TECHVERSE CHRONICLES - ISSUE 1

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WESAT

WOMEN ENGINEERED SATELLITE

WESAT(Women Engineered Satellite), developed by **LBSITW,** is a groundbreaking project, initiated by the space club of our institute**. WESAT is India's first satellite payload developed by a women only institute led by an all women team and is also the first student satellite from the govt of Kerala.** The purpose of WESAT is to measure UV radiations in space and on earth's surface and their influence on the warm temperatures and climate change phenomenon in Kerala. This pioneering effort entirely manged by a team of women is a testament to gender equality and innovation. Overcoming challenges including the pandemic, the point collaborated with VSSC, ISRO, IN-SPACE, Dept. of Space culminating in ISRO's approval of the launch scheduled for November 2023. The anticipated launch of WESAT holds the promise of yielding invaluable insights into atmospheric warming and health risks specifically focusing on Kerala.

The **WESAT** project was born out of a collective passion for space exploration and the allure of a women-only space endeavour. The team was captivated by the potential of contributing to space research and understanding the impact of UV radiation. The project's goal aligned perfectly with the desire to make a positive difference in society and set a unique milestone in the field of aerospace engineering.

THE PAYLOAD

The Payload of the Women Engineered Satellite is a 1.5kg satellite that measures ultraviolet rays and solar irradiance in space and on Earth. WESAT was launched on January 1,2024 as a secondary payload on the Polar Satellite Launch Vehicle-C58/XPoSat mission

THE MISSION

The satellite project, WESAT is the first satellite led by an all women institute. The satellite will be used to study the effect of ultraviolet radiations on Kerala and help the state better prepare for the effects of climate change.

In simple terms, WESAT is designed to study the effects of UV radiation on Earth, with a special focus on the Indian state of Kerala. The primary mission objective is to understand the UV radiation intensity above and below Earth's atmosphere. This research is vital for a variety of reasons.

GOVERNMENT PARTNERSHIP

MoU signed with VSSC, ISRO, IN-SPACE, Dept. of Space and Govt. of India for launching WESAT in the upcoming PSLV mission. WESAT's collaboration with the esteemed organizations like the Indian Space Research Organization (ISRO) and IN-SPACE is a testament to the project's legitimacy. The team sent a proposal to ISRO, which was approved after several discussions. This collaboration ensures the successful execution of their mission. The project received funding

from the central government through DST Nidhi Prayas scheme and from the state government via Kerala Startup Mission. WESAT has received 30 lakhs funding from the Government of Kerala along with Kerala Startup Mission.

ACHIEVEMENTS

Our institute is proud to be the first institute in Kerala and the only women institute in India to accomplish this milestone. Our project has garnered extensive media coverage in a multitude of prestigious newspapers like The Hindu, The Indian Express, Malayala Manorama, Vasundhara etc. and telecasted on prominent TV as well as YouTube channels like Asianet, Manorama, ETV Bharat, etc.

CONCLUTION

WESAT, the Women Engineered Satellite, represents a milestone in space technology and gender equality. This ambitious project, led by an all-female team of engineers, has demonstrated the remarkable capabilities of women in aerospace engineering. Beyond the technical achievements, WESAT's commitment to education and empowerment serves as a source of inspiration for women and girls around the world. Through dedication, collaboration, and innovation, WESAT is shedding light on the impact of UV radiation and changing the narrative in space exploration.

INSIGHTS FROM TECH EXPO

As part of the Tech Expo organized under PRAYAAG 3.0(TECHNICAL FEST OF OUR COLLEGE) we as a team of three students from the Electronics and Computer Engineering (ERE) department showcased a smart car parking system using Arduino Nano. The team consisted of Mayoori ,Devika Nair ,Aakamksha PS .

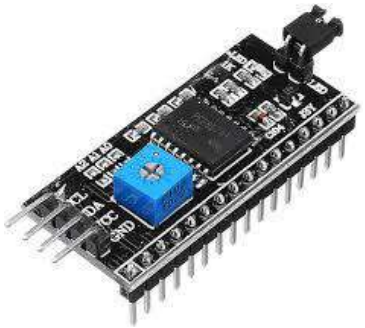
SYSTEM COMPONENTS AND DESCRIPTION

Arduino Nano, 16x2 LCD Display, 12C Module, Servo Motor, IR Sensor, Berg strips. The smart car parking system detects empty parking slots and guides drivers to available spaces

1. Arduino Nano: Processes sensor data and controls the servo motor.2. 16x2 LCD Display: Displays parking slot availability.3. 12C Module: Enables communication between Arduino and external devices.4. Servo Motor: Controls the parking slot gates.5. IR Sensor: Detects vehicles and updates parking slot availability.6. Berg Strip: Provides a physical barrier to indicate occupied parking slots.

