone, Nitrogen Dioxide, Sulphuric Dioxide And Others, On A Daily Basis," Says Jerram, "And Have Been Designed To Provide Unprecedented Accuracy And Resolution.

"Over The Years Teledyne Has Built Up Extensive Experience In The Deployment Of Sensors Into Space," Jerram Explains.

"The Key Challenges Tend To Be Sustainability And Reliability. We've Never Had A Sensor Fail Which Is Critical When You Consider That These Missions Can Cost Billions And There Is No Possibility Of Building In Any Type Of Redundancy."

According To Jerram, "Space Is A Nasty Environment. You Have Vibration On Launch, That Can Be Severe, And When It Comes The Components You Have To Take Into Account The Radiation Levels That They Will Need To Be Able To Work In.

"Testing To Destruction Is A Critical Aspect Of The Design Process."

When It Comes To Radiation The Effects Are Many Folds, According To Jerram.

"Ionizing Radiation Causes An Increase In Leakage Current, So We Need To Look At Keeping Sensors Colder. In The Design Phase You Can Get Round That And It Has Become Less Of An Issue In Modern Electronics.

"With Images Sensors, However, A Key Challenge Is 'Hot Pixels' And That Is Near Impossible To Solve – All You Can Do Is Ensure That They Are Able To Work At Lower Temperatures.

"There Is Also The Issue Of Latch-Up Damage And The Creation Of Parasitic Varistors, Dumping High Levels Of Current Into A Device Very Quickly From High Energy Particles. That Can Only Be Addressed Through Innovative Design Techniques."

Of Concern To Designers Is The Effect Of Radiation Over An Extended Period Of Time.

"Most Semiconductor Manufacturers Use A Modern Standard Process, So We Need To Change The Design.

"When It Comes To Ccds, We Look To Make The Gate Oxide Thinner To Reduce The Impact Of Threshold Shift - That's One Example; Another Issue Is That Ccds Suffer From Charge Transference Degradation, So We Need To Make The Transfer Channels Narrower."

By Making Sensors More Efficient, Gathering Every Photon That's Detected, Means That Missions Can Become More Efficient And The Technology Sent Into Space Smaller And More Economic.

3. SPEECH RECOGNITION

Ms. Zakia Sultana,
Assistant Professor
Department Of ECE

This Paper Deals With The Topic SPEECH RECOGNITION Which Can Make A Revolution In The Years To Come. Speech Recognition Acts As An Interface Between The User And The System. Its Applications Vary To The Extent That It Is A Successful Replacement For Input Devices Like Keyboard, Mouse Etc. This Paper Contains Information About Automatic Speech Recognition Which Decodes Speech Signals To Phones, Which Is The Basic Building Block Of Any Word. Speech Recognition Systems Are Classified As Dependent And Independent Systems. Dependent Systems Recognize The Sound Generated By A Single Speaker Whereas An Independent System Recognizes Sounds Generated By Multiple Speakers.

Speech Recognition Technologies Allow Computers Equipped With A Source Of Sound Input, Such As A Microphone, To Interpret Human Speech, E.G., For Transcription Or As An Alternative Method Of Interacting With A Computer.
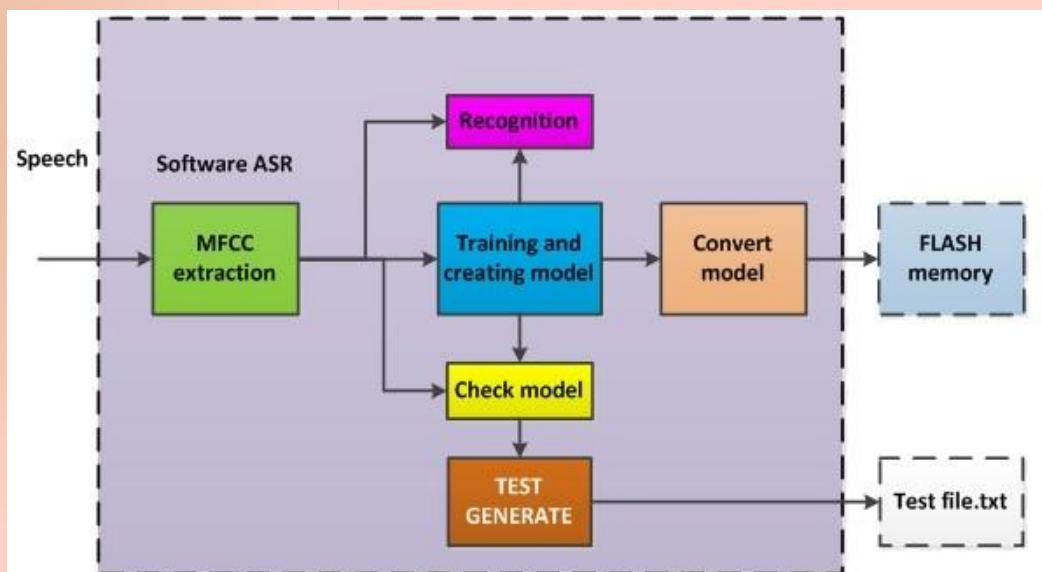
Automatic Speech Recognition

Automatic Speech Recognition Is The Process By Which A Computer Maps An Acoustic Speech Signal To Text. Automatic Speech Understanding Is The Process By Which A Computer Maps An Acoustic Speech Signal To Some Form Of Abstract Meaning Of The Speech.

What Does Speaker Dependent / Adaptive / Independent Mean?

A Speaker Dependent System Is Developed To Operate For A Single Speaker. These Systems Are Usually Easier To Develop, Cheaper To Buy And More Accurate, But Not As Flexible As Speaker Adaptive Or Speaker Independent Systems.

A Speaker Independent System Is Developed To Operate For Any Speaker Of A Particular Type (E.G. American English). These Systems Are The Most Difficult To Develop, Most Expensive And Accuracy Is Lower Than Speaker Dependent Systems. However, They Are More Flexible.

A Speaker Adaptive System Is Developed To Adapt Its Operation To The Characteristics Of New Speakers. It's Difficulty Lies Somewhere Between Speaker Independent And Speaker Dependent Systems.

What Does Small/Medium/Large/Very-Large Vocabulary Mean?

