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Hand Gesture Controlled Quadcopter

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1 INTRODUCTION

The purpose or the idea of our project was to control a quadcopter using hand gestures or hand movements. The quadcopter will be controlled by particular movements of our hand and these will be detected by sensors worn in our glove and sent to the quadcopter using signals and the quad will fly accordingly.

2 MOTIVATION

We have all used remote controllers to maneuver RC Cars, Planes and even Quadcopters.We wanted to get rid off these controllers and experience the joy and excitement of handling these things from a whole new dimension.That's what our main motive was, to give the user a whole new experience of controlling bots and planes with their own hand gestures.

3 PROJECT DETAILS / DETAILED DESCRIPTION

There will be a glove on our hand containing components like accelerometer + gyroscope(MPU6050), arduino board, a wireless transceiver module, flex sensors, battery. The MPU Sensor will detect the accelerations along its axes and this will be transmitted by the transceiver through arduino wireless communication. The other wireless module, on the quadcopter, that is, the other transceiver will receive these signals and send it to the arduino board, which will be coded to maneuver the quadcopter as desired.

4 PLAN OF ACTION / TIMELINE

Going on to timeline, this project needs about 5 weeks for completion. Here is the timeline of our project:

4.1 Part I (Completed in 4 weeks with proper demonstration to the managers of the Aeromodelling Club.)

- Week 1
    1. Start learning arduino.
    2. Research on different RF Modules.
    3. Research on flex sensors and potentiometric sensors.
    4. Research on accelerometers and gyroscopes.
- Week 2
    1. Finalising Sensors and modules.
    2. Buy major components of the project.
    3. Complete learning of arduino.
    4. Start coding part once the components are brought.
- Week 3
    1. Code both the arduino and sensors.
    2. Design the basic structure of glove with arduino and sensors.
    3. Soldering different items to the quad structure and glove.
    4. Mounting of arduino, batteries, power distribution board and other connections on the quadcopter frame.

- Week 4

    1. Getting used to Open Pilot Software to callibrate our vehicle.
    2. Start callibrating our vehicle to test motors and ESC's.
    3. Debugging in the code or solving any other problem with the quadcopter.

4.2 Part II (To be done in the starting of 3rd semester)

- Week 5

    1. Start callibrating our hand gesture transmitter using Open pilot software.
    2. Check the operability of the quadcopter.
    3. Testing quadcopter in the open with actual transmitter and receiver.
    4. Testing with our hand gesture transmitter/receiver.
    5. Fixing other minor problems and give finishing touch.

5 COMPONENTS

- Quadrotor Frame + ESC's + Motors (Acquired from Aeromodelling Club)
- Sensors : Flex sensors, MPU6050
- Flight Control Board CC3D
- Power Distribution Board + Bullet/Golden connectors

- Transmitter/Receiver (NRF24L01)
- Arduino Uno + Arduino Nano
- Jumper wires, 9V AA size batteries
- Quadcopter battery + charger + battery monitor
- Hand glove

6 PROBLEMS FACED & THEIR SOLUTIONS

- Problem- The Range of the transmitter and receiver is not large enough.
  Solution-This is set as a project limitation as the range cannot be increased further because then it will affect the data transmission.
- Problem- The connections and soldering were not proper in the beginning.
  Solution- We did all the connections and soldering from ground zero and ensured its proper working at each step.
- Problem- The callibration of the Vehicle and the transmitter was not proper.
  Solution- We identified the mistake and searched a bit more about callibrating Quads using Open pilot software. The Vehicle is callibrated but the transmitter part is yet to be done.