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NARAYANA ENGINEERING COLLEGE
GUDUR, AP

Department of
Electronics and Communication Engineering

TECHCOM

Technical Magazine

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Vision of the Institute

To be one among the premier institutions of the country for professional Education in producing technocrats with Competent skills, Innovative ideas and Ethics strong to serve the nation.

Mission of the Institute

- To provide an environment most conducive to learning with state of the art infrastructure, well equipped Laboratories and research facilities to impart high quality technical education.
- To emphasize on innovative ideas and creative thinking and prepare them to meet the growing challenges of the industry.
- To inculcate the leadership qualities, multi-disciplinary approach, ethics and lifelong learning in graduates to serve the diverse societal needs of our nation.

Vision of the Department

To produce technically competent Electronics & Communication Engineers with a motive to meet the needs of the industry and evolving society through advanced research, professional ethics and lifelong learning.

Mission of the Department

- To enrich the technical skills of the students through effective teaching-learning practices, continuous assessment methods and eminent faculty.
- To continuously enhance creative thinking, research ability and innovative skills of students through training on core and multidisciplinary technologies and skill enhancement programs.
- To inculcate leadership qualities, ethics, social responsibility and gratitude through outreach programs.

Program Educational Objectives (PEOs)

PEO-1: Attain the global and local opportunities and reach greater heights in their chosen profession by demonstrating technical expertise.

PEO-2: Gain recognition by exhibiting problem solving expertise for addressing significant problems of industry and society.

PEO-3: Become good leaders with ethics and support, contribute and encourage diversity and inclusiveness in their workplace and society.

Program Outcomes (POs)

PO-1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-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.

PO-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.

PO-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.

PO-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.

PO-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.

PO-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.

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

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

PO-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.

PO-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 multi disciplinary environments.

PO-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.

Program Specific Outcomes (PSOs)

PSO-1: Responsive to ideas: Apply the knowledge on core Electronics and Communication Engineering in order to develop skills to analyze, design and develop innovative solutions for the real world problems.

PSO-2: Domain Expertise: To develop interpersonal skills to demonstrate proficiency using the latest hardware and software solutions by maintaining professional and societal responsibilities.

Professor Desk

It is a pleasure to Head the Department of Electronics and Communication Engineering at Gudur. The department offers B.Tech. The department has a team of highly experienced and motivated faculty members. All the Faculty members are well qualified and competitive enough in preparing the young minds (our students) for global competition. Students of ECE department are highly motivated and ready for IT Industry with hands on experience on current technologies. Students achieve University top positions and are working with Top level companies like Capgemini, Accenture, TCS, HCL, Infosys, Wipro, Cognizant, etc.

Students are facilitated with Personality Development Program (PDP Classes), Communication Classes for better placements. Competitive exams, quizzes and other co-curricular activities are the part of schedule. Sports, Co-curricular and extracurricular activities take place at Institute level and students participate in various Intra-College, Inter-College, our students have their own Bagged group and won many prizes in different competitions.

Department works for overall growth of students and inculcate the qualities/features that are required and acceptable by Society. Faculty/Students take initiative for social causes at individual level and as a team under different Banners/Clubs of the Institute. Turning a student in to a good citizen is the prime aim of ECE department.

ULTRAVIOLET DISINFECTION ROBOTS TO IMPROVE HOSPITAL CLEANING

The global COVID-19 pandemic due to the novel coronavirus SARS-CoV-2 has challenged the availability of tradi- tional surface disinfectants.