The Size Of Vocabulary Of A Speech Recognition System Affects The Complexity, Processing Requirements And The Accuracy Of The System. Some Applications Only Require A Few Words (E.G. Numbers Only), Others Require Very Large Dictionaries (E.G. Dictation Machines). There Are No Established Definitions, However, Try

• Small Vocabulary - Tens Of Words

• Medium Vocabulary - Hundreds Of Words

• Large Vocabulary - Thousands Of Words

• Very-Large Vocabulary - Tens Of Thousands Of Words

What Does Continuous Speech And Isolated-Word Mean?

An Isolated-Word System Operates On Single Words At A Time - Requiring A Pause Between Saying Each Word. This Is The Simplest Form Of Recognition To Perform Because The End Points Are Easier To Find And The Pronunciation Of A Word Tends Not Affect Others. Thus, Because The Occurrences Of Words Are More Consistent, They Are Easier To Recognize.

A Continuous Speech System Operates On Speech In Which Words Are Connected Together, I.E. Not Separated By Pauses. Continuous Speech Is More Difficult To Handle Because Of A Variety Of Effects. First, It Is Difficult To Find The Start And End Points Of Words. Another Problem Is "Co Articulation". The Production Of Each Phoneme Is Affected By The Production Of Surrounding Phonemes, And Similarly The Start And End Of Words Are Affected By The Preceding And Following Words. The Recognition Of Continuous Speech Is Also Affected By The Rate Of Speech (Fast Speech Tends To Be Harder).

The Process Of Speech Recognition

There Are Several Approaches To Automatic Speech Recognition:

• Acoustic-Phonetic -- This Approach Is Based On The Idea That All Spoken Words Can Be Split Up Into A Finite Group Of Phonetic Units. If All Of These Phonetic Units Can Be Characterized Computationally, One Should Be Able To Figure Out What Phonetic Units Have Been Spoken, And Then Decode Them Into Words.

• Pattern Recognition -- This Approach Uses A Training Algorithm To Teach A Recognizer About The Patterns Present In Specific Words. It Is Similar To The Acoustic-Phonetic Approach, But Rather Than Defining The Patterns Explicitly (As Phonetic Units), Hidden Markov Model (HMM) Based Pattern Recognizer Finds It's Own Set Of Patterns.

• Artificial Intelligence -- This Approach Mixes The Previous Two Approaches By Combining Phonetic, Syntactic, Lexical, And/or Semantic Based Analysis With Pattern Recognition.

Speech Detection

The First Task Is To Identify The Presence Of A Speech Signal. This Task Is Easy If The Signal Is Clear, However Frequently The Signal Contains Background Noise. The Signals Obtained Were In Fact Found To Contain Some Noise. Two Criterions Are Used To Identify The Presence Of A Spoken Word. First, The Total Energy Is Measured, And Second The Number Of Zero Crossings Are Counted. Both Of These Were Found To Be Necessary, As Voiced Sounds Tend To Have A High Total Energy, But A Low Frequency, While Unvoiced Sounds Were Found To Have A High Frequency. Only Background Noise Was Found To Have Both Low Energy And Low Frequency. The Method Was Found To Successfully Detect The Beginning And End Of The Several Words Tested. Note That This Is Not Sufficient For The General Case, As Fluent Speech Tends To Have Pauses, Even In The Middle Of Words (Such As In The Word 'Acquire', Between The 'C' And 'Q'). In Fact, Reliable Speech Detection Is A Difficult Problem, And Is An Important Part Of Speech Recognition.

Blocking

The Second Task Is Blocking. Older Speech Recognition Systems First Attempted To Detect Where the Phones Would Start and Finish, and Then Block the Signal by Placing One Phone in Each Block. However, Phones Can Blend Together In Many Circumstances, And This Method Generally Could Not Reliably Detect.

4. PLASMA ANTENNA TECHNOLOGY

Ms.Y.Amrutha,
Assistant Professor
Department Of ECE

In This Paper, The 'Plasma Antenna Technology' Is Introduced To Solve The Problems Of Radio Antennas. On Hearing The Name 'Plasma Antenna' For The First Time, We May Get A Wrong Impression That It Is Something Entirely Different. But That Is Not The Case. Plasma Antenna Is Just Another Type Of Radio Antenna Which Is Currently Under Development. In This Innovation, Plasma Is Used As A Replacement For The Metal Elements Of The Traditional Antennas. It Performs All The Functions Of The Radio Antennas. That Is It Can Be Used For Transmission And Reception Of Signals.

Plasma Antenna Is A Special Type Of Antenna In Which The Metal Conducting Elements Of A Conventional Antenna Are Replaced By Plasma. It Employs An Ionized Gas Enclosed In A Tube As The Conducting Element Of Antenna. When Gas Is Electrically Charged Or Ionized To Plasma, It Becomes Conductive And Allowing Radio Frequency Signals To Be Transmitted Or Received. When Gas Is Not Ionized The Antenna, Element Ceases To Exit. When Voltage Is Applied To Antenna Electric Field Is Produced Which Causes Current To Flow In Antenna. Due To Current Flow, Magnetic Field Is Produced. It Is More Advantageous Than Other Antenna Due To Ionized Gas. It Has Higher Efficiency And Enhanced Bandwidth.

Plasma Antennas:

On Earth We Live Upon An Island Of "Ordinary" Matter. The Different States Of Matter Generally Found On Earth Are Solid, Liquid, And Gas. Sir William Crookes, An English Physicist Identified A Fourth State Of Matter, Now Called Plasma, In 1879. Plasma Is By Far The Most Common Form Of Matter. Plasma In The Stars And In The Tenuous Space Between Them Makes Up Over 99% Of The Visible Universe And Perhaps Most Of That Which Is Not Visible. Important To ASI's Technology, Plasmas Are Conductive Assemblies Of Charged And Neutral Particles And Fields That Exhibit Collective Effects.

