|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Requirement** | **Usage** | **Quantity** | **Price** | **Amount** | **Consumable** | **Link** |
| Teensy | Flight controller | 1 | 2100 | 2100 | Yes | [Teensy](https://robu.in/product/teensy-4-0-development-board/?gclid=Cj0KCQjw4bipBhCyARIsAFsieCzL8BK6Ylb1wuBvIogAacC6NNNR8hhrN5YLy2t6vlMy3C9AibI260oaAotfEALw_wcB) |
| ESCs | Flight controller | 4 | 405 | 1620 | Yes | [ESC](https://robocraze.com/products/simonk-red-esc-30a-for-quadcopter?_pos=1&_sid=852518bc0&_ss=r) |
| 1000kv BLDC | Flight controller | 2 | 375 | 750 | yes | [BLDC](https://robocraze.com/products/a2212-1000kv-bldc-brushless-motor?_pos=1&_sid=ff4ec9a24&_ss=r) |
| RC transmitter and receiver | Flight Controller | 1 | 4650 | 4650 | Yes | [RC Transmitter](https://robu.in/product/flysky-fs-i6-2-4g-6ch-ppm-rc-transmitter-with-fs-ia6b-receiver/) |
| Total | – | -- | - | 9,120 | - | - |

**Why teensy4.0?**

1. Clock Speed:
   * Faster ARM Cortex-M7 processor for complex control algorithms.
   * Up to 600 MHz clock speed for quicker computation and real-time data processing.
2. Floating-Point Unit (FPU):
   * Hardware FPU accelerates mathematical operations crucial for sensor fusion.
3. Memory:
   * Larger RAM size for handling large datasets and running complex algorithms.
4. Low Latency:
   * Designed for low-latency applications, ensuring quick response times for stability.

**Why ESC’s and BLDC Motors?**

The inclusion of Electronic Speed Controllers (ESCs) and Brushless DC (BLDC) motors is crucial for the initial stages of our project-

1. Code Testing:
   * Real-world Simulation: ESCs and BLDC motors allow us to test our code in a real-world simulation environment. This is essential for assessing the accuracy and reliability of our control algorithms under practical conditions.
   * Dynamic Response: The interaction between the flight controller's code and the ESCs with BLDC motors provides insights into the dynamic response of the drone. This step is vital for identifying and addressing any discrepancies between the theoretical model and the actual performance.
2. Fine-Tuning Drone Model:
   * PID Parameters Adjustment: With ESCs and BLDC motors in place, we can fine-tune the Proportional, Integral, and Derivative (PID) parameters. This process is crucial for optimizing the drone's stability and responsiveness, ensuring it behaves as expected in different flight scenarios.
   * Kalman Filter Optimization: Testing with real hardware enables us to adjust Kalman filter parameters accurately. Fine-tuning the filter is essential for precise sensor fusion, leading to accurate estimation of the drone's orientation and position.
3. Iterative Development:
   * Feedback Loop: The combination of ESCs, BLDC motors, and our flight controller code establishes an iterative development cycle. This feedback loop allows us to make continuous improvements, refining the code and control algorithms based on real-world performance data.
4. Realistic Performance Evaluation:
   * Real-Time Testing: ESCs and BLDC motors provide an environment for real-time testing, allowing us to evaluate the drone's performance realistically. This step is crucial for identifying and addressing any issues early in the development process.

**Why transmitter and receiver?**

1. Parameter Control:
   * Allows real-time adjustment of thrust, pitch, yaw, and roll parameters during flight simulations.
2. Flight Controller Interaction:
   * Direct interface to validate proper functioning of the flight controller code.
3. User-Defined Inputs:
   * Enables simulation of user inputs for a comprehensive evaluation of code adaptability.