CTC(T&IT),CRPF

Monthly e-Newsletter

November - 2021

Always do your best. What you plant now, you will harvest later

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"Dream is not something that you see while sleeping.
It is something that does not let you sleep."

– A P J Abdul Kalam

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EDITOR'S CENTER

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READER'S CENTER

“Scorpius” suite of electronic warfare (EW)

Defense firm Israel Aerospace Industries (IAI) has unveiled its “Scorpius” suite of electronic warfare (EW) systems, which the company claims are the world’s first EW system “capable of simultaneously targeting multiple threats, across frequencies and in different directions.”

This machine powerful enough to hit threats of various kinds without problems. Ships, missiles, UAVs, low probability of interception (LPOI) radar; any object that works through the action of an electromagnetic spectrum has no way out against Scorpius.

What most of all makes Scorpius noteworthy is the Active Electronically Scanned Array (AESA) technology, sensitivity of its receiver and the incredible transmission power (ERP). These elements areresponsible for the system's speed of action and its multi-objective ability - the ability to hit multiple targets at the same time. These threats include missiles, communication links, drones, ships, and low probability of interception radars.

According to IAI, Scorpius’ AESA’s multi-beam capability allows the system to “simultaneously scan the entire surrounding region for targets, and deploy narrowly focused beams to interfere with multiple threats across the electromagnetic spectrum.” Scorpius can effectively disrupt radar and electronic sensors, navigation, and data communications, the company said.

The system branches into four different components

Scorpius-G:

Ground-based EW system designed to detect and interrupt ground and air threats. The system isideal for rapid vehicle deployment, creating "an electronic dome of protection" above a wide geographic area, providing "Soft-kill" air defense.

Scorpius-N:

Naval system defends ships against "Over-the-Horizon Anti-Ship Cruise Missiles, Unmanned Combat Aerial Vehicles, and airborne imaging radars" at extended range through early detection and targeting. SP: self-protection system for fighter aircraft.

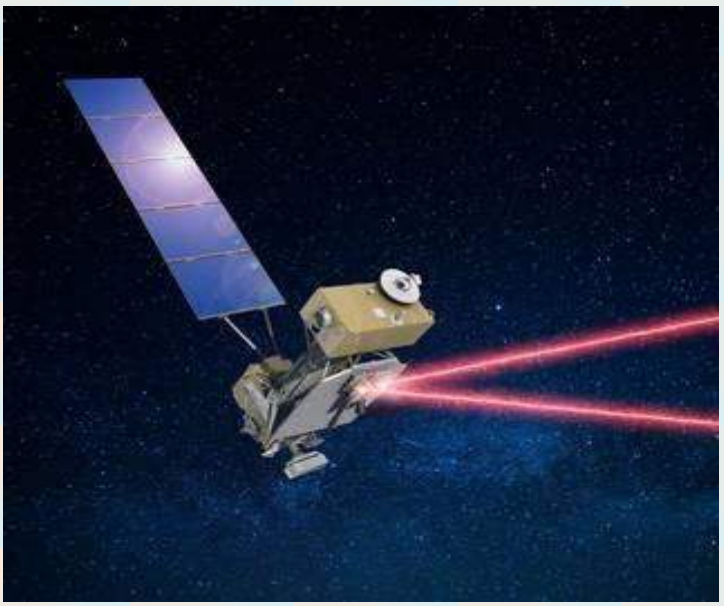
Scorpius SJ

The Scorpius SJ air defense system disrupts enemy ground-based and aerial electromagnetic attacksacross a large geographical area based on similar technologies.

Scorpius-T

Finally, the most recent version of the system is the Scorpius-T provides EW training for pilots, emulating "a variety of modern air-defense systems, simultaneously, from a single platform," supporting training for fifth-generation aircraft.

Laser Communications Relay (LCR)



The Laser Communications Relay Demonstration (LCRD) will showcase the unique capabilities of optical communications. Currently, most NASA missions use radio frequency communications to send data to and from spacecraft. Radio waves have been used in space communications since the beginning of space exploration and have a proven track record of success. However, as space missions generate and collect more data, the need for enhanced communications capabilities becomes paramount.