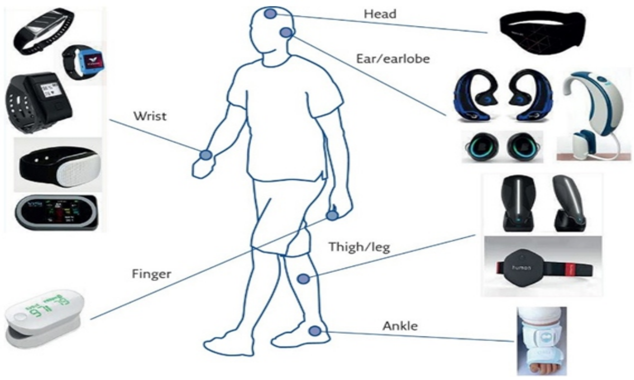
It has also stimulated the production of ultraviolet-disinfection robots by companies and institutions. These robots are increasingly advocated as a simple solution for the immediate disinfection of rooms and spaces of all surfaces in one process and as such they seem attractive to hospital management, also because of automation and apparent cost savings by reducing cleaning staf. Yet, there true potential in the hospital setting needs to be carefully evaluated. Presently, disinfection robots do not replace routine (manual) cleaning but may complement it. Further design adjustments of hospitals and devices are needed to overcome the issue of shadowing and free the movement of robots in the hospital environment. They might in the future provide validated, reproducible and documented disinfection processes. Further technical developments and clinical trials in a variety of hospitals are warranted to overcome the current limitations and to fnd ways to integrate this novel technology in to the hospitals of to-day and the future.

Robots may be defined as machines programmed by humans to perform tasks and navigate themselves through space and time on their own. The most widely applied technology focusses on surface disinfection by applying ultraviolet (UV)-C radiation. All types of Disinfection robots ofer a non-touch technology, delivering disinfection by irradiation of efective intensity to kill microorganisms, but with no mechanical removal of dirt or biological material, which contain bacteria and viruses. Ultra violet light at a wavelength of 254 nm (UV-C) is bactericidal, sporicidal, fungicidal and virucidal. Shadowing with UV-C light, where some surfaces are not exposed due to obstruction or inaccessibility, is a known limitation of this type of technology. Shadowing and distance significantly reduce UV-C intensity and thus limit an efficient disinfection process. The current literature indicates that UV-C disinfection systems can deficiently reduce microbial contamination in vitro settings.

In practice, this has also been shown for ambulances, for patient rooms and for bacterial contamination in operating rooms. Efficacy is a function of the initial inoculum, soiling, applied energy and time of exposure. These vary depending upon the microorganism and in case of bacteria, whether it is in a vegetative state or spore . Most importantly, UV disinfection systems must be validated for each room or setting before use, and be supervised after initial deployment. Defining the exact UV-C device positions for clinical settings is critical to ensure the proper functioning of a UV-C device to achieve the anticipated disinfection efficacy.

