Ibrahim Nazir Sangi

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Full Stack Hardware Engineer
(Electrical/Embedded)

Proven track record of developing innovative products from concept to production, with over six years of professional experience overseeing hardware, firmware, and electrical engineering processes.

A versatile, passionate, self-motivated engineering professional with a product-oriented designing and developing skills. Technopreneur with over decades of experience in building innovative electronics products started from his own garage. Exceptional communicator consistently partnering cross-functional teams to ensure operational success. Analytical, innovative, and resourceful leader accustomed to driving productivity and ensuring timely project completion. Outstanding ability to analyze and solve complex problems. Excellent in system design concepts and achieving hardware specifications.

Embedded System Design / Assembly C, C++, Programming / Digital and Analog Circuit Design & Analysis / Design Mixed Signal Modules / Power Supply Design / Mechanical Design / Analog and Digital Signal Processing / Product Design & Development / Schematic & PCB Designer / Hardware & Software Debugging / Troubleshooting & Issue Resolution / Soldering SMD / Bring-up / Prototyping / BGA / Validation / Testing / PCBA / R&D

PROFESSIONAL EXPERIENCE

Electrical Engineer (Jan 2020 to Present)   **Luraco Inc. — Arlington, TX**

- Developing a **state machines driven**, **peripherals loaded embedded firmware** for i9 chair motherboard and daughter
- **Leading the development** of all new upgraded hardware/electrical and firmware designs for upcoming i9 massage chair (6 different boards, 12 motors, 8 sensors, three different microcontrollers), flagship product
- Delivered and developed a brushless DC motor design, **twice powerful**, **twice efficient, ESD safe**, and **three times less BOM cost** as compared to previously selling design (**ESD passed** in **first go out of eight tries** with previous BLDC hardware)
- Completely upgraded the hardware for the i9 Massage chair making it **reliable, efficient**, **feature-rich**, fewer components, and **less costly** (Fully responsible for hardware and firmware development)
- Slashed cost of up to **70 percent** on the prototype and production, of printed circuit boards (PCB) and PCB assembly (PCBA) and by changing vendors
- Saved production cost of up to **30 percent**, by sourcing the same components from different vendors
- Caught and **fixed four years old production bugs** in hardware and firmware related to different products
- Introduced and improved precise current measurement techniques by **routing kelvin connections** to shunt resistors
- Improved hardware to **ESD proofing**, **reducing EMI, grounding planes** issues, and handling of different grounds
- Actively involved with the technical support team to solve bugs and handling customer's feedback
- Improvements, additional features, and bugs fixed in **Qt-based embedded application** for the remote
- Working together in a team on hardware and embedded assignments from home, during a **COVID-19 lockdown situation**
- TI MSP430 low-level drivers and state-machine code non-blocking code development
- Saved company a total of **$50,000** in a direct saving **within a year**.

Design Engineer (Computer Hardware/Electrical) (Jan 2019 to Dec 2019)   **Rex Robotics — Naperville, IL**

- Setup a low budget research and development laboratory for board bring-up, rework, debugging and testing (capable of developing in-house two-layer board with 10mil minimum trace width)
- Hacked Arduino hardware based on STM32 microcontrollers to have our own customized firmware and device drivers using STM32 toolchain (HAL libraries)
- Introduced the new design tool for **rapid prototyping** and to reduce product design cycle

- Designed and developed a high-speed board 1.5Gbps for multiple CSI-2/Parallel, camera streams with Xilinx Zynq (Patent pending and in collaboration with Avnet Inc. to manufacture and sell it)
- Device drivers, device tree binding, Kernel configurations, software/hardware interfacing with Linux video framework (V4L2) and Gstreamer for stereo vision applications
- Developed a complete embedded and hardware solution for an autonomous rover. Including schematics, PCB, embedded code for STM32 microcontroller and python scripts

Graduate Research Assistant (Jan 2017 to May 2018)   **Eastern Illinois University — Charleston, IL**

- Designed, and programmed a self-navigated robot with C at the **National Robotics Challenge** in 2018
- Led a team of five to design a partial automated robot and program with C to an Arduino microcontroller at ATMAE robotics competition in 2017 (**Won fourth position, out of 10**)

Design Engineer (Jun 2012 to Aug 2016)   **And-Or Logic — Islamabad, Pakistan**

- Crafted a high-speed PCB (1Gbps and 3.4Gbps) motherboard **in 15 days with zero rework** required
- **Slashed project timelines by three months** by implementing a new hardware designing software for the company
- **Created low-level, highly efficient APIs** for multiple microcontrollers, later distributed company wide. Reduced time and labor for each project by 10%. Enhanced firmware 10% by modifying low/high-level APIs, enabling data to almost send in real time
- **Drastically improved debugging performance**, designing and implementing a new debugging device
- Developed power systems up to 6KVA (inverter, charge controllers)
- **Cut BOM costs by 20% ($200 per prototype)** through negotiations and partnerships with Chinese vendors; researched available resources and changed the equivalent part number
- **Championed improvements to smart battery firmware/hardware.** Optimized APIs, removed extra loops, and altered hardware components to increase self-discharge from three days to six months
- Enhanced hardware module in a production model, **improving battery performance from two to 30 days; created a 90% reduction** in BOM costs
- Achieved successful **production of 70 units with 99.9% accuracy**

Founder (Apr 2006 to Aug 2016)   **IbrahimLabs — Rawalpindi, Pakistan**

- **Hardware solution provider** according to customers' requirements (locally and internationally)
- Building own innovative ideas and hardware solutions to automate certain daily tasks
- Working on projects-based solutions to learn and earn by **doing rapid prototyping**
- Writing blogs for open-source coding/hardware for young engineers to learn
- Running a blog; code, examples and simulations are open source https://www.ibrahimlabs.com/
- Please visit my website for a few of my personal portfolio: https://www.ibrahimsangi.com/project.html

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TECHNICAL PROFICIENCIES

- Altium Designer, Cadence OrCAD, Allegro, Capture, Layout, PCB editor, Proteus, PSpice, EAGLE
- Oscilloscope, Logic Analyzers, Power Supplies, Soldering Iron, DMM, Hot-air rework station.
- Keil µVision, MPLAB, MATLAB, Eclipse, GitHub, SVN, AVR studio, Microsoft Office (Word, Excel, PPT), Visual Studio & Visio, IAR Embedded workbench, Windows, Linux, Vivado, Code composer studio
- UART, SPI, GPIO, I2C, SMbus, PMbus, JTAG, USB, ARM, microcontrollers (MCU), SoC, PIC, STM32, DsPic, MIPI CSI-2, MSP430

EDUCATION
Master of Science in Computer Technology, 2018
Eastern Illinois University, Charleston IL, 2018
Bachelor of Science in Electronics, 2012
Comsats Institute of Information Technology, Islamabad, Pakistan, 2012

- Led a team of three to design a quadcopter microdrone (Final year project)