Optical communications is one of these enhancements and will provide significant benefits for missions, including bandwidth increases of 10 to 100 times more than radio frequency systems. Additionally, optical communications provides decreased size, weight, and power requirements. A smaller size means more room for science instruments. Less weight means a less expensive launch. Less power means less drain on the spacecraft's batteries. With optical communications supplementing radio, missions will have unparalleled communications capabilities.

The LCRD payload will be hosted onboard the U.S. Department of Defense's Space Test Program Satellite 6 (STPSat-6). Once in orbit, engineers located at LCRD's mission operations center in Las Cruces, New Mexico, will start the activation process by turning the payload on and get it ready to start transmitting data over infrared lasers. Until its first user is launched, LCRD will practice sending test data to and from its ground stations. This test data will be sent up through radio frequency signals from the mission operations center and then the LCRD spacecraft will reply over optical signals. This test data will include spacecraft health data; tracking, telemetry, and command data; and sample user data to ensure LCRD is properly operating.

Missions in space will send their data to LCRD, which will then relay the data down to designated ground stations on Earth. NASA has been leveraging communications relay satellites since 1983 when the first Tracking and Data Relay Satellite launched With LCRD relaying data for ILLUMA-T, this will be the first operational optical communications system for human spaceflight. ILLUMA-T will send data to LCRD at rates of 1.2 gigabits per second over optical links, allowing for more high-resolution experiment data to be transmitted back to Earth.

LCRD will be able to downlink data over optical signals at a rate of 1.2 gigabits per second. This is almost double the rates of the 2013 Lunar Laser Communications Demonstration, which downlinked data from the Moon over an optical signal of 622 megabits per second.

Although optical communications systems reduce size, weight, and power requirements, the entire LCRD payload is actually the size of a standard king-sized mattress!

Augmented reality (AR):-

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities.

What Is Augmented reality ?

AR can be defined as a system that fulfills three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.2The overlaid sensory information can be constructive (i.e. additive to the natural environment), or destructive (i.e. masking of the natural environment). This experience is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment.

The difference between virtual reality and augmented reality

In virtual reality (VR), the users' perception of reality is completely based on virtual information. In augmented reality (AR) the user is provided with additional computer generated information that enhances their perception of reality. For example, in architecture, VR can be used to create a walk-through simulation of the inside of a new building; and AR can be used to show a building's structures and systems super-imposed on a real-life view. Another example is through the use of utility applications. Some AR applications, such as Augment, enable users to apply digital objects into real environments, allowing businesses to use augmented reality devices as a way to preview their products in the real world.

Technology

Hardware

(Man wearing smart glasses)

Hardware components for augmented reality are: a processor, display, sensors and input devices. Modern mobile computing devices like smartphones and tablet computers contain these elements, which often include a camera and microelectromechanical systems (MEMS) sensors such as an accelerometer, GPS, and solid state compass, making them suitable AR platforms. There are two technologies used in augmented reality: diffractive waveguides and reflective waveguides.

Display:-

Various technologies are used in augmented reality rendering, including optical projection systems, monitors, handheld devices, and display systems, which are worn on the human body.

Eyeglasses:-

AR displays can be rendered on devices resembling eyeglasses. Versions include eyewear that employs cameras to intercept the real world view and re-display its augmented view through the eyepieces[31] and devices in which the AR imagery is projected through or reflected off the surfaces of the eyewear lens pieces.

HUD:-

Main article: Head-up display

(Headset computer)

A head-up display (HUD) is a transparent display that presents data without requiring users to look away from their usual viewpoints. A precursor technology to augmented reality, heads-up displays were first developed for pilots in the 1950s, projecting simple flight data into their line of sight, thereby enabling them to keep their "heads up" and not look down at the instruments. Near-eye augmented reality devices can be used as portable head-up displays as they can show data, information, and images while the user views the real world. Many definitions of augmented reality only define it as overlaying the information.

Contact lenses:-

Contact lenses that display AR imaging are in development. These bionic contact lenses might contain the elements for display embedded into the lens including integrated circuitry, LEDs and an antenna for wireless communication. The first contact lens display was patented in 1999 by Steve Mann and was intended to work in combination with AR spectacles.