DESIREDDY SUSRITHA REDDY
17F11A0416

WEARABLE DEVICES FOR PHYSICAL ACTIVITY AND HEALTHCARE MONITORING IN ELDERLY PEOPLE

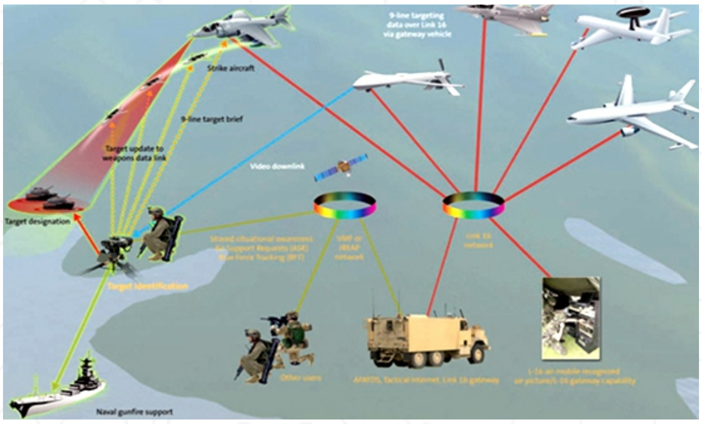


The availability of wearable devices (WDs) to collect biometric information and their use during activities of daily living is significantly increasing in the general population. These small electronic devices, which record fitness and health-related outcomes, have been broadly utilized in industries such as medicine, healthcare, and fitness. Since they are simple to use and progressively cheaper, they have also been used for numerous research purposes. However, despite their increasing popularity, most of these WDs do not accurately measure the proclaimed outcomes. In fact, research is equivocal about whether they are valid and reliable methods to specifically evaluate physical activity and health-related outcomes in older adults, since they are mostly designed and produced considering younger subjects' physical and mental characteristics. Additionally, their constant evolution through continuous upgrades and redesigned versions, suggests the need for constant up-to-date reviews and research. Accordingly, this article aims to scrutinize the state-of-the-art scientific evidence about the usefulness of WDs, specifically on older adults, to monitor physical activity and health-related outcomes. Worldwide, population aged over 64 years is growing quicker than all other age groups. According to the 2019 revision of the world population prospects, elderly people will represent 16% of the world population by 2050. Assuring quality of life during the aging process will be one of the most significant social challenges of the twenty-first century, and it includes providing a good healthcare and warranting that elders maintain their capacity to independently perform activities of daily living for the longest period possible, i.e., the so-called active aging process. The use of wearable devices (WDs) and technology to evaluate and monitor physical activity and health-related outcomes in order to maintain overall health, preserve motor control, cardiovascular, metabolic and cognitive performance throughout the aging process will certainly be advantageous .Particularly, the use of WDs—essentially composed by a sensor that generates an electrical signal, when reacting to a physical phenomenon, coupled to a transducer (an electronic circuit) that analyzes and transmits it—integrated in accessories, garments, or clothes, allow permanent and pervasive evaluation of physical activity and health-related outcomes . Nevertheless, despite WDs' massive availability and constant evolution, their actual utility to measure these outcomes and extensive use by the elderly population continues to be limited. The rising concern to provide quality of life for elderly people, the high prevalence of chronic diseases in this population, and the heterogeneity related to their health conditions make it urgent to investigate and disseminate the use of valid and reliable WDs, which are adequate to assist elders and researchers during active aging. Accordingly, accurate monitoring of physical activity is an important aspect to precisely assess if elders are accumulating the appropriate amount of sedentary behavior and/or physical activity required to meet the evidence-based public health recommendations, which are needed to mitigate health risks and attain significant health-related benefits. Moreover, together with the substantial increase in life expectancy, the elderly population has a high prevalence of chronic diseases, particularly cardiovascular diseases and diabetes, which can be mitigated by adopting a healthy lifestyle that includes no smoking, reduced alcohol intake, healthy body composition, good nutrition, and daily moderate to vigorous physical activity . The use of WDs to help control and attain this healthy lifestyle will certainly be beneficial for all.

Lastly, despite the aging process per se, genetic predisposition and other non-modifiable factors are strongly related to lower cognitive performance and dementia onset in elders, increasing evidence shows that modifiable risk factors such as physical activity, social interaction, and cognitive tasks or activities can prevent or delay dementia. Since cognitive performance is associated with the ability to perform activities of daily living independently, accurate monitoring of tasks that enhance cognitive function could be a key factor in preserving independence, hence preventing or at least postponing the need for institutionalization.

CHEJARLA SIRISHA RANI
18F11A0418

Tactical Targeting Network Technology



Also commonly referred to as TTNT for short, Tactical Targeting Network Technology is a very specific type of waveform technology that is intended to meet a pressing need for high throughput, anti-jam, low latency and quick net join waveforms for IP connectivity as it relates to the Global Information Grid. Essentially, it's a way to deliver the fastest and most secure ad hoc mesh network that instantly and accurately shares voice, video and data information between two points. The architecture of the technology itself was based largely on the Joint Airborne Network-Tactical Edge document, also referred to as the JAN-TE, which itself was based on the Time Sensitive Target Networking Technology requirements of the Tactical Data Link Transformation Capability Document.

There are a wide range of different benefits to this type of technology, particularly in terms of defense and government applications. Not only does it provide a low latency, ad hoc, IP-based network functionality, but it can successfully do so for more than 200 users at any given time.

The connection itself is also "self-forming" and "self-healing," which means that platforms (read: users) can automatically join and leave the network without any type of advanced planning - something that is a hurdle to overcome with other types of networking options. This would be very beneficial for situations where multiple jets were in communication not only with each other, but also with crews on the ground as well.