Plasmas Carry Electrical Currents And Generate Magnetic Fields. When The Plasma Antenna Research Laboratory At ANU Investigated The Feasibility Of Plasma Antennas As Low Radar Cross-Section Radiating Elements, Red Centre Established A Network Between DSTO ANU Researchers, CEA Technologies, Cantec Australasia And Neo Lite Neon For Further Development And Future Commercialization Of This Technology .The Plasma Antenna R & D Project Has Proceeded Over The Last Year At The Australian National University In Response To A DSTO (Defence Science And Technology Organization) Contract To Develop A New Antenna Solution That Minimizes Antenna Detectability By Radar.
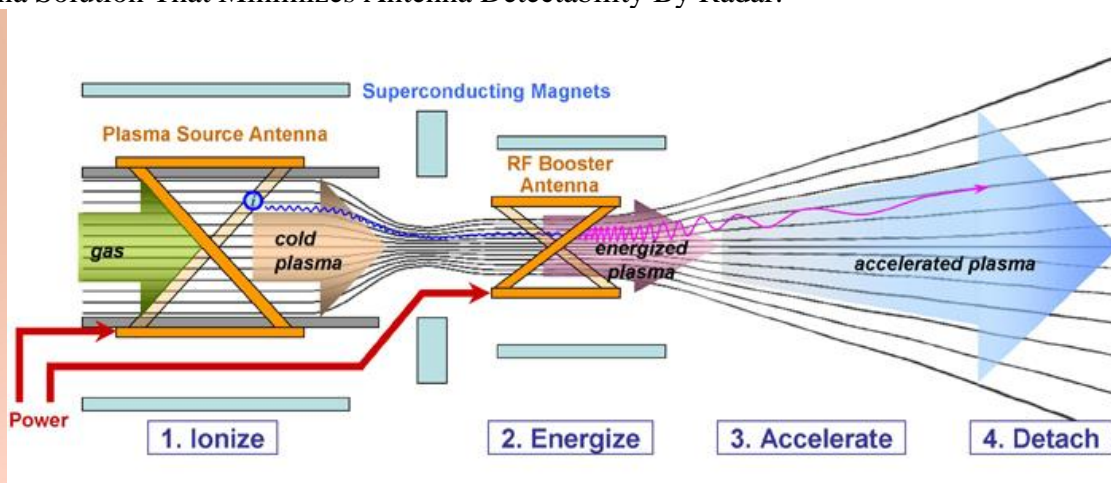
Since Then, An Investigation Of The Wider Technical Issues Of Existing Antenna Systems Has Revealed Areas Where Plasma Antennas Might Be Useful. The Project Attracts The Interest Of The Industrial Groups

Involved In Such Diverse Areas As Fluorescent Lighting, Telecommunications And Radar. Plasma Antennas Have A Number Of Potential Advantages For Antenna Design. When A Plasma Element Is Not Energized, It Is Difficult To Detect By Radar. Even When It Is Energized, It Is Transparent To The Transmissions Above The Plasma Frequency, Which Falls In The Microwave Region. Plasma Elements Can Be Energized And De–Energized In Seconds, Which Prevents Signal Degradation. When A Particular Plasma Element Is Not Energized, Its Radiation Does Not Affect Nearby Elements. HF CDMA Plasma Antennas Will Have Low Probability Of Intercept (LP) And Low Probability Of Detection (LPD) In HF Communications.

PLASMA ANTENNA TECHNOLOGY:

Since The Discovery Of Radio Frequency ("RF") Transmission, Antenna Design Has Been An Integral Part Of Virtually Every Communication And Radar Application. Technology Has Advanced To Provide Unique Antenna Designs For Applications Ranging From General Broadcast Of Radio Frequency Signals For Public Use To Complex Weapon Systems. In Its Most Common Form, An Antenna Represents A Conducting Metal Surface That Is Sized To Emit Radiation At One Or More Selected Frequencies. Antennas Must Be Efficient So The Maximum Amount Of Signal Strength Is Expended In The Propagated Wave And Not Wasted In Antenna Reflection.

Plasma Antenna Technology Employs Ionized Gas Enclosed In A Tube (Or Other Enclosure) As The Conducting Element Of An Antenna. This Is A Fundamental Change From Traditional Antenna Design That Generally Employs Solid Metal Wires As The Conducting Element. Ionized Gas Is An Efficient Conducting Element With A Number Of Important Advantages. Since The Gas Is Ionized Only For The Time Of Transmission Or Reception, "Ringing" And Associated Effects Of Solid Wire Antenna Design Are Eliminated. The Design Allows For Extremely Short Pulses, Important To Many Forms Of Digital Communication And Radars. The Design Further Provides The Opportunity To Construct An Antenna That Can Be Compact And Dynamically Reconfigured For Frequency, Direction, Bandwidth, Gain And Beam Width. Plasma Antenna Technology Will Enable Antennas To Be Designed That Are Efficient, Low In Weight And Smaller In Size Than Traditional Solid Wire Antennas.

5. WEARABLE TECHNOLOGY

K.Devara Nagudu, V.Naveen Kumar

Wearable technologies can be defined as "the technological devices that are worn on a user's body". Wearable technology (WT or wearable computing) encapsulates a plethora of devices worn directly on or loosely attached to a person. Commonly, the latter comprises smart phones, which have become integral to the popularity and functionality of WT. Although there is a debate defining smart phones as WT, their existence has seen the demise and re birth of WT as useful aids to assist daily living. This is primarily due to the rise of third-party applications which have nurtured innovation but at the expense of well-organized app development, leaving the end-user overwhelmed with choices. Indeed, the mobile computing power of smart phones is so influential that they will likely play a key role in ongoing WT innovations such as performing quick, robust and easy bioassays anywhere and at any time.

In short, WT can be subdivided into two categories: (i) primary, those operating independently and functioning as central connectors for other devices and/or information and;(ii) secondary, capturing specific actions or executing a measurement offloading to a primary wearable device for analysis. Additionally, those categories may include smart textiles where the physical properties of the material can measure or react to stimuli from the user or environment. Smart textiles currently lay beyond the scope of normal daily use as the concept of wearing electronic or uncommon tailoring materials interwoven within clothes or directly on the skin remain the vernacular of technological idealists.

TYPESOFWEARABLETECHNOLOGIES

Wearable Health Technologies:

The most important contribution of wearable technologies in the health sector is enabling continuous monitoring of a patient's health status and gathering real-world information about the patient. Thus, the doctors may monitor the heart rate, blood pressure, fever, and other health indicators ubiquitously and times independently while the patients performing their daily routine activities. Wearable technologies can be used for diagnoses and treatments of several diseases. Other applications of wearable technologies in the health sector are Cardiovascular Disease, Rehabilitation, Applications in Parkinson's disease, Functional Assessment after Stroke. However, today the wearable technologies in the health sector are mostly focused on data gathering, monitoring and diagnosis of health problems.