Virtual retinal display:-

A virtual retinal display (VRD) is a personal display device under development at the University of Washington's Human Interface Technology Laboratory under Dr. Thomas A. Furness III. With this technology, a display is scanned directly onto the retina of a viewer's eye. This results in bright images with high resolution and high contrast. The viewer sees what appears to be a conventional display floating in space.

Eye Tap:-

The Eye Tap (also known as Generation-2 Glass captures rays of light that would otherwise pass through the center of the lens of the wearer's eye, and substitutes synthetic computer-controlled light for each ray of real light.

Handheld:-

A Handheld display employs a small display that fits in a user's hand. All handheld AR solutions to date opt for video see-through. Initially handheld AR employed fiducial markers, and later GPS units and MEMS sensors such as digital compasses and six degrees of freedom accelerometer–gyroscope.

Spatial:-

Spatial augmented reality (SAR) augments real-world objects and scenes, without the use of special displays such as monitors, head-mounted displays or hand-held devices. SAR makes use of digital projectors to display graphical information onto physical objects. The key difference in SAR is that the display is separated from the users of the system. Since the displays are not associated with each user, SAR scales naturally up to groups of users, allowing for collocated collaboration between users.

Tracking:-

VR positional tracking:-

Modern mobile augmented-reality systems use one or more of the following motion tracking technologies: digital cameras and/or other optical sensors, accelerometers, GPS, gyroscopes, solid state compasses, radio-frequency identification (RFID). These technologies offer varying levels of accuracy and precision. The most important is the position and orientation of the user's head. Tracking the user's hand(s) or a handheld input device can provide a 6DOF interaction technique.

Networking:-

Mobile augmented reality applications are gaining popularity because of the wide adoption of mobile and especially wearable devices.

Input devices:-

Techniques include speech recognition systems that translate a user's spoken words into computer instructions, and gesture recognition systems that interpret a user's body movements by visual detection or from sensors embedded in a peripheral device such as a wand, stylus, pointer, glove or other body wear.

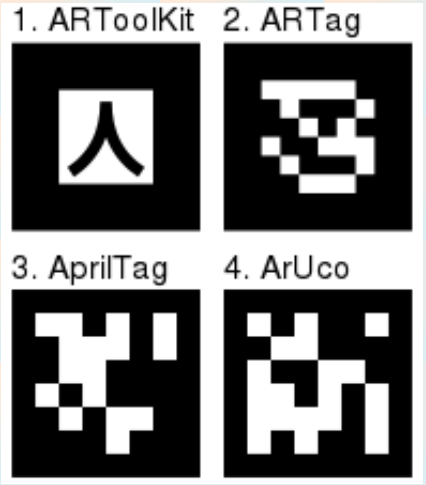
Computer:-

The computer analyzes the sensed visual and other data to synthesize and position augmentations. Computers are responsible for the graphics that go with augmented reality. Augmented reality uses a computer-generated image which has a striking effect on the way the real world is shown. With the improvement of technology and computers, augmented reality is going to lead to a drastic change on ones perspective of the real world.

Projector:-

Projectors can also be used to display AR contents. The projector can throw a virtual object on a projection screen and the viewer can interact with this virtual object. Projection surfaces can be many objects such as walls or glass panes.

Software and algorithms:-



Comparison of some augmented reality fiducial markers for computer vision

A key measure of AR systems is how realistically they integrate augmentations with the real world. The software must derive real world coordinates, independent of camera, and camera images. That process is called image registration, and uses different methods of computer vision, mostly related to video tracking.

Development:-

The implementation of augmented reality in consumer products requires considering the design of the applications and the related constraints of the technology platform. Since AR systems rely heavily on the immersion of the user and the interaction between the user and the system, design can facilitate the adoption of virtuality. For most augmented reality systems, a similar design guideline can be followed. The following lists some considerations for designing augmented reality applications:

Environmental/context design:-

Context Design focuses on the end-user's physical surrounding, spatial space, and accessibility that may play a role when using the AR system. Designers should be aware of the possible physical scenarios the end-user may be in such as:

- Public, in which the users use their whole body to interact with the software
- Personal, in which the user uses a smartphone in a public space
- Intimate, in which the user is sitting with a desktop and is not really moving
- Private, in which the user has on a wearable.