The Arduino Nano is an open-source breadboard-friendly microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc and initially released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers.



12C is a synchronous serial communication protocol used for short-distance communication between integrated circuits.

A servo motor is a type of electric motor that uses feedback mechanisms to precisely control its rotational position, speed, and acceleration.

CONCLUSION

Our project detects the empty slots and helps the drivers to find parking space in unfamiliar city. The average waiting time of users for parking their vehicles is effectively reduced in this system .It effectively satisfy the needs and requirements of existing car. It also eliminates unnecessary traveling of vehicles across the filled parking slots in a city.

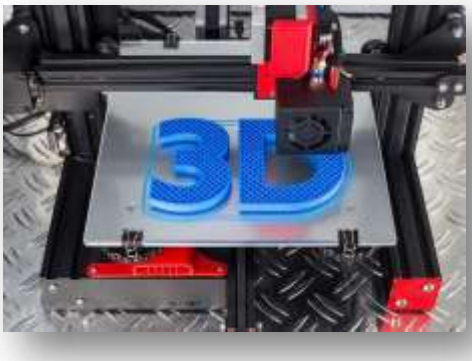
The smart car parking system using Arduino Nano was a successful project that demonstrated the potential for innovative solutions to real-world problems. Although we faced challenges in implementing the system in our college, the experience provided valuable insights into the design, development, and deployment of IoT-based systems

Insights from the 3D Printing Talk:

Exploring the Future of Manufacturing

The Expanding World of 3D Printing: From Prototypes to Production

3D printing, also known as additive manufacturing, has moved beyond its initial novelty and is now a powerful tool reshaping industries from healthcare to aerospace. This technology, which builds objects layer by layer from digital designs, offers unprecedented design freedom, customization, and speed, revolutionizing how we create and manufacture.



A Layered Approach to Creation:

At its core, 3D printing translates digital blueprints (CAD files) into physical objects. This process begins with slicing a 3D model into numerous thin cross-sections. The 3D printer then meticulously deposits or fuses material according to these slices, building the object layer by layer until it is complete. This additive process stands in stark contrast to traditional subtractive manufacturing (like milling or machining), which removes material from a solid block.

A Material World:

The versatility of 3D printing is amplified by the diverse range of materials it can utilize. While plastics like PLA and ABS remain popular for hobbyists and prototyping, the technology has expanded to encompass:

- **Metals:** Titanium, aluminum, stainless steel, and other metals are used in aerospace, medical implants, and tooling.
- **Resins:** Liquid photopolymers cured by UV light offer high precision and smooth surface finishes, ideal for detailed models and jewelry.
- **Ceramics:** Used in applications requiring high heat resistance and durability.
- **Composites:** Combining different materials to achieve specific properties like strength and lightness.

Diverse Technologies, Diverse Applications:

Several 3D printing technologies cater to different needs and materials:

- **Fused Deposition Modeling (FDM):** The most common and affordable method, FDM extrudes melted plastic filament layer by layer.
- **Stereolithography (SLA) and Digital Light Processing (DLP):** These resin-based technologies use UV light to cure liquid resin, producing highly detailed and accurate parts.
- **Selective Laser Sintering (SLS) and Selective Laser Melting (SLM):** These powder-bed fusion technologies use lasers to fuse powdered materials (plastics or metals), creating strong and functional parts.
- **Material Jetting:** This technology jets droplets of liquid material, allowing for multi-color and multi-material printing.

Impacting Industries Across the Board:

The impact of 3D printing is felt across various sectors:

- **Manufacturing:** 3D printing enables on-demand production of custom parts, reducing lead times and inventory costs. It is also used for creating tooling, jigs, and fixtures.
- **Healthcare:** From personalized prosthetics and implants to surgical guides and anatomical models for pre-surgical planning, 3D printing is transforming healthcare.
- **Aerospace:** Lightweight and complex components for aircraft and spacecraft are being produced using 3D printing, improving fuel efficiency and performance.

- **Consumer Goods:** Personalized products, custom footwear, and even 3D-printed food are becoming increasingly common.
- **Education:** 3D printing provides students with hands-on experience in design, engineering, and manufacturing.