Wearable Textile Technologies:

Integrating the technologies into textile products is a recent concept, which enables the development of wearable electro textiles for sensing / monitoring body functions, delivering communication facilities, data transfer, control of the environment, and many other applications. Especially, the emergence of nano-fibers and nano-coatings provide an unusual characteristics and lead breakthrough changes in the textile industry. One of the most significant applications of wearable technologies in the textile industry is the clothes which can change their colures on demand or based on the biological indicators of the wearer. In order to enhance the popularity and social acceptance of the wearable textile technologies, the designers should take some key attributes into considerations. These attributes are "thermal management, moisture management, mobility, durability, flexibility, and sizing and fit, as well as the psychological areas of cognitive load and attention".

Wearable Consumer Electronics: Wearable consumer electronics can be defined as the electronic devices that are worn on a user's body to catalyze the daily activities. Today, the big electronic companies such as

Google, Apple ,Samsung ,Nike, Qualcomm and Microsoft make strategic investments in wearable consumer electronics.Althoughthereareseveraltypesofwearableconsumerelectronicssuchaswristband,

Head bands, rings etc., the most promising products are smart glasses and watches. Smart watches enables users to make and receive calls, read SMS's, receive instant notifications, take pictures, monitor exercises and heart rate, listen to music. Besides all other wearable devices, when they complete their evolution, smart glasses are expected to lead a paradigm shift in users' everyday life. Today, the most respectable smart glasses are the Google Glass. It is a device that is worn like conventional glasses, and composed of computerized central processing unit, integrated display screen, high-definition camera, microphone, bone conduction sound transducer, and wireless connectivity. Designers should solve several issues such as the battery, heating, comfort, aesthetic and fashion etc.

THEFUTUREOFWEARABLE TECHNOLOGIES

The advances in the development of wearable and remote monitoring devices are growing exponentially. These platforms will provide more accurate measurements of physical status and physiologic parameters in more convenient ways and will soon influence different aspects of health care practices, including prevention (e.g., activity and eating behavior tracking, stress-level monitoring, dehydration warning), diagnosis (e.g., early detection), and disease management (e.g., drug dose monitoring and reminders). In particular, efforts are underway to build the next generation of wearable sensors to detect cancer-related chemical and biomarkers. For example, wearable bandage and micro needle electrochemical sensing platforms have been developed to detect the presence of the tyros in enzyme biomarker on the skin surface and within skin moles for rapid screening of skin melanoma.

Artificial intelligence would also be able to keep refining and optimizing the messages from continuous learning as more data feed in. Although the possibilities of what one could do with the ever-evolving wearable technologies seem to be unlimited, one of the caveats is that we have to rely on the assumption that the devices will be working reliably as intended. Nevertheless, not all wearable devices are regulated in the same way. The majority of consumer-facing wearable products have no published data about their accuracy values. Wearable devices and digital health software are regulated by the U.S. Food and Drug Administration (FDA) if they claim medical use intent. For example, the Apple Watch has featured heart rate measurement since its Series 1 model was released in2016. Because the intended use for the heart rate measurement is for wellness-related purposes (e.g., to estimate workout intensity) rather than for medical purposes, it is not under FDA's regulation. In late 2018, the release of Apple Watch Series 4 marked the first direct-to-consumer product that comes with FDA-approved built-in electrocardiogram functionality. Shortly after, Alphabet announced that its Verily Study Watch had been cleared by the FDA as a medical device that can record, store, transfer, and display electrocardiogram data.

The race to have an FDA stamp on their wearable products signals a high interest from the technology companies entering the health care market, which further speeds up medical device use among regular consumers. Recognizing this rising trend, the FDA is working on updating and refining their plan in guiding and regulating digital health-related products. Wearable devices and digital health software will change the way we practice medicine and perform clinical research. Primary care clinicians and cardiologists have begun seeing patients with self-detected arrhythmia.

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6. BATTERYLESS PHONES

P.Deepa
P.Savya Sree

The smart phones we are using these days are indeed smart; however, are they really that smart as the companies claim? The answer to this question is yes, but aren't those really dumb if discussed in terms of battery life? Yes, they are. Even the companies that sell smart phones at phenomenal rates have the issue of battery's performance. The performance is better as compared to others, but it is still a mystery if discussed in terms of long life. The idea of battery less mart phones was initiated by a group of researchers from "The University of Washington", who invented the phone with a dial pad, and to the next level of astonishment, the phone was designed so that it could harvest energy from "Radio Signals". The phone developed, features a dial pad, a small led light, and will also include an E-ink display.
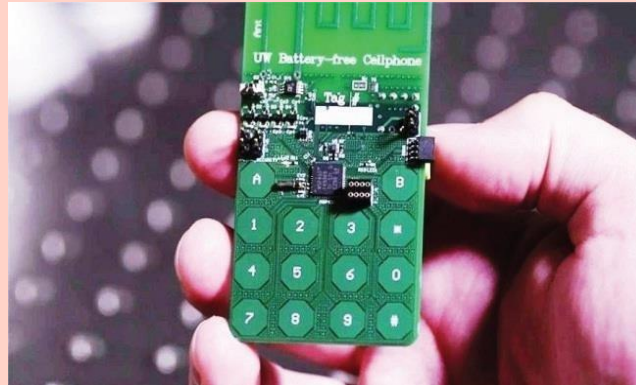
The perspective for battery less phones is to get a solution for draining of the batteries .Lot of discrepanciesaboutthebattery'sperformanceweregoingonaroundtheworld. The issue about the battery's anomalous drain lead to the research of innovative stuff, which furthermore lead to the invention of these Battery Less Mobiles.

The multi task calculating apps can increase your battery's life, but to a very small extent. These apps maintain your phone's battery life by clearing other apps from the background and by suggesting you the precautions about how to use your phones effectively, but battery less phones are way different as the battery doesn't exist and hence, they will be greatly helpful in the future, especially for upcoming generations.

Framework for Battery Free Phones

The prototype invented a few months back, yields energy from ambient sources, and surprisingly those ambient sources are "Radio Signals or Radio Waves", and the device uses a minute photo diode to harvest energy from the ambient light or RF sources. It consumes only 3.5 microwatts of power from these energy sources. The device has a limited range of just 31 feet from the base station and the range can be expanded to 50 feet with the help of a small "Solar Cell".

Procedure for Fetching Energy from Ambient Sources

Harnessing Energy

In order to harness energy from the ambient sources, a base station is required and the base station is placed as per the range specified(31feet-50feet), RF energy can be transmitted in unlicensed bands or grids ranging from 868MHz to 5.4GHz from their respective base stations [7]. It is then, that this RF energy is transfigured into DC power through some energy harnessing devices such as "Power cast's Power harvester Receivers", these receivers also contain criterion or conventional antennas having an average resistance of 40-50 ohms.