Possible applications:-

Augmented reality has been explored for many applications, from gaming and entertainment to medicine, education and business. Example application areas described below include archaeology, architecture, commerce and education. Some of the earliest cited examples include augmented reality used to support surgery by providing virtual overlays to guide medical practitioners, to AR content for astronomy and welding.

Archaeology:-

AR has been used to aid archaeological research. By augmenting archaeological features onto the modern landscape, AR allows archaeologists to formulate possible site configurations from extant structures.

Urban design & planning:-

AR systems are being used as collaborative tools for design and planning in the built environment. For example, AR can be used to create

augmented reality maps, buildings and data feeds projected onto tabletops for collaborative viewing by built environment professionals. Design options can be articulated on site, and appear closer to reality than traditional desktop mechanisms such as 2D maps and 3d models.

Visual art:-

AR applied in the visual arts allows objects or places to trigger artistic multidimensional experiences and interpretations of reality.

Augmented reality can aid in the progression of visual art in museums by allowing museum visitors to view artwork in galleries in a multidimensional way through their phone screens.

Remote collaboration:-

Primary school children learn easily from interactive experiences. As an example, astronomical constellations and the movements of objects in the solar system were oriented in 3D and overlaid in the direction the device was held, and expanded with supplemental video information. Paper-based science book illustrations could seem to come alive as video without requiring the child to navigate to web-based materials.

Emergency management/search and rescue:-

Augmented reality systems are used in public safety situations, from super storms to suspects at large. Emerging Technology for Emergency Management", by Gerald Baron

The camera operator was better able to search for the hiker knowing the geographic context of the camera image. Once located, the operator could more efficiently direct rescuers to the hiker's location because the geographic position and reference landmarks were clearly labeled.

Military:-

Augmented reality system for soldier ARC4 (U.S. Army 2017) An interesting early application of AR occurred when Rockwell International created video map overlays of satellite and orbital debris tracks to aid in space observations at Air Force Maui Optical System.Starting in 2003 the US Army integrated the SmartCam3D augmented reality system into the Shadow Unmanned Aerial System to aid sensor operators using telescopic cameras to locate people or points of interest. The system combined fixed geographic information including street names, points of interest, airports, and railroads with live video from the camera system.

Broadcast and live events:-

Weather visualizations were the first application of augmented reality in television. It has now become common in weather casting to display full motion

video of images captured in real-time from multiple cameras and other imaging devices. Coupled with 3D graphics symbols and mapped to a common virtual geospatial model, these animated visualizations constitute the first true application of AR to TV.

The dangers of AR

Reality modifications-

In a paper titled "Death by Pokémon GO", researchers at Purdue University's Krannert School of Management claim the game caused "a disproportionate increase in vehicular crashes and associated vehicular damage, personal injuries, and fatalities in the vicinity of locations, called PokéStops, where users can play the game while driving.

Privacy concerns:-

The concept of modern augmented reality depends on the ability of the device to record and analyze the environment in real time. Because of this, there are potential legal concerns over privacy. While the First Amendment to the United States Constitution allows for such recording in the name of public interest, the constant recording of an AR device makes it difficult to do so without also recording outside of the public domain. Legal complications would be found in areas where a right to a certain amount of privacy is expected or where copyrighted media are displayed.

The Benefits and Challenges of UAVs

The Federal Aviation Administration predicts that by 2017, the market for military UAVs will surpass $10 billion, while the Association for Unmanned Vehicle Systems International believes that private drone sales will break $82 billion in the first decade of sales. There's no question the UAV industry is booming, but that growing popularity brings a multitude of benefits and challenges.

UAV or an unmanned aerial vehicle is a remote-controlled aircraft. It can be operated remotely in real-time or pre-programmed to fly autonomously on the pre-defined routes. Popularly known as a drone, the use of this type of aircraft is increasing in all sectors. It is important to note that missiles that fly autonomously are not categorized as UAVs. These attack units are classified separately under the weapons category. UAVs or drones can be classified in different ways.