Challenges and Future Outlook:

Despite its potential, 3D printing faces challenges:

- **Scalability:** While suitable for prototyping and small-batch production, scaling up for mass production can be challenging.
- **Material limitations:** The range of printable materials is still limited compared to traditional manufacturing processes.
- **Cost:** While becoming more affordable, the cost of some 3D printing technologies and materials can still be a barrier.

Looking ahead, 3D printing is poised for further growth and innovation. Advancements in materials, printing speeds, and automation will expand its applications and make it even more accessible. The convergence of 3D printing with other technologies like artificial intelligence and robotics will further revolutionize manufacturing and design, ushering in a new era of digital fabrication. The future of making things is undoubtedly being shaped, layer by layer.

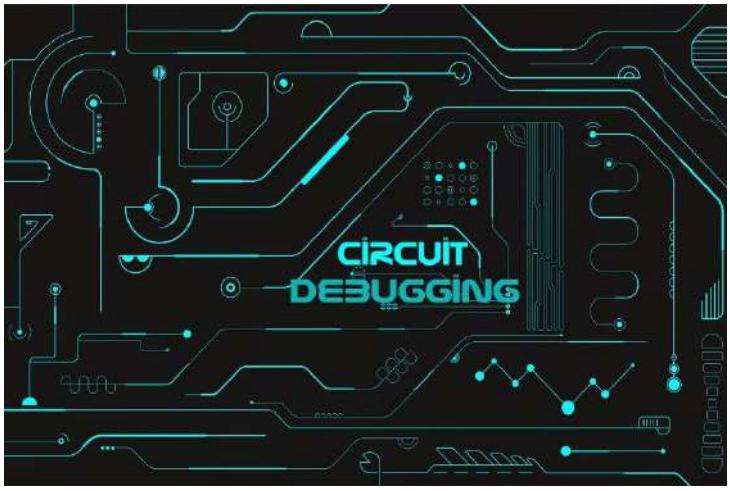
Student Review

-Soja A (S1 ERE)

As an engineering student, I found the 3D printing talk incredibly informative, particularly the deep dive into the various additive manufacturing processes. The speaker effectively explained the nuances of FDM, SLA, SLS, and metal-based 3D printing, highlighting their respective advantages and limitations in terms of material properties, precision, and cost. The discussion of post-processing techniques, such as surface finishing and heat treatment, was also valuable. I appreciated the emphasis on the engineering challenges associated with scaling up 3D printing for mass production and the current research being conducted to address these challenges. It provided a valuable perspective on the future of manufacturing and the role engineers will play in its development.

CIRCUIT DEBUGGING

Circuit debugging is the process of identifying, diagnosing, and fixing problems in an electrical or electronic circuit that prevent it from functioning as intended. Think of it as troubleshooting a circuit to ensure that all components and connections work together properly.



Why Is Circuit Debugging Important?

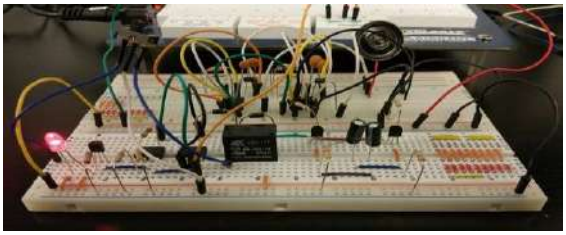
When building, designing, or repairing a circuit, unexpected issues like broken connections, faulty components, or incorrect wiring can occur. Debugging helps:

1. Ensure the circuit performs its intended function.
2. Prevent damage to components caused by shorts or incorrect voltage/current.
3. Save time and resources by identifying problems efficiently.

Common Problems in Circuits:

- **No power**: Circuit doesn't turn on.
- **Short circuit**: Excessive current flow due to improper connections.
- **Incorrect output**: Signals or voltages don't match expectations.
- **Component failure**: Burnt, damaged, or aged components.
- **Noise/interference**: Erratic behavior due to electrical noise.
- **Wiring errors**: Misconnections or loose connections.

HOW CIRCUIT DEBUGGING HAPPENS?



Debugging a circuit can be a bit tricky, but with a structured approach, you can pinpoint the problem effectively. Here's a step-by-step guide for circuit debugging:

1. Understand the Circuit

- Review the circuit diagram (if available). Make sure you understand its purpose and how it's supposed to function.
- Identify the inputs, outputs, and key components.

