# HUBAIL K

📞 +91 9656383100 ✉ hubailk7@gmail.com 🔗 linkedin.com/hubailk ⭘ https://github.com/hubailk

## SUMMARY

Experienced Robotics and Automation Engineer with 5 years of experience in robotics, automation, and embedded systems. Skilled in new product development, robotic manipulators, and system integration, delivering advanced automation solutions across industrial and medical domains. Proficient in robotics simulation with NVIDIA Isaac Sim, Isaac Lab, and Physics AI, ROS 2, and reinforcement learning. Experienced in programming and deploying robotic manipulators, developing control logic, and integrating with PLCs, pneumatics, and vision systems. Adept at collaborating with cross-functional teams to design innovative, reliable, and scalable robotic systems, ensuring high precision, optimized workflows, and improved productivity.

## SKILLS

**Programming Languages**: Python, C++, RAPID, VAL-3, Ladder Logic.
**Simulation & Robotics Tools**: NVIDIA Isaac Sim 5, Isaac Lab, PhysicsAI, RobotStudio, RoboDK, Sysmac Studio, TIA Portal, Arduino IDE, Git, ROS 2, RViz, MoveIt 2
**Hardware & Systems**: ABB YuMi, ABB GoFa, Omron TM900, Staubli TX60, Siemens PLC, Omron PLC, Pneumatic Systems, Schunk Grippers, Festo Components, Raspberry Pi, ESP32, TurtleBot 3
**Methodologies & Processes**: FMEA, Root Cause Analysis, HIL Validation, Agile (Azure DevOps)
**Future of Automation**: Make → Train → Deploy → Maintain

## EXPERIENCE

### SINERGIA MEDIA LABS
*Senior Robotic Engineer*

Jan 2021 – Present
*Bangalore, India*

- **Led early-stage concept development for drug delivery device assembly lines**, focusing on system integration, functionality testing, and performance evaluation to ensure reliable operations.
- **Collaborated with cross-functional teams** , including mechanical engineers and third-party technicians, to seamlessly integrate mechanical, electrical, and software components. .
- **Designed and optimized pneumatic and electrical systems** for automation lines, ensuring high efficiency, reliability, and minimal downtime.
- **Programmed and integrated advanced robotic systems** including **ABB YuMi**, **Omron TM900**, and **Staubli TX60 robots** using **RobotStudio**, **VAL3**, and **SRS**, enabling high-precision automation workflows.
- **Simulated robotic workflows and optimized path planning**, significantly reducing setup time and improving system throughput.
- **Implemented embedded control systems** using **microcontrollers** (Arduino, ESP32) and designed **PCBs** for **ventilator solutions**, collaborating with **NUS** and **MIT** during the **COVID-19 crisis**.
- **Executed FMEA and root cause analysis**, enhancing system performance and reducing operational risks, while also participating in HIL validation through custom test benches.
- **Mentored interns and utilized Agile methodologies (Azure DevOps)** to track project milestones, manage tasks, and ensure timely, goal-aligned delivery of automation solutions.
- **Programmed Siemens and Omron PLCs** and **integrated components** from **Festo**, **Schmalz**, **Schunk** , and **CKD** into automation systems, ensuring seamless **hardware-software coordination**.

## PROJECTS

### ROBOTICS SIMULATION WITH NVIDIA ISAAC SIM, ISAAC LAB AND PHYSICSAI | *Isaac sim, isaac lab, Ros2*

- Designed a digital twin of a TurtleBot3 for SLAM, navigation, and reinforcement learning.
- Integrated ROS 2 Humble for real-time data exchange and autonomous navigation.
- Simulated physics-accurate environments for robust sim-to-real transfer.

### GENAI ROBOTICS SYSTEM: VOICE-TO-ROBOT INTELLIGENT AUTOMATION | *ROS, MoveIt!, GPT-4o, Whisper, YOLOv5, OPC UA*

- Developed a Generative AI-powered robotic system enabling Staubli TX2-60 to perform pick-and-place tasks from natural language (voice/text) commands.

- Integrated Whisper, GPT-4o with LangChain, and YOLOv5 + OpenCV for speech-to-text, intent interpretation, and real-time object detection with coordinate transformation.
- Implemented ROS + MoveIt! for motion planning and collision-free control, interfaced with Staubli ROS driver and OPC UA PLC for vacuum gripper actuation.
- Built two architectural approaches:
  * **Tool Calling** with modular Python functions for object detection, motion planning, and gripper control.
  * **LLM Code Generation with Redis semantic caching** for dynamic Python code execution and adaptive automation.

### SMARTDOSE 10 FLEX ASSEMBLY LINE  | *OmronPLC, ABB YuMi, ABB GoFa*

- User has experience designing and implementing robotic automation solutions for assembly lines, specifically for **Smart Dose 10** drug delivery devices. They focus on assembling **Smart Dose devices** efficiently using **robots**, ensuring precision, optimized workflow, and cost reduction.
- Designed and developed robotic workcells and layout configurations, optimizing material flow and reducing cycle times by 25%.
- Programmed and integrated **ABB YuMi, ABB GoFa** and **Omron TM900 robots** into the **FPM system**, collaborating with cross-functional teams to define specifications.
- Used **RobotStudio** and **RoboDK** for simulation and offline programming, validating and optimizing robot paths.

### FILL AND FINISH AUTOMATION | *Stäubli TX60, Seimens PLC, Profinet, ProfiBus, EGL gripper*

- Automated the **Fill and Finish** process in a pharmaceutical facility by designing robotic systems, integrating automation equipment, optimizing production, improving product quality, and reducing manufacturing time.
- User has experience programming and integrating **Staubli TX60 robots** using **VAL3**, developing **PLC programs** (Ladder and S7-GRAPH), and implementing **PROFIBUS/PROFINET protocols** for seamless communication.
- Integrated robotic arms with **pneumatic systems**, **Schunk EGL grippers**, and **vacuum cups** to enhance precision and efficiency in automation, optimizing workflows for improved performance.

### IndVentr200 (i200) | *C++, ESP32, PID Controller*

- The **Individualized System for Augmenting Ventilator Efficacy (iSAVE)**, in collaboration with **MIT**, enables a single ventilator to support multiple patients. The **INDVENTR-200** is an advanced and affordable ventilator designed for **emergency care**, offering **pressure** and **volume control modes** to strengthen healthcare systems during the **COVID-19 pandemic** and future **epidemics**.
- Programmed **microcontrollers** (Arduino, ESP32) for **sensor interfacing**, **actuator control**, and **data acquisition**, and implemented **control algorithms** for **pressure**, **flow**, and **volume regulation** in the **INDVENTR-200 ventilator**.
- Designed **PCB layouts** for **embedded controller boards**, verified **hardware functionality** through **bench testing**, and collaborated with researchers from **NUS** and **MIT** to optimize **firmware** for **ventilator solutions** during the **COVID-19 crisis**.

### EMG CONTROLLED PROSTHETIC ARM (Capstone Project)  | *Arduino, Servo, 3D printing*

- Developed a myoelectric prosthetic arm using EMG signals from the remaining arm to control the prosthesis.
- The prosthetic arm responds to the user's muscle signals, allowing for more natural movement and helping amputees perform daily tasks with greater ease and independence.

## EDUCATION

### TKM COLLEGE OF ENGINEERING, KOLLAM                                       2020
*B. Tech in Electronics and Communications ( CGPA: 7.4/ 10 )*

### AKNM GOVT. POLYTECHNIC COLLEGE, THIRURANGADI                           2015
*Diploma in engineering ( CGPA: 6.7/ 10 )*