Classification of UAVs :- CLASSIFICATION BY SIZE

Large Size Drones:

These drones are used in the attack, combat and reconnaissance roles. Large size UAVs can fly to a very long distance without recharging or refueling. Large attack systems can carry missiles that can be fired remotely after observing and locking in the target. Reconnaissance UAVs are used to observe and secure a very large area.

Medium Size Drones: This range of drones is generally used in reconnaissance or to gather data. Such units are deployed in military, commercial, industrial and agricultural fields.

Small Size Drones: These drones are the most widely used units. UAVs of this size are used by commercial establishments, government departments, professional photographers and hobbyists.

Miniature Drones: These units are used for very specific purpose. Miniature drones have been developed for military usage. The device is small enough to fit in the palm. Military personnel uses it for spying during a close combat mission. It can be used to view the inside of a standing or damaged building during search and rescue operations.

CLASSIFICATION BY DESIGN

Aircraft Design: This type of UAV has a propeller on the tail or nose. Some wing design units have propellers on the wings. Jet propulsion is also used in large UAVs. There are small units that can be launched even from hand but larger units require a small runway to get off the ground. The advantage of this design is that this type of UAV consumes a lower amount of energy compared to UAV with tilt-rotor design.

Tilt Rotor Design: This type of UAV is also called quadcopter because of the use of four rotors for lift and propulsion. It can lift off and land anywhere in the same way as a helicopter. These UAVs are the most widely used units due to ease of launching and landing. There is no need of runway or catapult to launch the aircraft.

CLASSIFICATION BY USAGE

Military: UAVs have been used widely in attack and combat roles. Military use of drones includes reconnaissance and observation from the sky. Cargo drones are used to supply weapons and cargo to military units.

Commercial: There is a wide range of commercial applications of drones. A camera-equipped drone is used to map an area. It helps know if the proposed construction site is suitable for the construction of a particular structure. UAV is used in the commercial sector to take photos and videos of buildings, construction sites and ground areas. Real estate developers use such photos and videos to advertise their building projects.

Agricultural: Farmers use drones to spray pesticides, fertilizers and other chemicals. Special cameras and sensors are used to spot problems in the crops. Diseased parts of the crop can be spotted early. Different types of data related to the farm, crop, land and atmospheric conditions can be collected. This data is used to ensure healthy crops and successful harvest.

Police: Law enforcement agencies use drones to fight crimes. They use it for surveillance of a suspected target. Real-time surveillance is useful during active crime scenes where sending the police personnel without knowing the ground situation can be dangerous.

3D Mapping: Advance 3D imaging equipment installed in a drone is used to survey the landscape. Thousands of high-quality images are stitched together to create precise and high definition 3D maps of a ground area. It gives a better understanding of the geographical features of the area.

Disaster Relief: It is difficult to know the magnitude of destruction immediately after a disaster. There is an urgent need to find ground information quickly. Sending search and rescue teams to such an area without prior knowledge of ground conditions may result in a waste of precious time. A UAV helps know exact locations where help is needed.

Hunting Hurricane: Drones equipped with scientific equipment are used to

observe storms and other natural disasters. The data collected and analyzed from such operations are used to develop predictive models that help predict an impending disaster with better accuracy.

Product Delivery: This type of commercial venture is yet to take off due to regulatory constraints. However, many companies are working actively in this field. It is going to be a lucrative field for the sellers of products.

Research and Development: Scientists use drones to gather different types of data related to the ground, sea and air. They can find useful data without sending several teams to the target locations. Accurate scientific data from various locations can be collected quickly and easily.

Reconnaissance: UAVs are now used widely to protect border areas from intruders. It helps gather intelligence information on the battlefield. The information proves useful in protecting borders, combat units, and security installations. Military personnel can avoid high-risk missions or go to such missions with better information on the ground situation

General Users: Hobbyists use small-size drones for recreational purposes. These units are used to enjoy the thrill of flying an aircraft. Now many UAVs made for general users have a camera to take photos and videos. Some new UAV models can follow the moving drone pilot. There are strict drone flying rules and regulations that hobbyist drone operators must know.