Speaking of military-based applications, TTNT also allows for the instant and secure sharing of the aforementioned types of voice, video and data transfer rates at speeds of up to Mach 8 - or roughly 6138 miles per hour. This again would be very beneficial in a situation where high speed aircraft are engaged in secure communications with one another, even if they were going in different directions. Beyond speed, the volume of data being transferred is also an important performance criteria. The stated TTNT throughput requirement is 10 Mbps at a distance of 300 nautical miles, a significant comparable volume and range.

CH PAVANI
19F11A0412

Developing custom test fixtures for mil-dtl-38999 cable assemblies

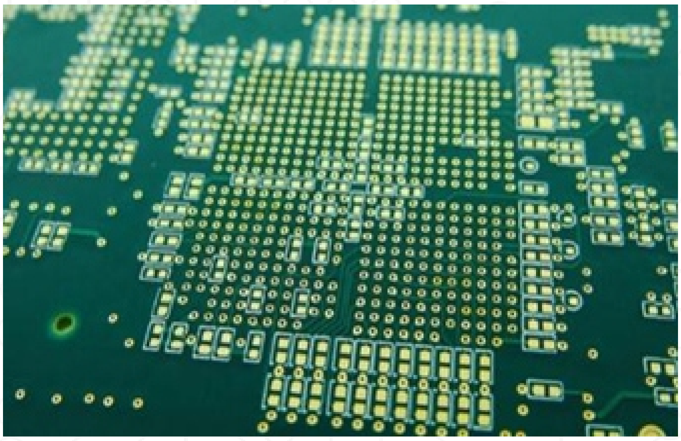
Extensive lead times and costs, design engineers must carefully select the precise combination of features before deciding on a connector scheme and the exact part numbers for the Mil-spec cable assemblies conforming to Mil-DTL-38999 are known for their ability to survive the toughest of conditions, their high reliability, and their capacity to function in mission-critical settings. This also means that these mil-spec cable assemblies are among the most complex cable types that exist where costs can exceed several thousand dollars per cable. These high costs come from the expensive wire and connectors used and from the fact that certain custom cable assemblies can take dozens of hours to assemble.

Considering the cost and overall impact of an anomaly where the cable doesn't work properly, what is the point of spending all this time and money to assemble a cable only for it to break or fail prematurely? Testing of mil-spec cables is absolutely necessary at the development stage and again during full rate production.

Mil-DTL-38999 is a widely known military standard that covers circular connectors terminated to cables with either crimp connectors or solder cups. This specification states that connectors shall be environmentally sealed and rated for temperatures of -65°C to +200°C. Within the family of Mil-DTL-38999 connectors and terminated assemblies, there are options for high-density, bayonet, jam nut, and panel mounting interconnects to name a few. Since Mil-DTL-38999 connectors are known plugs and receptacles.

NANDIPAKA SAIKUMAR
17F11A0459

Mixed Signal Acceptance Circuit Board Designs



Most systems now are handling 4G and 3G PCBs. This means that components are transmitting and receiving frequencies that can range from 600 MHz up to 5.925 GHz and bandwidth channels of 20MHz, or 200kHz for IoT systems. When designing PCBs for 5G network systems, the components will need Mm-wave frequencies of 28GHz, 30GHz, and even 77GHz based on the application. For bandwidth channels, 5G systems will be dealing with 100MHz right below and 400 MHz right above 6GHz frequencies.

These higher speeds and higher frequencies will demand the appropriate materials within the PCB to capture and transmit both lower and higher signals at the same time without experiencing signal loss and EMI.

In addition, an added problem is that the devices will become lighter, portable, and smaller. With strict weight, size, and space limitations, the PCB materials will have to be flexible and light while accommodating all the microelectronics along the board.

Thinner traces and stricter impedance control will need to be adhered to for the PCB copper tracings. The traditional subtractive etching processes used for 3G and 4G high-speed PCBs may be switched out for modified semi-additive processes. These modified semi-additive processes will provide more precise trace lines and straighter walls.

Printed circuit board designed with tight lines and spaces

Material substrates are also being redesigned. Printed circuit board companies are looking at materials that provide a dielectric constant as low as 3, as standard materials for lower speed PCBs are usually 3.5 to 5.5. Tighter fiberglass weaves, lower dissipation factor loss materials, and low-profile copper will also be options for high-speed PCBs used for digital signals to prevent signal losses and to promote greater signal integrity.