How is Power Saved?

If we head back again towards the mobiles and devices of today's generation, the phenomenon behind the battery's hunger for power is the process of converting analog signals into digital data packages that a phone can interpret. This process consumed the highest amount of power in smart phones that we are operating at present; however, that's not the case with battery free cell phones as the battery free prototype takes the dominance of minute vibrations that occur in the phone's microphone and speaker when the user speaks into the microphone or listens to an incoming call. An antenna connected to the shell and speaker components receives the analog radio signals, which are emitted by the cellular base station and then these signals are transmitted back to the cellular base station by the use of a "backscatter" in order to maintain a cycle of transferring digital packages that furthermore helps in retaining signal strength so that the call doesn't hang up in an insufficient manner.

Objective

Design a practical battery less cell phone

Take your cell phone anywhere for any length of time and never worry about recharging it

never allow your cell phone to run out of battery

Never bother with your phone charger

Advantages

Conserves electricity, saves time, no charging issues

Limitations

Limited range, connecting to calls with ear/head phones ,use of solar cell, lacking multiple operational Features

Future Scope& Possible Enhancements

The team of researchers already explained the major pros and cons of the battery free cell phone and demonstrated the model with a hope of making major enhancements in the future. The prototype lacked multiple features and in-fact, the phone was limited to a capacitive dial pad which was made upon a plane mother board with all the crucial parts (photo diodes and solar cell) exposed .Hence, some of the betterments that can be implemented are increasing range, encryption, video streaming and internet access, low power e-ink display.

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7. NATURAL LANGUAGE PROCESSING USING   AI

P.Deepa

Traditionally, Natural Language Processing (NLP) systems have been mostly based on techniques that are inherently explainable. Examples of such approaches, often referred to as white box techniques, include rules, decision trees, hidden Markov models, logistic regressions, and others. Recent years, though, have brought the advent and popularity of black box techniques, such as deep learning models and the use of language embeddings as features. While these methods in many cases substantially advance model quality, they come at the expense of models becoming less interpretable.

Currently, there is a trend of building large AI systems in a distributed, agent-oriented manner. The complex tasks performed e.g. by systems with multimodal user interfaces or by systems tackling the processing of spontaneous speech often require more than one computer in order to run acceptably fast. If pure speed is not the primary motivation, the incorporation of several modules, each of them possibly being realized in a different programming language or even a different programming paradigm, demands complex interfaces between these modules. Furthermore, only modularization makes it possible to develop applications in a truly distributed manner without the need to copy and install versions repeatedly over.

The actual realization of the interfaces should ground on a sound theoretical framework and it should be as independent as possible from the module implementations. Typically, when an interface between two subcomponents of a system is needed, at first very simple means e.g. file interfaces or simple pipes are considered. This does not only lead to a variety of different protocols between components which is natural to a certain degree, due to the different tasks performed by the components and the purpose of the interface data but also to a number of different implementation strategies for interfaces. The Into arc Communication Environment, ICE an implementation of a channel-oriented, multi-architecture, multi-language communication module for large Al-systems, which is particularly useful for systems integrating speech and language processing. A channel-oriented model for interaction relations between software modules seemed to be the most suitable system for our needs. We adopted the CSP-approach and its actual realization in the transporter hardware. This core functional model was slightly modified to satisfy the needs emerging from experiences with actual systems.

Verb Mobile and applications

Verb Mobil, the primary application for which ICE was built, aims at developing an automatic interpreting device for a special type of negotiation between business people. The dialogue situation is as follows: Two businesspersons, speaking different languages, are involved in a face-to-face dialogue trying to schedule an appointment. They both have at least; some knowledge of English and use English as a common language. In case one of the dialogue partners runs into problems, he or she activates the interpretation system by pressing a button and switches back to his or her mother tongue. The system interprets the respective utterances into English. Therefore, it interprets the dialogue on demand in certain situations.

The Verb Mobil system consists of a large number of components, each of them designed to cope with specific aspects of the interpretation process. Among them are a recorder for speech signals, a HMM-based word recognizer, and modules for prosodic, syntactic and semantic analysis, dialogue processing, semantic evaluation as well as components for both German and English synthesis. There are several interfaces between the individual parts of the application which are used to forward results or to realize question-answering behavior. The interchanged data between components is very heterogeneous with regard to both type and quantity: Speech information as it is sent from the recorder to the speech recognizer consists of a stream of short integer values which Maya mount to several megabytes. The objects exchanged

Between semantics construction and transfer are relatively small, but highly structured: Semantic representations with several embedded layers.

ICE Design Structure

The Interco Communication Environment ICE is a software environment for the development of distributed AI-systems. It is designed to give a flexible and efficient communication means that is oriented at an abstract model suitable for such purposes. It uses publicly available communication software (PVM) that is widely used and realizes interface for several programming languages used in AI.

The global architecture of a system designed and constructed using ICE is shown in fig.1. A system consists of several components which may be written in any programming language. Each component gets a unique name and may communicate with all other components of the system. A special component (ILS,Intarc License Server) acts as a "conference" which introduces new components to the system and handles informational requests. After having attached to the ILS, components communicate with one another using channels.

Of the most common available communication methods, namely shared memory, Remote procedure calls and Message passing we assume the last one to be the most appropriate for distributed AI-systems. One doesn't run into memory contention problems when working with many components on the same shared memory segment and doesn't get access right problems. Remote procedures work synchronously and eventually produce waiting periods. Message passing on the other hand lends itself easily to a task-oriented system that asynchronously issues requests and answers requests from other components.
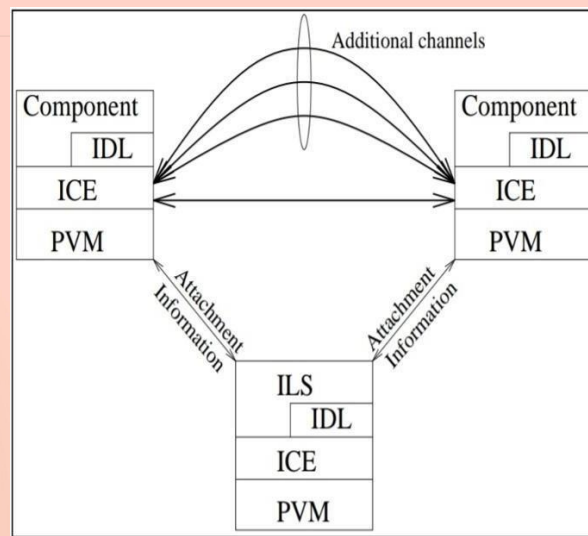
The overall structure of an ICE-system

The interior structure of a component is layered as far as the communication parts of the software are concerned. The low-level communication routines are provided by PVM (see above). Next, a software layer defines the functions of ICE. This is comprised of the basic functionality of ICE itself and a set of interface functions for different programming languages.

