RAJAT GUPTA

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PROFESSIONAL SUMMARY

Mechanical engineer with hands-on experience in production optimization, control systems, and autonomous platforms. Experienced in UAV development, pneumatic automation, and system-level process design. Skilled in integrating mechanical design with control logic, sensors, and AI-based analytics to create efficient, autonomous systems. Focused on defense and aerospace applications where precision engineering meets intelligent automation.

EDUCATION

- **New York University, Tandon School of Engineering** – Brooklyn, NY
  Master of Science, Mechanical Engineering | August 2024- present
- **Manipal Institute of Technology** – Manipal, India
  Bachelor of Technology, Mechatronics Engineering, Minor in Digital Marketing | Sept 2020-May 2024

EXPERIENCE

Emerson Automation Solutions – Pune, India
Mechanical Engineering Intern | Jan 2024 – June 2024

- Applied Maynard Operation Sequence Technique (MOST) to optimize butterfly valve assembly, cutting lead time by 13 seconds per valve and improving throughput across the line.
- Conducted time-motion and PERT analysis to map non-value-adding activities, collaborating with production technicians to standardize ergonomic workflows and reduce fatigue, recommending workflow and equipment layout changes adopted by management.

Shapoorji Pallonji Group – Mumbai, India
HVAC Engineer Intern | Jan 2023 – June 2023

- Developed BOQs and heat-load-based piping schematics for the New Delhi Railway Station project.
- Assisted in approval documentation and coordination between design and field teams.

LawgicHub AI – Remote
Co-Founder & Head of Systems Strategy | 2024 – Present

- Co-founded an AI-based legal technology startup developing intelligent document and case management platforms.
- Directed system architecture, market research, and UI integration while leading non-software operations including investor outreach and international hiring.
- Applied systems-engineering and process-optimization principles to build multi-agent automation workflows and improve model reliability.
- Established U.S. expansion strategy heading international operations, driving research and team formation for the American legislative automation product line.

PROJECTS

Autonomous UAV Platform – "Drone Project V1"

- Built a fully integrated 250 mm quadcopter from the ground up tuned via Betaflight with adaptive PID control. Designed as a low-SWaP testbed for defense-grade UAV autonomy and payload integration research.
- Conducted vibration filtering, EMI mitigation, and failsafe logic programming; achieved >0.3 m hover CEP under variable payloads.
- Integrated PPO reinforcement learning agent trained in Isaac Sim for sim-to-real deployment, testing autonomous pitch/roll control via UART stream.

SpinLaunch-Inspired Kinetic Launch Simulator

- Simulated a ground-based centrifuge launch system using Basilisk, integrating 3-DOF ascent, orbital insertion, and rendezvous dynamics.
- Quantified Δv reduction, drag limits, and capture window feasibility for payload delivery to 400 km orbit.

Arduino Controlled Evaporative cooled PV System

- Developed an automated water-mist cooling system with sensors for temperature, irradiance, wind, and pressure; activated solenoid-driven sprays above threshold temperature.
- Applied NOCT and PVsyst models for control logic, reducing module temperature rise and improving electrical output by 6.7%.
- Currently developing version 2 with enhanced sensor and algorithmic integration and on-board data logging for real-time efficiency tracking.

Pneumatic Copra Desheller

- Designed a pneumatic deshelling system using solenoid-controlled air actuation for automated copra breaking.
- Created full CAD and circuit design, integrating pressure-regulated valves for consistent shell separation.
- Simulated impact loads to prevent kernel damage; aimed to cut manual labor time by 70% and offer a low cost alternative for small scale farmers.

TECHNICAL SKILLS

- **Design & Simulation:** SolidWorks, AutoCAD, ANSYS, Simulink, CFD, Thermal Analysis, Fusion 360, Finite Element Modeling
- **Programming & Computational Tools:** Python, MATLAB, C, Basilisk (Space Mission Simulation), Betaflight, Isaac Sim, Excel (Advanced Modeling), Data Visualization
- **Control Systems & Automation:** PID Tuning, PLC Programming, Arduino, Raspberry Pi, Embedded Systems Integration, Signal Processing, Process Optimization
- **Robotics & Mechatronics:** UAV Systems, Sensor Integration, Actuator Control, Reinforcement Learning (PPO), Computer Vision (OpenCV), System Identification
- **Prototyping & Manufacturing:** 3D Printing (Metal & Polymer), CNC Machining, Pneumatic Systems, Rapid Prototyping, Material Testing, Assembly Optimization
- **Mechanical Systems & Analysis:** HVAC Design, Thermofluid Systems, Energy Efficiency Analysis, Vibration Analysis, Lean Manufacturing