There are various problems, issues, and challenges associated with UAVs.

It is difficult to regulate the flying of small drones. Thousands of small drones are sold every year. These products are available easily online and offline. A small drone can be built even by a novice using easily available parts from the Internet.

Even a small drone poses high safety risks to large planes and ground installations like fuel depots. There are occasional instances where operators lose control of their UAV during the flight. There have been no serious accidents so far but there are many reports of criminals using drones to supply illegal and banned items into prisons. The insurance aspect is not fully defined and developed. There are privacy risks to people. Drones can fly high and record visible parts of private property. It can be used to look inside homes through windows.

Government authorities have been trying to overcome these challenges with proper regulations. There are many rules and regulations for UAV ownership and operations and law enforcement agencies are already using different technologies to stop rogue UAVs. The options include signal jamming as well as capturing and attacking to bring down the rogue UAVs.

The drone industry is also advancing at a rapid pace. Large numbers of UAVs are being sold and used all around the world. At the same time, the drone industry is expected to generate more than 100,000 jobs. The use of such technologies help improve living conditions. There are benefits and challenges in the use of UAVs. Governments are trying to keep pace with these developments by framing proper rules and regulations.

FULL FORMS RELATED TO COMPUTER

No.	Abbreviation	Full Form
1	CIDR	Classless Inter-Domain Routing
2	ROM	Read Only Memory
3	CPU	Central Processing Unit
4	URL	Uniform Resource Locator
5	USB	Universal Serial Bus
6	VIRUS	Vital Information Resource Under Siege
7	TCP	Transmission Control Protocol
8	IOS	iPhone Operating System
9	SATA	Serial Advanced Technology Attachment
10	RAM	Random Access Memory
11	SMPS	Switched-Mode Power Supply
12	CD	Compact Disc
13	DVD	Digital Versatile Disc
14	CRT	Cathode Ray Tube
15	HTTPS	Hyper Text Transfer Protocol Secure
16	MPEG	Moving Picture Experts Group
17	PNG	Portable Network Graphics
18	IP	Internet Protocol
19	GIS	Geographical Information system
20	OSI	Open Systems Interconnection

FAQ

1. What was the original system board speed of the ATX board?

A. 33 MHz

B. 60 MHz

C. 66 MHz

D. 100 MHz

2. Which bus architecture supports 32-bit / 64-bit cards and transfers information at 33 MHz?

A. ISA

B. EISA

C. AGP

D. PCI

3. Which motherboard component is responsible for charging the CMOS RAM so that CMOS can maintain its CMOS data?

A. Battery

B. BIOS chip

C. CMOS chip

D. Power supply

4. How many pins does a standard IDE controller have?

A. 33 pins

B. 40 pins

C. 50 pins

D. 20 pins

5. Which of the following best describes a baby AT system board?

A. Uses Slot 1

B. Runs at 100 MHz

C. Uses a socket 7 ZIF socket

D. Incorporates AGP

6. How many devices are supported in a USB chain?

A. 10

B. 27

C. 127

D. 32

7. How many pins does a standard floppy drive controller have?

A. 33 pins

B. 40 pins

C. 50 pins

D. 20 pins

8. Which bus architecture might be found in older IBM servers?

A. ISA

B. MCA

C. VESA

D. EISA

9. What type of cache memory will you find on system boards?

A. L1

B. L2

C. SDRAM

D. SRAM

10. Which type of memory module supports 32-bit data chunks?

A. DIMM

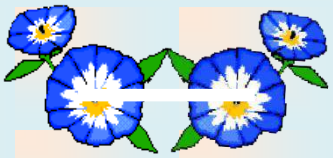
B. Cache

C. SIMM

D. Video

Acknowledgement

We are highly thankful for reading out this compilation and hope it will be useful for you in our day today professional and personal life. We would like to hearyour interest areas, suggestions from you to make this newsletter more informative and interesting. Your views will definitely help us to create this newsletter as an effective medium to reach you with latest development in the fields of communication and technology.



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Answers to the Quiz

1	2	3	4	5	6	7	8	9	10
D	D	A	B	C	C	A	B	B	C