Component structure

At the moment ICE supports six languages with different dialects

- C
- C++
- Allergo common Lisp

- CLSIP
- LUCID Common Lisp
- Sicstus Prolog
- Quintus Prolog
- Tcl/Tk

These software layers suffice to communicate basic data types like numbers and strings. Additionally, a separate layer (IDL) is present to allow the exchange of more complex data types. One may specify routines to encode and decode user-defined data types which can then be transmitted just as the predefined scalar types. At the moment, this schema is used for a few dedicated data structures, e.g. for speech data or arbitrary prolog terms, which may be even cyclic.

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8. VISIBLE LIGHT COMMUNICATION

S.Shamshad

A data Communications variant which uses visible light between400 and 800THZ (780–375nm). VLC is a subset of optical wireless communication technologies. The technology uses fluorescent lamps (ordinary lamps, not special communications devices) to transmit signals at 10 Kbits/s, or LEDs for up to 500 Mbit/s over short distances. Systems such as RONJA can transmit at full Ethernet speed (10 Mbit/s) over distances of 1–2 kilometers (0.6–1.2 miles).

The history of visible light communications (VLC) dates back to the 1880s in Washington, D.C. when the Scottish-born scientist Alexander Graham Bell invented the Photo phone, which transmitted speech on modulated sunlight over several hundred meters. This pre-dates the transmission of speech by radio. In December 2010 St. Cloud, Minnesota, signed a contract with LVX Minnesota and became the first tocommerciallydeploythistechnology.TheVLCstandardizationprocessisconductedwithintheIEEE 802.15.7group.
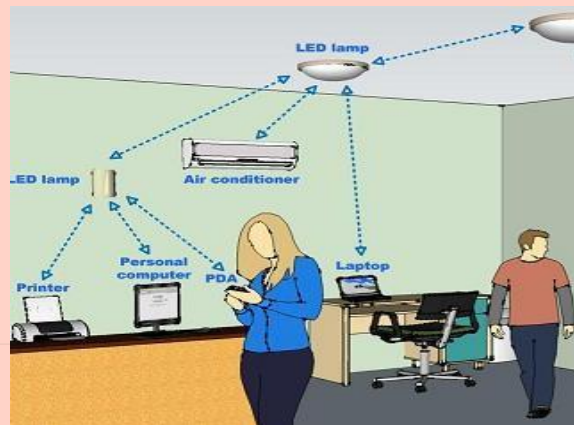
In order to send data, a modulation of light is required. A modulation is the form in which the light signal varies in order to represent different symbols. In order for the data to be decoded. Unlike radio transmission, a VLC modulation requires the light signal to be modulated around a positive dc value, responsible for the lighting aspect of the lamp. The modulation will thus be an alternating signal around the positive dc level, with a high-enough frequency to be imperceptible to the human eye. Due to this superposition of signals, implementation of VLC transmitter usually require a high-efficiency, higher-power, slower response DC converter responsible for the LED bias that will provide lighting, alongside a lower-efficiency, lower-power, but higher response velocity amplifier in order to synthesize the required ac current modulation.

There are several modulation techniques available, forming three main groups:] Single-Carrier Modulated Transmission (SCMT), Multi-Carrier Modulated Transmission (MCMT) and Pulse-Based Transmission (PBT).

The Single-Carrier Modulated Transmission comprises modulation techniques established for traditional forms of transmission, such as radio. A sinusoidal wave is added to the lighting dc level, allowing digital information to be coded in the characteristics of the wave. By keying between two or several different values of a given characteristic, symbols attributed to each value are transmitted on the light link. Possible techniques are Amplitude Switch Keying (ASK), Phase Switch Keying (PSK) and Frequency Switch Keying (FSK). Out of these three, FSK is capable of larger bit rate transmission once it allows more symbols to be easily differentiated on frequency switching. An additional technique called Quadrature Amplitude Modulation (QAM) has also been proposed, where both amplitude and phase of the sinusoidal

Multi-Carrier modulated Transmission works on the same way of Single-Carrier Modulated Transmission methods, but embed two or more sinusoidal waves modulated for data transmission. This type of modulation is among the hardest and more complex to synthesize and decode. However, it presents the advantage of excelling in multipath transmission, where the receptor is not in direct view of the transmitter and therefore makes the transmission depend on reflection of the light in other barriers.

Pulse-Based transmission encompasses modulation techniques in which the data is encoded not on a sinusoidal wave, but on a pulsed wave. Unlike sinusoidal alternating signals, in which the periodic average will always be null, pulsed waves based on high-low states will present inherit average values. This brings two main advantages for the Pulse-Based Transmission modulations:

- It can be implemented with a single high-power, high-efficiency, dc converter of slow response and an additional power switch operating in fast speeds to deliver current to the LED at determined instants.
- Once the average value depends on the pulse width of the data signal, the same switch that operates the data transmission can provide dimming control, greatly simplifying the dc converter.

Due to these important implementation advantages, these dimming-capable modulations have been standardized in IEEE 802.15.7, in which are described three modulation techniques: On-Off Keying (OOK), Variable Pulse Position Modulation (VPPM) and Color Shift Keying (CSK).

On the On-Off Keying technique, the LED is switched on and off repeatedly, and the symbols are differentiated by the pulse width, with a wider pulse representing the logical high '1', while narrower pulses representing logical low '0'.

Variable Pulse Position also switches the LED on and off repeatedly, but encode the symbols on the pulse position inside the data period. Whenever the pulse is located at the immediate beginning of the data period, the transmitted symbol is standardized as logical low '0', with logical high '1' being composed of pulses that end with the data period.

Color shift keying (CSK), outlined in IEEE 802.15.7, is an intensity modulation-based modulation scheme for VLC. CSK is intensity-based, as the modulated signal takes on an instantaneous color equal to the physical sum of three (red/green/blue) LED instantaneous intensities. This modulated signal jumps instantaneously, from symbol to symbol, across different visible colors; hence, CSK can be construed as a form of frequency shifting.