2. Visual Inspection

- Look for visible issues such as:
  - Broken wires.
  - Burnt components (e.g., resistors, capacitors, ICs).
  - Loose connections or solder joints.
  - Polarity issues (especially for diodes and electrolytic capacitors).

3. Verify Power Supply

- Check if the circuit is receiving the correct voltage and current.
- Use a multimeter to measure the power at the source and across components.
- Ensure there are no power supply fluctuations.

4. Component Testing

- Test key components (resistors, capacitors, diodes, transistors, ICs) using a multimeter or component tester.
- Replace any damaged or faulty components

5. Check Continuity

- Use the continuity mode on a multimeter to check for broken connections or short circuits.
- Ensure that all connections are properly soldered.

6. Signal Tracing

- Use an oscilloscope or logic analyzer to trace the signal path.
- Verify if the expected signal (voltage or waveform) is present at each stage of the circuit.

7. Divide and Conque

- Break the circuit into smaller sections and test each section independently.
- Start with the power supply section, then move to the input, processing, and output stages.

8. Check for Overheating

- Turn on the circuit and look for components that heat up excessively. Overheating often indicates a short circuit or incorrect configuration.

9. Cross-Check Against the Schematic

- Compare your circuit with the schematic to ensure no components are missing or misplaced.
- Double-check component values (e.g., resistor and capacitor ratings).

10. Eliminate Noise

- If the circuit behaves erratically, check for electrical noise or interference.
- Add decoupling capacitors near ICs if noise is a problem.

11. Software Debugging (if applicable)

- For circuits with microcontrollers, review the firmware or code.
- Use debugging tools (e.g., serial monitor, in-circuit debugger) to test code logic

12. Rebuild the Circuit

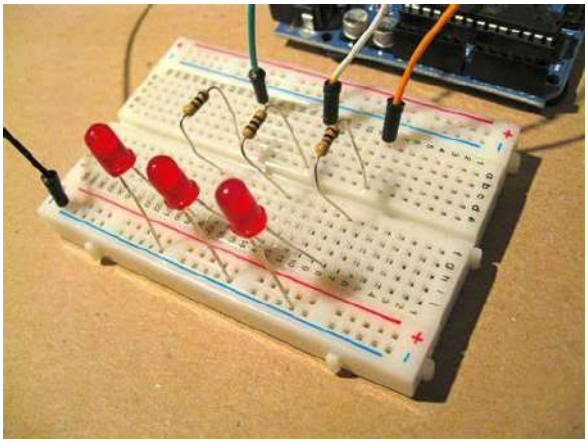
- If you still can't find the issue, rebuild the circuit from scratch. This helps identify errors made during assembly.

Tools You'll Need

- Multimeter.
- Oscilloscope (if dealing with AC or complex waveforms).
- Soldering iron and desoldering tools.
- Logic analyzer (for digital circuits).
- Component tester.

STUDENT REVIEW:

- Diya Bhatt A(S1 ERE)



Circuit debugging teached me valuable lessons in problem-solving, attention to detail, and resilience. It sharpened my ability to analyze issues systematically, emphasizing the importance of testing and understanding how each component—like resistors, capacitors, and transistors— which contributes to the circuit's function. I was able to learn that debugging highlights the need for clear documentation, logical troubleshooting, and creative thinking to solve unexpected challenges. It also offered me hands-on experience with tools like multimeters and oscilloscopes while fostering insights into circuit design and the importance of avoiding common mistakes. Ultimately, debugging enhanced my technical skills, patience, and adaptability, prepared me to my future experiments and lab sessions.

Department of Electronics & Communication Engineering

Vision: To become a centre of excellence in Electronics, Communication, Instrumentation and Computer Engineering to facilitate professional education and research keeping higher level of value systems.

Mission:

M1: To transform young women to high quality engineers, entrepreneurs and researchers with ethical values.

M2: To contribute creative engineering solutions to industry by keeping pace with latest technological advancements.

M3: To provide intellectual services to the society by the application of Electronics, Communication, Instrumentation and Computer Engineering.

MISSION AND VISION OF LBSITW

Mission

- To provide value-based technical education
- To transform young women into professionals who excel in academics, research, and development
- To meet societal challenges
- To contribute to creative engineering solutions to industry
- To provide intellectual services to society

Vision

- To become a center of academic excellence that empowers women in the technical domain
- To equip young women for continuous learning
- To inculcate aptitude for sustainable engineering solutions and advanced research
- To transform young women into high quality engineers, entrepreneurs, and researchers