COMPUTER SCIENCE CLUB ACTIVITIES

Activity: WORKSHOP on TECHNOLOGY BUSINESS INCUBATION

Participants: 30

Date: 21-02-2025 to 22-02-2025 & 01-03-2025

Conducted By

Department of Computer Science

Timings: From 9.30 AM to 5.00 PM

Topics Covered :

- **PCB(Printed Circuit Board) Theory**

- **Designing of PCB Software**

- **Lab Visit on PCB**

- **Manufacturing of PCB**

Registration fee Rs. 250/- for Student………..

PCB (Printed Circuit Board) software is used to design the layout of PCBs, which are essential for connecting electrical components in a wide variety of devices, from consumer electronics to industrial machinery. The software provides tools to help engineers and designers create the schematics, simulate circuit behavior, and ultimately lay out the physical design of the PCB that will be manufactured.

Here's a breakdown of the key features and types of PCB software:

Key Features of PCB Software:

1. **Schematic Capture**: This feature allows designers to draw and simulate the electrical circuits before the physical PCB layout is made. It helps to define components and their connections.

2. **PCB Layout Design**: The PCB layout feature places the components on the board and routes the electrical connections between them. It ensures the components are correctly placed and that signal paths are optimized for performance and space.

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3. **DRC (Design Rule Check)**: This feature checks the layout against manufacturing constraints (like spacing between traces and components) to ensure it's ready for production.

4. **Footprint Library**: The software comes with or allows the creation of libraries containing the footprints (physical layouts) of components that will be used on the board.

5. **Simulation**: Many PCB design tools offer circuit simulation to predict how the circuit will behave in real-world conditions before physically manufacturing the PCB.

6. **3D Visualization**: Some advanced tools allow designers to view the PCB in 3D to check for mechanical interference, such as issues with component placement.

7. **Manufacturing Output**: PCB software can generate the necessary files (like Gerber files) that are used by manufacturers to produce the PCB.

8. **Bill of Materials (BOM)**: A list of components, with part numbers and quantities, needed to assemble the PCB.

Popular PCB Design Software:

1. **Altium Designer**: One of the most powerful and widely used PCB design tools, offering advanced features for schematic capture, PCB layout, simulation, and 3D visualization.

2. **EAGLE**: Known for its user-friendly interface, it's a popular choice for hobbyists and smaller companies. It's also owned by Autodesk, which integrates with other software like Fusion 360.

3. **KiCad**: A free, open-source PCB design tool that provides a comprehensive suite for schematic design, PCB layout, and 3D visualization. It's great for both beginners and experienced users.

4. **OrCAD**: A professional-grade tool that provides robust schematic capture, simulation, and PCB layout. It's often used by engineers working on high-end, complex designs.

5. **PADS**: A PCB design tool that's commonly used in the industry for both small and large-scale projects, offering high-level features like simulation and design analysis.

6. **EasyEDA**: An online tool that allows users to design PCBs in the cloud. It's easy to use and suitable for beginners and hobbyists, offering schematic capture and PCB layout.

7. **DipTrace**: Another PCB design software that provides both beginner-friendly and advanced features, such as schematic capture, PCB layout, and component libraries.

8. **CircuitMaker**: A free, community-based version of Altium Designer, which allows for collaboration and sharing of designs.

Types of PCBs Based on Manufacturing:

- **Single-sided PCB**: Components are mounted on one side of the PCB.

- **Double-sided PCB**: Components are mounted on both sides.

- **Multi-layer PCB**: PCBs with more than two layers of conductive material, separated by insulating layers. These are used for more complex designs.

Conclusion:

In conclusion, the PCB workshop has provided valuable insights into the critical process of designing, manufacturing, and assembling printed circuit boards (PCBs). We've covered the essentials of PCB design, from schematic capture and layout creation to the importance of generating Gerber files for production. Understanding the manufacturing process—such as copper etching, drilling, plating, and soldermask application—has highlighted the complexity and precision required to produce reliable PCBs.

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Lecture On PCB Software:

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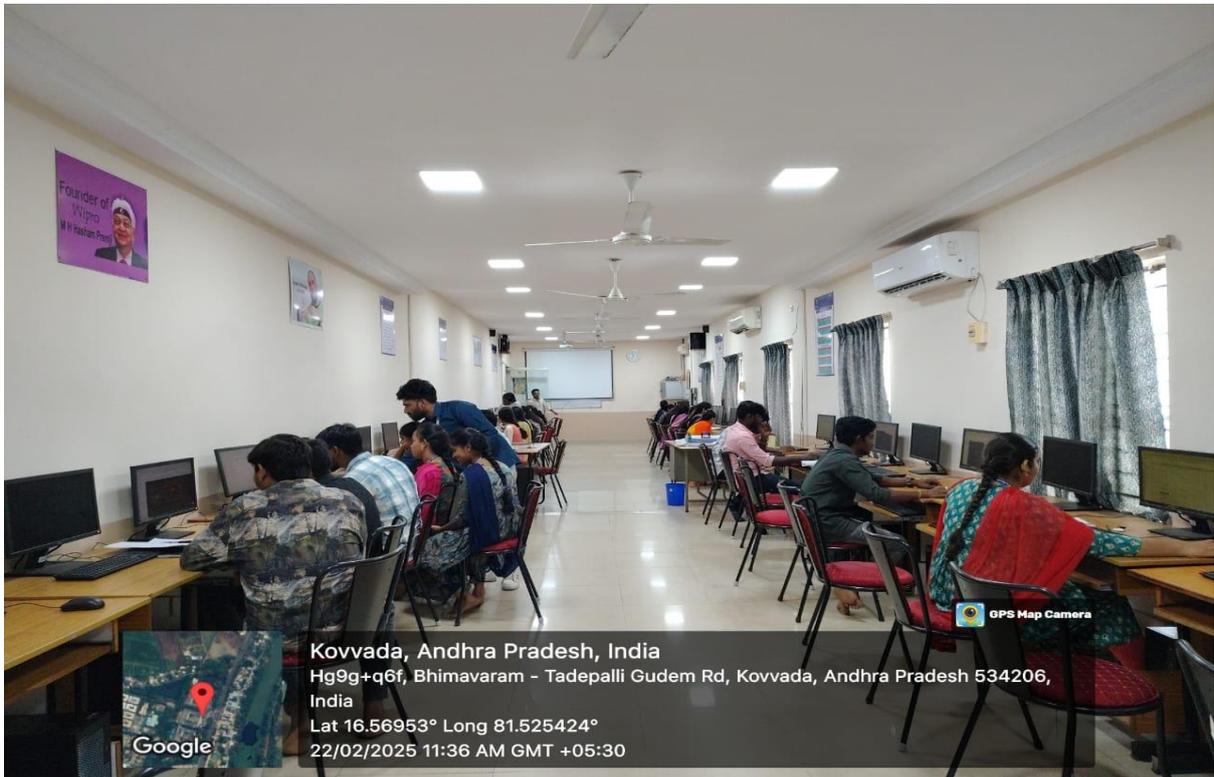
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P V V N Lokeswari

I B.Sc Computer Science

The TBI workshop was a great learning experience. I feel more confident in my communication skills and would highly recommend this workshop to others looking to improve their skills proficiency and public speaking abilities.

T Purushotham

I B.Sc Computer Science

The Computer Science Department workshop was well-organized and truly engaging. I truly appreciate the efforts that the faculty and coordinators put in to make the learning experience both educational and enjoyable. The variety of activities helped enhance different technical skills in an interactive way. These activities helped many students overcome challenges like lack of confidence in coding, problem-solving, and understanding complex concepts.