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9. DETECTION OF LUNG CANCER ON CHEST CT IMAGES USING CONVOLUTION AL NEURAL NETWORKS

P.N.Bhavani, K.Saketh Ram, P.Sathvika

Cancer is a disease in which some of the body's cells grow hysterically and spread to other parts of the body. It is a noteworthy general health issue worldwide with increasing mortality rates. For the year 2020, the expected incidence of cancer patients in India was 679,421 (94.1 per 100,000) for men and 712,758 (103.6 per 100,000) for females. One in 68 males (lung cancer), 1 in 29 females (breast cancer), and 1 in 9 Indians will suffer from cancer throughout their life. The predicted 5 most common cancers in 2020 for males (lung, mouth, prostate, tongue and stomach) comprises 36% of all cancers and for females (breast, cervix uteri, ovary, corpus uteri and lung) comprises53%ofallcancers. In the study conducted in 2018, it is anticipated that 18.1 million cancer cases will be added to the available cancer cases in the world and around 9.6 million cancer cases will result in death.

There are over 100 diverse cancers that affect humans. Lung cancer is the most common type of cancer in the world with a rate of 13%. The survival rate of lung cancer patients combining all stages is roughly 14% with a time span of about 5-6 years. The main problem with lung cancer is that most of these cancer cases are diagnosed in later stages of cancer making treatments more problematic and significantly reducing the survival chances. As a result, early and precise lung cancer diagnosis is critical. Lung cancer diagnosis can be done by using various imaging modalities such as Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), Computed Tomography (CT) and Chest X-rays. CT scan images are chosen over other imaging modalities because they are more reliable, have better quality and have less distortion. The diagnosis process can be supported by utilizing existing technological means and deep learning is one of the common models preferred recently, so as to reduce the cost and diagnosis effort significantly.

Datasets:

The term dataset refers to a file with one or more records in it. A dataset is a named group of records. Datasets can hold information such as medical records or insurance records, to be used by a program running on the system. Usually, a dataset is divided into three types:

Training set: In dataset, a training set is implemented to build up a model. We can extract features and train to fit a model.

Validation set: We can divide the training set into a train set and validation set. Based on the validation test results, the model can be trained which helps to get the most optimized model.

Testing set: Testing data issued to test the trained model.

Python:

Like many fields of engineering, electronics and communication engineering also involves data science applications. However, python is quite popular programming language in data science. Python is extensively used in various applications such as Signal processing, image processing, control system engineering, embedded systems, data visualization, automation, IoT etc.

Image Augmentation Techniques:

The various data augmentation techniques can increase the classification accuracy for CNN and Convolution machine learning algorithms. The Kara's package in Python is used to implement picture augmentation techniques.

Original image
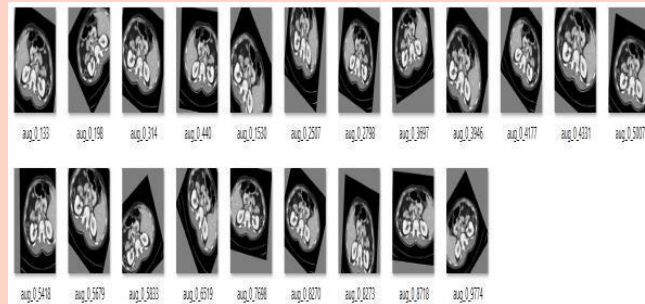
New images obtained from original image using augmentation techniques

Convolution Neural Network(CNN):

Many tasks involving intelligence and pattern recognition are performed very easily by humans but are extremely difficult to automate. For instance, we recognize various objects and make sense out of the large amount of visual information in our surroundings, requiring very little effort. This task is performed by our neural network. The neural network is part of the nervous system containing a large number of interconnected neurons. A Convolution neural network (CNN) is a neural network with one or more Convolution layers that is mostly used for image processing, classification, segmentation and also for other auto correlated data. There are various architectures of CNNs available which are essential in building algorithms. They are Le Net, Alex Net, VGG – 16, Google Net, Res Net and ZF Net. In this study, Lent, Alex Net and VGG – 16 are used.
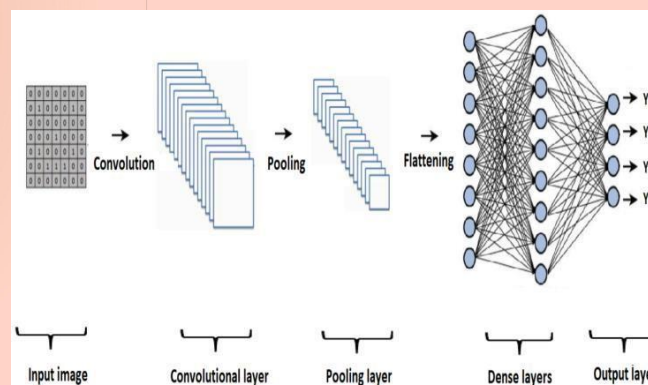
Convolution AL Neural Network Model

Optimization Techniques:

One of the main reasons for using optimization methods is to update the weights at every single stage until the best learning in CNN architecture is realized. The optimization methods used in deep learning are: Gradient Descent, ADAM method, Stochastic Gradient Descent (SGD), RMS prop and AdaGrad.

Machine Learning Methods:

Machine learning is a method that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, recognize patterns and make decisions with minimal human intervention. The algorithms that can be applied to data problems are: Linear Regression, Logistic Regression, Linear Discriminate Analysis, Decision Tree, SVM, Naive Bays, kNN, K-Means, Random Forest, Dimensionality Reduction Algorithms, Gradient Boosting algorithms.

Feature Selection:

The process of picking a subset of relevant characteristics for use in model creation is known as feature selection, also known as variable selection, attribute selection or variable subset selection. Feature selection is used before modeling the data because it reduces over fitting, improves accuracy, reduces training time. In this study, the extraction of features is performed by using Minimum Redundancy and Maximum Relevance (mRMR) algorithm and Principal Component Analysis (PCA).

