

# Mutte Ur Rehman

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## Experience

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- ImViA, Robotics & Control Engineer Thesis Intern** | Le Creusot, France Jan 2023 - June 2023
- Developed robust **non-linear control** for quadcopters and wheeled robots, enabling precise tracking, disturbance resilience, and computer vision integration for real-time autonomy.
  - Tested on AR Drone 2.0, DJI Tello Drone, and TurtleBot3.
  - Strong programming skills in ROS and C++.
- Z-PARADISE SAS, Robotics & Control Engineer Intern** | Staffelfelden, France June 2022 - Sep 2022
- Pool Quality Sensor: Designed PCB and programmed the swimming pool filtration management system using various components **ESP32**, sensors, & **solar power** and implemented **Z-wave protocol**.
  - Integrated CI/CD pipelines using Azure DevOps, ensuring efficient deployment and maintenance of software product
- Sky High Escape Rooms, Robotic Software Engineer** | Remote Aug 2020 - Oct 2020
- Node-RED** escape room program for Raspberry Pi with multiple user inputs, **camera feeds**, and HDMI/audio output, designed with a specific **sequencing algorithm**.

## Education

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**MSc in Computer Vision and Robotics (VIBOT)**, Université de Bourgogne | Le Creusot, France 2021-23

**BE Mechatronics Engineering**, Air University | Islamabad, Pakistan 2015-19

**Courses:** Advance Linear Algebra | Embedded Systems | Real Time Imaging & Control | Machine Learning | Deep Learning | Perception | Autonomous Robotics | Controls | Advance Image Processing | Scene Segmentation and Interpretation

## Skills

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**Programming** CAN BUS, Python, C/C++, C#, embedded C, CUDA, CMake, Matlab, Git, Scripting (Bash)

**Software** Linux, Pm2, Tensorflow, Pytorch, Docker, OpenCV, PyQt, Tkinter, ROS, ESP32

**languages:** English, French, Urdu

**Project management:** Time Management, Problem-solving, Documentation, Engaging Presentation, Leadership, On-site coordination

## Projects

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### Enhanced Battery Pack Monitoring and Inverter Control System

- Implemented an advanced battery pack monitoring and inverter control for multiple systems.
- Enhance battery pack monitoring by 20% through the development of a custom **CAN bus** protocol decoder.
- Established reliable communication with the Solutronic inverters, enabling efficient charging and discharging operations.
- Stored and analyzed battery pack data in a local **SQLite database**, providing valuable insights into battery health and performance.
- Created a user-friendly dashboard for **visualizing and analyzing** collected data, allowing technicians to efficiently monitor and troubleshoot battery issues.

### Agrobot: Autonomous Agricultural Device

- Developed an **autonomous robotic system**, Agrobot, that automates seeding, irrigation, and soil analysis tasks, improving efficiency and crop yields by 20%.
- Integrated **soil moisture** sensors into Agrobot, enabling precise irrigation, and reducing water consumption by 15%.
- Introduced a **GPS-guided navigation system** for Agrobot, ensuring consistent and **precise seeding and irrigation**, reducing human error and improving field coverage.

### Visual Servoing using ROS and Python

- Used **Python ROS** to calibrate camera in Eye to hand camera configuration, did pose estimation, calculated distance & orientation to reach the destination and applied **A-Star** to determine the path without obstacle. Developed **Robot control system** to drive robot.

### Portable Weather Station Dashboard

- Developed a portable weather station powered by **Raspberry Pi** and **OpenWeather API**
- Designed a dynamic dashboard built using **Grafana**, **InfluxDB**, and **Telegraf** for real-time weather **data visualization**.

### SnowPlow Robot

- A smart snowplow robot equipped with OpenWeather API for snow monitoring, **geofencing-based** driveway clearing, **RTK GPS** path planning, and obstacle avoidance using **LIDAR**.

### QR-Driven Parallel Automation System

- Designed a PCB with **I2C** integration and developed **concurrent control** software for 48 pumps, 32 servo motors, and 16 stepper motors, using QR code scanning and **multithreading & multiprocessing** for efficient operation.

### UVC Light Disinfectant Robot

- Designed **PCB**, **control algorithm**, and **user interface** for UVGo1, a disinfectant robot utilizing **UV-C** (254nm) light to eliminate bacteria and viruses from surfaces.

### Drone Light Show

- Developed and implemented a comprehensive **hardware and software** solution for a fleet of drones used in a Drone Light Show.
- Collaborated closely with AI and engineering teams to achieve about 12% increase in **drone efficiency** and enhance overall performance.
- Utilized advanced algorithms, **data-driven insights**, and software engineering principles to create a **robust and reliable** drone system.

## Publication

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Artificial Neural Network Based Self-tuned PID Controller for Flight Control of Quadcopter, 2019-ICEET, Lahore. [Link](#)

## Achievements

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| 2019 | <b>Vice Chancellor's Recognition Award among 1500 students</b> , Air University        | <i>Islamabad, PK</i> |
| 2019 | <b>1st Position at Robo-rumble Competition</b> , SOFTEC 2019 – Fast University (NUCES) | <i>Lahore, PK</i>    |
| 2019 | <b>1st Position at Robowars Competition</b> , AirTech'19 - Air University              | <i>Islamabad, PK</i> |