

Fixed wing drone with auto-navigation

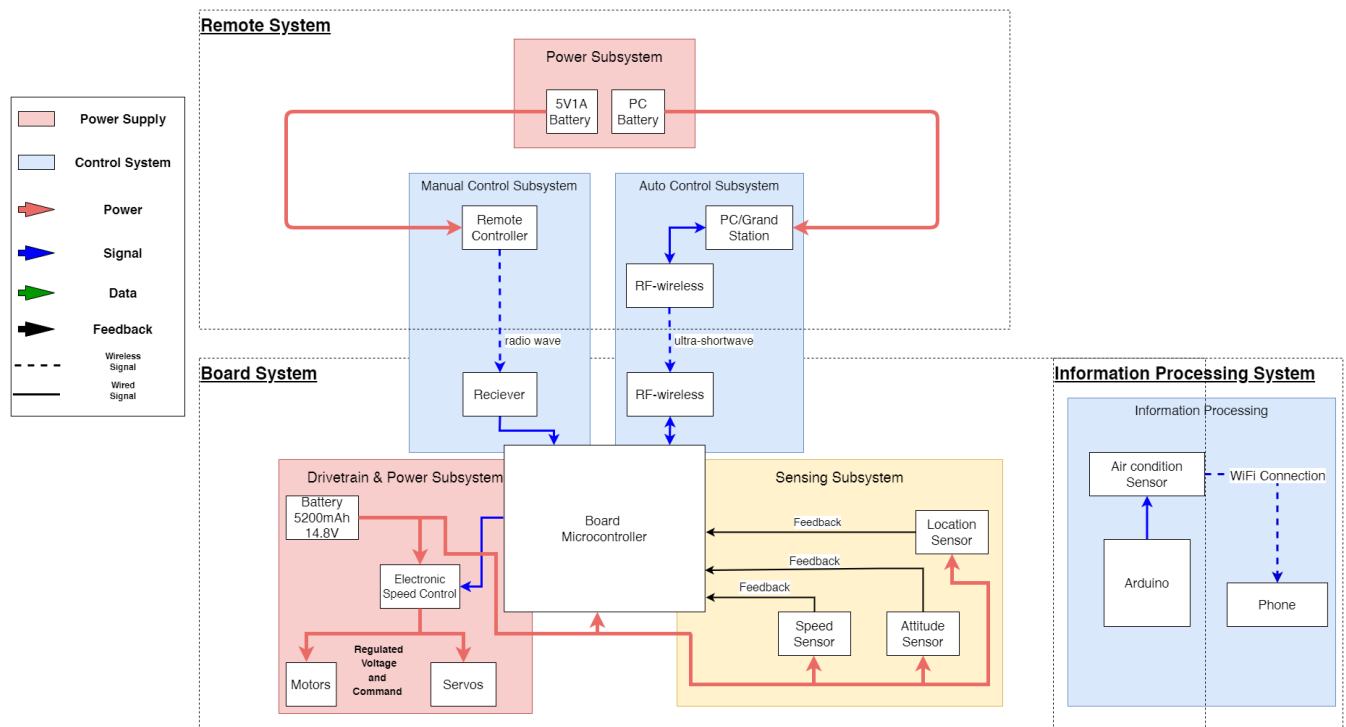
Group7

Introduction

In recent years, the increase in natural disasters such as chemical leaks, wildfires, and volcanic eruptions has led to the need for prompt notification of affected areas and the collection of accurate environmental data to reduce casualties and prevent environmental damage. Traditional methods of communication and data collection may not be effective in hazardous or hard-to-reach areas, creating a need for a novel solution.

This project aims to build a fixed-wing drone with auto-navigation. Compared to the rotorcraft, the fixed wing drone has a larger flight range and higher speed, so the fixed wing drone is better suited to our goals. The designed drone can automatically fly along a specified route based on computer instructions when it receives an alarm signal. This will improve the response speed to disasters and reduce the risks of flight operation. Additionally, the drone will carry an air quality sensor to collect air condition data including temperature, humidity, and air pressure, during flight and transmit it in real-time or store it in SD card for later analysis. This solution offers a more efficient and effective way to communicate and collect environmental data during natural disasters, reducing the risk of harm to individuals and the environment. Considering the drone is easy to get damaged, we have to get prepared to repair the mechanical part of the drone, our plan is to design replaceable components of the drone, we use 3D printing, laser cutting and other methods to manufacture the replacement parts, when some components damage, we can very quickly change them and recover the drone's mechanical function.

Block diagram



High-level Requirements List

- (1) The drone can be controlled manually so that we can control the drone to high altitude area about over 100m to collect data including the air quality.
- (2) The drone can realize self-stabilization in the air, ensuring that it will not roll over and crash while flying steadily in the air
- (3) The drone can navigate autonomously so that the drone can collect data from different places autonomously when out of the remote controller's receiving range about 800m.
- (4) The drone can take off from its landing gear instead of jettisoning, avoiding the risk of injury from the tail propeller.
- (5) The air quality sensor installed on the drone can detect the air data including temperature, humidity and pressure and then we can use the phone to get the data.

Stable device	➤ Complete and protected appearance ➤ Replaceable components ➤ Attack angle can be about 15 degrees	10
Manual control	Can react to the signal sent by remote controller. ➤ Four servos ➤ Motor	10
Self-stability	Under self- stable mode, the drone servos can react to external movement.	10
Air condition detection	The circuit can create network Wi-Fi and the sensor can detect the air data including temperature, humidity and pressure.	10
Set off and auto-navigation	The drone can set off manually and fly in the planned path.	10
Total		50 points