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10. ANALYSING PROBABLE SOLUTION SONIMPACT OF 5G COMMUNICATION REGARDING HUMAN HEALTH

U.Upendra,K.Sai keerthi,B.Rathnakar

In telecommunications, 5G is the forthcoming revolution of mobile technology. It is a new global wireless technology after 1G, 2G, 3G, and 4G networks. Like its previous technologies (1G, 2G, 3G, and 4G networks), 5G networks are cellular networks, during which the area is split into small hexagonal areas called cells. All 5G wireless devices in a cell are connected to the web and telephone network by radio waves through an antenna within that cell.

The main advantage of the 5Gnetworksisthatthey're going to have larger bandwidth, giving higher uploading and downloading speeds up to 10gigabitsper second(Gbit/s). It's expected that the networks will increasingly be used as general internet service contributors for desktop computers and laptops. 4G mobile phones aren't capable of new networks, which require 5G enabled hardware wireless devices.

The increased speed is achieved partially because of using additional higher-frequency radio waves than the low and medium band frequencies used in previous cellular networks. However, higher-frequency radio waves have a shortest physical range, which requires smaller geographic cells. A5G network is going to be up to three differing types of cells, each requiring specific antenna designs and also giving higher uploading and downloading speeds up to 10 gigabits per second.

Low-band 5G uses a same frequency range as 4G technology, 600–850 MHz, giving download speeds a little higher than 4G networks 30–250 megabits per second. Low- band cell towers have a range and coverage area as same as 4G towers. Mid-band 5G uses microwaves 5–3.7 GHz, allowing speeds of 100–900 Mbit/s, with each cell tower providing service up to many kilometers in radius.

This level of technology is most generally developed, and was installed in many metropolitan areas in 2020. High-Band 5G uses frequency range of 25–39 GHz, although higher frequencies could also be utilized in the longer term. However, millimeter waves (mmWave) have verylimitedrange, requiring many small cells and they are blocked by materials in walls or windows.

The advancing in 5G wireless communication is leading for the further developing of human life ,but in the context of environment and human health we are not focusing the hazard effects of wireless communication. To meet our future requirements, we now started research on a new generation 5G which can be of great use to enable fast connectivity between the devices, vehicles, robots, sensors, drones, etc .But on the other side there are many challenges to be solved like it can affect human health, temperatures, plants and animals. So, we should try to come with some handy solutions which help in preventing some damages of 5G at least to some extent.

Performanceof5G:

Speed: The wave length of 5G waves is in millimeter range. So, it's also known as mm Waves. Its speed ranges from50 Mbits/s to gigabits/s. The Sub-6 GHz 5G or mid-band 5G, will usually have range between 100 and 400 Mbit/s, but this has a farther reach than mm Wave, especially outdoors.

Low-band spectrum delivers the greatest range, thereby having a best coverage area for a given site, but its slower than the others.5G speeds in the less common millimeter wave spectrum, it has much more profuse bandwidth and shorter range, so, there will be greater frequency reusability, can be significantly higher.

Error Rate: Adaptive signal coding system is used in 5G to keep the bit error rate low. The transmitter will switch to a less error prone coding mechanism if the error rate is too high. So, to ensure a low error rate it sacrifices bandwidth.

Range: The range of 5G depends on multiple factors. A key factor is the frequency being used in 5G. The millimeter Wave signals have a range of couple of hundred meters, but in the right circumstances we have theoretical range up to couple of hundreds of kilometers.

Methods:

In this telecommunication era we cannot stop using of smart devices which run on internet or cannot prevent the usage of cell phones as we all are hooked and crooked to them and in these extra ordinary situations past 2 years, we are still more dependent on smart devices. So it is necessary situation to think about methods by which we can reduce the impact of radiofrequency radiation caused due to cellular networks and internet services.

So, one method to reduce the impacts of RF radiation is to block some unwanted amount of RF waves that are transmitting from cellular to wersi.e. for example when a person in near to a cell phone tower he is prone to more radiation so to protect them we can use methods such as

- Faraday Cage
- Lead Shielding

Faraday Cage:

A Faraday cage is an enclosed space used to block electromagnetic fields. A Faraday shield may be formed by a incessant covering of conductive material, or in the case of a Faraday cage, by a network of such materials. Faraday cages are named after scientist Michael Faraday.

Faraday Cage

A Faraday cage operates based on exterior electrical field which causes the electric charges within the cage's conducting material to be distributed so that they cancel the field's effect in the cage's interior this occurrence is used to protect susceptible electronic equipment from external radio frequency interference (RFI) often during taxing or arrangement of the device.

They are also used to defend people and equipment against actual electric currents such as lightning strikes and electrostatic discharges, since the inserting cage conducts current around the exterior of the enclosed space and none passes through the interior.

Faraday cage protect the interior from outer electromagnetic radiation if the conductor is thick enough and holes are notably smaller than the wavelength of the radiation. They provide less attenuation of outgoing transmissions than incoming: they can block Electromagnetic pulse waves from natural phenomena very effectively, but a tracking device, especially in upper frequencies, may be able to penetrate fromwithin the cage for example some devices operate at various radio frequencies so while one frequency may not work, another one will.

The response or transmission of radio waves, a form of electromagnetic radiation, to or from a transmitter within a Faraday cage is heavily attenuated or blocked by the cage; on the other hand, a Faraday cage has mixed attenuation depending on wave form, frequency, or distance from receiver/transmitter, and receiver/transmitter power. Near-field, high-powered frequency transmissions like high frequency radio frequency identification signals are more likely to penetrate. Solid cages generally attenuate fields over a broader range of frequencies than mesh cages.

LeadShielding:

In lead shielding we use lead as a radiation guard to shield individuals or objects from radiation so as to reduce the effective impact. Lead can effectively attenuate certain kinds of radiation because of its high density and high atomic number.

Lead brick type structures for radiation protection

Lead's high density is based by the blend of its high atomic mass and the relatively small size of its bond length and atomic radius. The high atomic mass means that many electrons are needed to maintain a neutral charge and the small bond length and a small atomic radius means that many atoms can be packed into a particular lead structure. Because of lead's density and large number of electrons, it is well suited to scattering radiation. Eventually though, the lead will degrade from the energy to which it is exposed. However, lead is not effective against all types of radiation.

Electroplating:

Electroplating is the procedure of coating a metal with a thin coating of another metal by electrolysis to improve the metal's corrosion resistance. Electroplating is also known as electrode position and electroplated coating. Electroplating prevents oxidation of a substance, improves wear resistance and improves corrosive resistance.

The main purpose of electroplating is to improve:

- Appearance
- Protection against corrosion
- Special surface properties
- Engineering or mechanical properties

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