As industry becomes even more data driven, companies need to find ways to make data more accessible to workers in every area, including the plant floor. Touch screens are the ideal solution because they are inexpensive, easy to operate, rugged, and mobile. The large screen sizes available mean that a touch screen can display more information than traditional methods, such as bar code readers. The use of dashboards enables users to see process status at a glance without having to check a mechanical cockpit with multiple dials and gauges.

The data visualization makes it easy for people to see and act on exception information, even allowing for the diminished vision of older workers. Data visualization on industrial touch screens overcomes language barriers, skill sets, and environmental conditions such as low light.

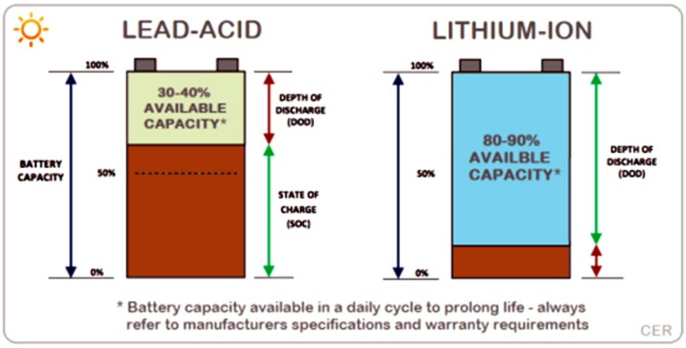
Touch screens can be mounted directly on the equipment they are monitoring, in any nearby area, or even in another location altogether in the case of dangerous or unhealthy industrial environments, making them ideal for any industrial facility.

Touch screens are versatile as well. By selecting a resistive touch screen, users will be able to interact with the device using a stylus or while wearing gloves, which may be an important consideration in certain conditions. In low-light situations, you may prefer an infrared touch panel. If graphics are a top priority, a high-quality surface capacitive screen may be the best choice.

If the screen must be visible at a distance, the large sizes available in infrared screens may be very important. The lifecycle of the screen also varies by touch type, as does its resistance to environmental conditions such as grit, solvents, or water.

KARRI LAKSHMI VENAKATAVARUN
18F11A0444

Lead Acid vs. Lithium Battery Packs: The Technologies



Before we can determine which type of military battery pack is truly better and more reliable, it's important to first gain a better understanding of the unique technologies at play in the first place.

Lead acid batteries have been around for a lot longer than people realize, having first been invented by a French physicist named Gaston Plante all the way back in 1859. It is the oldest type of rechargeable battery in existence and was indeed the first of its type designed with commercial use in mind. Because of its general dependable nature and modest cost-per-watt base, it is still widely used in automobiles, in marine applications, for uninterruptible power supplies, and for many other different jobs. The grid structure of a lead acid battery is, as its name suggests, made from a very specific type of lead-based alloy. Because pure lead is actually too soft and wouldn't be able to properly support itself during charging and discharging, small amounts of other metals are often used to help improve and empower the electrical properties. Once the battery itself has been discharged and the recharge cycle begins, the lead sulfate in the battery begins to reconvert into both lead and sulfuric acid.

Additionally, electricity flows through the water portion of an electrolyte/H20 mix during recharging - thus converting it back into its original hydrogen and oxygen forms. This is how energy is made, which is then stored in the battery until depleted.

A lithium battery is similar in many ways, yet very different in terms of the actual materials used to create, store, discharge, and recharge that energy. With a lithium battery, lithium material is stored in two components called the anode and the cathode. An electrolyte carries positively charged lithium ions from the former to the latter and vice versa via a component called a separator. As that lithium continues to move, it creates a charge in the positive current collector. That charge then flows directly into whatever device is being powered, thus depleting the reserves. During recharging, the process essentially reverses itself - lithium ions go from the cathode to the anode.

