



NIGHT FURY TECHNICAL DOCUMENTATION

About Us

Girift UAV is a student-driven engineering team that has been designing, developing, and testing unmanned aerial vehicles for over four years. By participating in various national UAV competitions, we continuously improve our expertise in autonomous flight, embedded systems, computer vision, and mission planning. Our goal is to transform innovative ideas into reliable, high-performance aerial platforms through teamwork, research, and hands-on engineering experience.

Mission:

Our UAV autonomously performs waypoint navigation, target detection, GPS localization, operator-assisted payload delivery, and aerial mapping within a single flight. The system integrates onboard perception, real-time telemetry, and a custom Ground Control Station to execute the complete mission efficiently and safely.

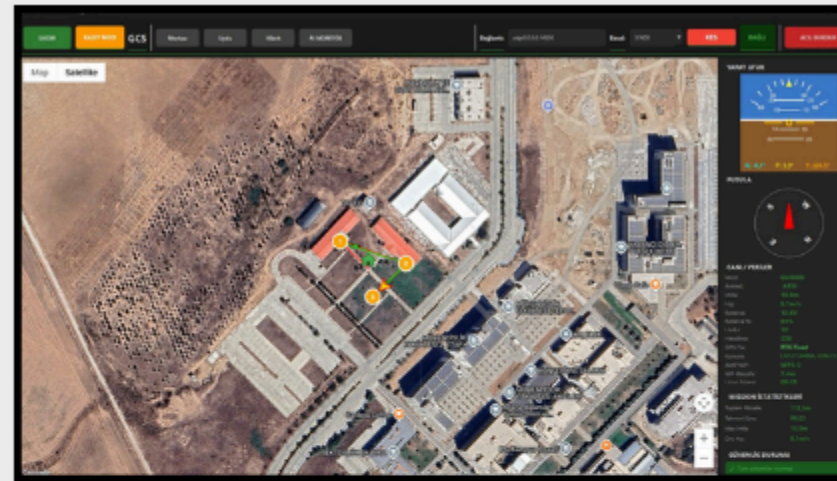
Avionics:

The avionics system consists of a Cuav X7 flight controller, RTK GPS for high-precision positioning, a Hobbywing X6-SE 280KV integrated propulsion system, SIYI HM30 long-range telemetry, a Radiolink AT9S Pro remote control system, an NVIDIA Jetson Nano AI onboard computer, and a SIYI A8 Mini imaging camera, providing reliable, autonomous, and high-performance mission capability.



Software:

The software architecture is designed as a modular and distributed system running on the Jetson Nano, Pixhawk flight controller, and our Ground Control Station. Independent modules perform real-time object detection, mapping, and payload delivery concurrently without affecting overall system performance. A YOLO-based vision algorithm detects targets and estimates their GPS coordinates using camera calibration and flight telemetry. Mapping images are captured at distance-based intervals to generate high-quality orthomosaic maps, while all mission data and operator commands are exchanged through the telemetry network. The software has been validated through both Gazebo SITL simulations and real flight tests, demonstrating reliable autonomous mission execution.



Aircraft Design:

Our UAV features a fully custom carbon fiber airframe that was entirely designed, analyzed, manufactured, and assembled by our team. The lightweight composite structure maximizes endurance while maintaining the structural strength and rigidity required for autonomous operations. Developed using SolidWorks for CAD modeling and structural analysis, the design enabled rapid iteration and optimization throughout the development process. All carbon fiber components were manufactured and integrated in-house, resulting in a robust, modular, and mission-ready platform optimized for the demanding requirements of the SUAS competition.

