

Task: Web-based UAV Monitoring and Task Execution

Platform

Overview:

You are tasked with developing a web-based UAV monitoring and task execution platform that allows users to manage drone tasks and retrieve images captured during task execution. The platform should provide functionalities for creating tasks, assigning tasks to drones, executing tasks, and retrieving images associated with each task.

Requirements:

Backend (Python Flask):

- Set up a Flask application to serve as the backend for the UAV monitoring platform.
- Implement RESTful API endpoints for managing drones, tasks, and images.
- Use SQLAlchemy ORM to interact with the database.
- Implement endpoints for:
 - `GET /api/drones`: Retrieve a list of drones with basic information.
 - `POST /api/tasks`: Create a new task with details such as task name, description, and assigned drone(s).
 - `GET /api/tasks/:id`: Retrieve details of a specific task, including associated drone(s).
 - `POST /api/tasks/:id/execute`: Execute a task, triggering image capture by the assigned drone(s). You need to generate 5 random noisy images and store it during this execution.
 - `GET /api/tasks/:id/images`: Retrieve images captured during the execution of a task.

Database Schema:

- Define a database schema with three tables: `Drone`, `Task`, and `Image`.
- Establish a one-to-many relationship between `Drone` and `Task` tables to allow drones to execute multiple tasks.
- Ensure proper foreign key constraints and data integrity.

Frontend (Vue.js):

- Develop a Vue.js application for the frontend of the UAV monitoring platform.

- Implement interfaces for creating tasks, assigning drones to tasks, and executing tasks.
- Design a page for displaying task details, including the list of associated drones and captured images.
- Utilize `fetch` API for communicating with the backend and updating the frontend UI dynamically.

Task Execution and Image Capture:

- Implement functionality to execute tasks assigned to drones.
- Trigger image capture by drones (generating dummy noisy images) during task execution and store the images.
- Associate captured images with the corresponding task for easy retrieval.

Submission Guidelines:

- Create a new repository for the UAV monitoring platform on GitHub or a similar platform.
- Commit your code to the repository.
- Include a README.md file with brief **setup instructions** and any additional notes.

Evaluation Criteria:

- Completion of Essential Features: Does the platform provide functionalities for managing tasks, assigning drones, executing tasks, and retrieving captured images?
- Code Quality: Is the code well-structured, readable, and maintainable?
- User Interface: Is the interface intuitive and responsive, providing a seamless experience for users?
- Integration: Are the backend and frontend components properly integrated, allowing data exchange and interaction?

Bonus Points:

- Use an OSS like minIO for storing images.
- Implement additional features beyond the basic requirements while maintaining simplicity and usability.
- Provide error handling mechanisms and clear feedback to users during task execution and image retrieval.
- Optimize database queries and API endpoints for improved performance.
- Implement authentication and authorization mechanisms for restricting access to sensitive functionalities.