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HOW ARE PCB DESIGNERS SHAPING THE DIGITAL AGE?

The article highlights the vital role of PCB designers in creating complex Printed Circuit Boards (PCBs) for electronic devices, while also addressing innovations, challenges, and future trends in PCB design.

In today's rapidly evolving technological landscape, an essential component of electronic devices is the Printed Circuit Board (PCB). This renders the role of a PCB designer crucial in shaping the future of electronic devices through their behind-the-scenes work, particularly within the Internet of Things (IoT) domain. As the driving force behind the optimal functionality, size, and efficiency of a device, PCB designers bring their physical and electrical layouts to life, whether it be a simple household gadget or a complex industrial device.



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THE ROLE OF A PCB DESIGNER

As the cornerstone of any electronic device, PCB designers are responsible for developing its electrical and physical blueprint. Their expertise spans both schematic diagrams and physical layouts, enabling them to convert designs into functioning PCBs. Through their in-depth understanding of electronic components and how these interact within a circuit, PCB designers handle the visualisation and creation of the circuit design, translate it into functional layouts, and proceed to test and prototype the design. They ensure the manufacturability of the design, considering materials, layers, copper traces, vias, and solder masks.

Navigating the complex intersection of precision and creativity, a PCB designer must meet technical parameters while addressing physical constraints, such as size and heat dissipation. This makes their role akin to that of an artist, balancing scientific knowledge with innovative problem-solving.

PCB DESIGN IN IoT DEVICES

As the IoT market continues to grow, the role of PCB designers becomes even more pivotal. IoT devices often

require compact and intricate circuits, designed to fit into small spaces while ensuring connectivity and energy efficiency. Furthermore, these devices must be robust enough to withstand various environmental conditions, adding yet another layer of complexity to PCB design.

PCB designers working on IoT projects must consider factors such as wireless communication protocols, power management, and system integration. The circuits need to deliver reliable performance while being

energy efficient. Striking this balance is challenging but achievable, thanks to advances in design tools and techniques that facilitate the management of such complex requirements.

INNOVATION IN PCB DESIGN AND CHALLENGES FACED BY PCB DESIGNERS

The field of PCB design is continually evolving, with designers pursuing innovation to meet the demands of modern electronics. Key advancements include the integration of new materials, adoption of advanced manufacturing processes, and the creation of increasingly intricate circuit layouts. High-density, multi-layered boards and flexible PCBs are becoming more prevalent, pushing the boundaries of design capabilities.

Computer-Aided Design (CAD) systems have revolutionised PCB design, enabling designers to produce detailed circuit layouts with greater accuracy. These systems allow for design simulation, testing, and the generation of manufacturing files, facilitating quicker prototyping and reducing production errors. Such tools empower designers to create sophisticated PCBs for a wide range of applications, from consumer electronics to industrial systems.

Despite these advancements, significant challenges persist. Miniaturisation is one of the most pressing

issues as devices become smaller while demanding more features. Designers must integrate an increasing number of components into shrinking spaces without compromising reliability.

Heat dissipation presents another major challenge. Improper heat management can reduce a device's performance or lifespan. PCB designers must use techniques such as thermal vias and strategic component placement to manage heat effectively. Maintaining signal integrity, especially in high-speed circuits, is equally critical to prevent data corruption or communication errors. Designers must carefully route signals, control impedance, and implement shielding techniques to mitigate interference and ensure smooth operation.


THE FUTURE OF PCB DESIGN

With the rapid integration of technology into everyday life, particularly the rise of IoT, wearables, and smart devices, the future for PCB designers is promising. The growing demand for skilled professionals in this field underscores the importance of continuously upgrading skills and adopting cutting-edge tools and techniques

to maintain a competitive edge.

Artificial Intelligence (AI) and Machine Learning (ML) are poised to play transformative roles in PCB design. These technologies can automate complex processes, such as trace routing and signal integrity analysis, reducing design time while enhancing precision. AI can also support predictive maintenance and real-time optimisation, making PCB designs more efficient and reliable.

With increasing concern for environmental sustainability, PCB design is also evolving to prioritise eco-friendly materials and energy-efficient, recyclable designs. Moreover, the onshoring of semiconductor manufacturing presents opportunities for new jobs and increased demand for skilled PCB designers.

In summary, PCB designers are at the epicentre of innovation in modern electronics. Their expertise drives the development of devices that power everyday lives, especially in the rapidly expanding IoT market. As the demand for advanced electronics grows, so does the significance of skilled PCB designers, making this a career with immense potential for growth and innovation. 

CALCOM VISION SECURES HPL ELECTRIC & POWER AS STRATEGIC PARTNER FOR LED LIGHTING MANUFACTURING

Calcom Vision Limited, a leading Electronics Manufacturing Services (EMS) and Original Design Manufacturer (ODM) in India, has entered into a strategic partnership with HPL Electric & Power Ltd to manufacture a diverse range of LED lighting products. HPL is a prominent multi-product electrical equipment manufacturer, offering solutions such as metering systems, switchgears, LED lighting, wires and cables, solar solutions, and modular switches.

This collaboration strengthens Calcom's market position, enabling mutual growth as the company expands its customer portfolio. The LED lighting products will be manufactured at Calcom's 15,000 sq. metre facility in Greater Noida.

Sharing insights into the partnership, Abhishek Malik, Executive Director of Calcom Vision Limited, stated: "HPL has been a key player in the power and cables industry for over 30 years, and we are proud to collaborate with them for shared success. Our commitment to building long-term, strategic partnerships and innovating products to meet market demands remains unwavering. By enhancing our R&D capabilities and expanding our engineering talent, we are strengthening our founda-



tion for future growth."

Calcom continues to prioritise customer needs, delivering a comprehensive range of indoor and outdoor LED products, solar lighting products, and BLDC fans. Its extensive client list includes leading Original Equipment Manufacturers (OEMs) such as Panasonic, Osram, Bajaj, USHA, Great White, Opplé Lighting, Amazon, and Anchor.