ACHI SAIRAM
18F15A0401

The Flammability Requirements of Custom Cables: Breaking Them Down

What many people don't realize about cabling is that the flammability rating requirement is dictated, in part, by both the location of that cable and the way in which it is being used. As of 2018, some of the existing industry standard flammability ratings for cables includes the following: VW-1: These cables have passed a VW-1 flame test and carry a "fire resistant" designation. The VW-1 test provides an assessment of the cable insulation material and resilience to fire. This is one of the most severe tests since it's performed vertically and can be viewed as a worst-case test condition. However, VW-1 cables are not appropriate for all applications such as those with confined spaces or high airflow. A careful assessment of the use case and installation environment must be made before electing to use a VW-1 rated cable.

Cl2 & CL3: NEC (National Electric Code) has an established standard defined in Article 725 for low voltage applications, less than 150 volts. This rating provides fire resilience and protection from electrical shock. CL2 & CL3 cables are also designed to support specific pull forces and 90-degree bends. Many low power/high frequency cables such as high-resolution video and coaxial cables carry the CL2 and CL3 designation.

Plenum: These types of cables are designed for installation in areas with forced air ventilation, air handling, and cooling systems. Since the high air flow environment can cause fire to rapidly spread, a cable jacket with fire retardant jacket is critical to prevent fire propagation. Since these cables may be collocated around air handling systems, there is also a need to minimize the amount of smoke produced if the cable jacket does combust. Specialized jacket materials can be employed for low-smoke characteristics. A non-plenum cable should never be used in an area that requires a plenum rating.

Other common types of flammability ratings include OFNR (Optical Fiber Nonconductive Riser), which is given to fiber optic cables that are designed to be used in vertical runs within buildings. OFNP (Optical Fiber Nonconductive Plenum) is the same but is designed for horizontal runs while also exhibits low smoke characteristics, similar to a plenum rating. CM (similar to CL2 and CL3), CMR (similar to CL2 and CL3 but for a riser applications) and CMP (similar to CL2 and CL3 but for a plenum applications) are ratings also given to network cables, they are roughly equivalent to Article 725 cables but are designed for much lower power ratings, such as ethernet cables.

PILLI MADHURI
18F15A0410

AESA RADAR

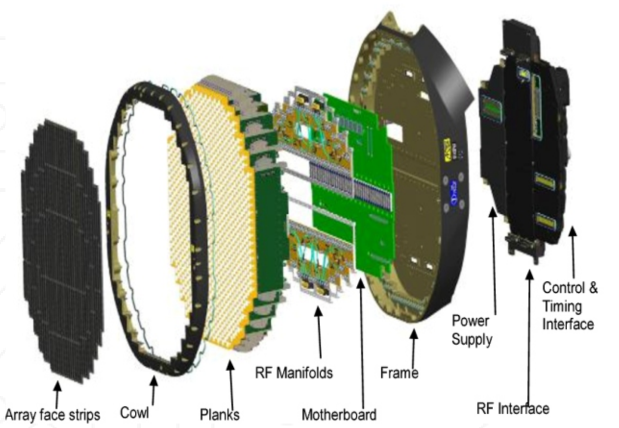


Figure 1. Airborne AESA Configuration

Active Electronically Scanned Arrays commonly known as AESA is a phased array radar system. It consists of an array of antennas which form a beam of radio waves that can be aimed in different directions without physically moving the antenna themselves. The primary use of AESA technology is in RADAR system

AESA systems are currently used on many different military platforms, including military aircraft and drones, to provide superior situational awareness.

The evolution of ASEA technology can be traced back to the early 1960s with the development of the passive electronically scanned array (PESA) radar, a solid state system which takes a signal from a single source and uses the phase shifter modules to selectively delay certain parts of the signal while allowing others to transmit without delay. Transmitting the signal in this way can produce differently shaped signals, effectively pointing the signal beam in different directions. This is referred to as beam steering.

The first AESA systems were developed in the 1980s and hadmany advantages over the older PESA systems. Unlike a PESA, which uses one transmitter/receiver module, AESA uses many transmitter/receiver modules which are interfaced with the antenna elements and can produce multiple, simultaneous radar beams at different frequencies.

MIRIYALA LIKHITHA
18F11A0459

BRAIN TWISTER

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