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380 Final

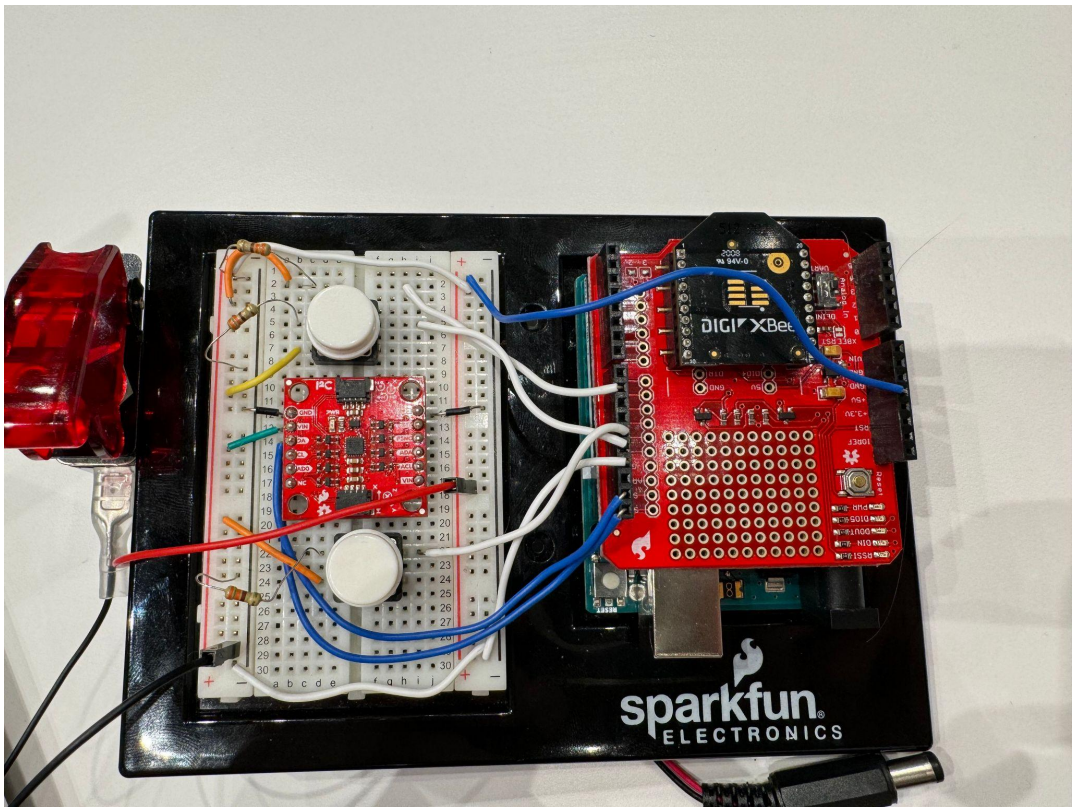
Drone Controller

Our project consisted of using an arduino to control a Tello drone. The hardware we used on the arduino was a gyroscope, two buttons, and a XBEE radio. The gyroscope was used to measure the tilt of our arduino. The arduino code filters through the gyroscope measurements and sends commands to the XBEE radio. For example, if the arduino is tilted forward between 90 and 45 degrees the command MOVE FORWARD is sent to the XBEE radio base station. The commands our arduino supports are MOVE FORWARD, MOVE BACKWARD, LEFT, RIGHT, UP, DOWN, ROTATE COUNTER CLOCKWISE, ROTATE CLOCKWISE, TAKE OFF, and LAND. These commands are sent to a python program that receives input from the XBEE radio base station. The python program uses the djtellopy python library to connect to the Tello drone. The program sends commands to the drone that correlate with the commands sent from the arduino. Two buttons on our arduino are used for the commands TAKE OFF, UP, and DOWN. Both buttons pressed at the same time will make the drone TAKE OFF or LAND depending on if the drone is in an on or off state. Pressing just the right button will make the drone fly up and pressing just the left button will make the drone move down. Our project incorporates sensors from our drone, recording the battery percentage, the temperature, and current height of the drone. A thread is used in our program to record these values from the drone and print them to the terminal every five seconds. The thread continuously records these values while the drone is flying. A temperature sensor is built into our gyroscope on the arduino as well. We have a

condition while the drone is flying that if the temperature sensor on the gyroscope reaches 70 degrees Celsius then the drone lands.

One of the biggest limitations to the project is the lack of beginner friendliness for the controller; this is because of how it will suspend after it sends a command to the laptop. This can cause some issues if you are turning it slowly back to its starting position since it will register the backswing as another input. The best way to avoid this is to reset the position after making a fast motion in the direction you want the drone to fly. Another limitation to our project is our land command. While the drone is flying the land signal is sent when both the up button and down button are pressed at the same time. When pressing both buttons the arduino always records an up or down command first then records that a land signal was sent. This makes landing immediately impossible because the arduino will first either go up or down. Adding another switch or button just to land the drone would fix this problem.

How has this project followed our original proposal? Well for starters we changed around what we are sensing in terms of data. Rather than use the accelerometer to handle the tilt controls we used purely the gyro. This worked exactly as we wanted and we were even able to get clockwise and counterclockwise working on top of forward, back, left, right, up, and down. Another thing that changed from the proposal is the use of a switch, while we were able to get our hands on a nice switch it used a circuit we didn't know. To switch states rather than a switch we used a combo press of the up and down buttons on the breadboard. In terms of what we kept from the original proposal we are still checking the gyro temperature and the gyro but now we are measuring drone temp, drone height, drone battery, gyro temp, gyro orientation.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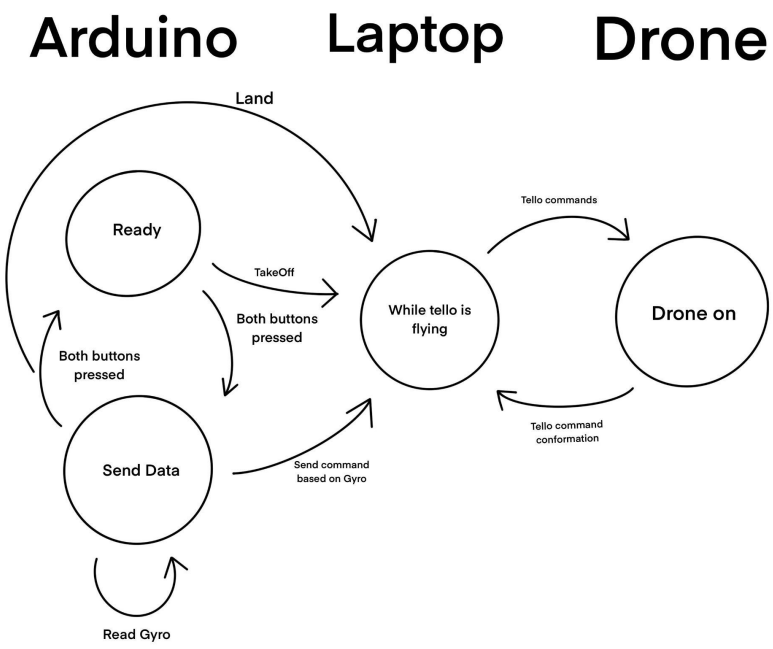
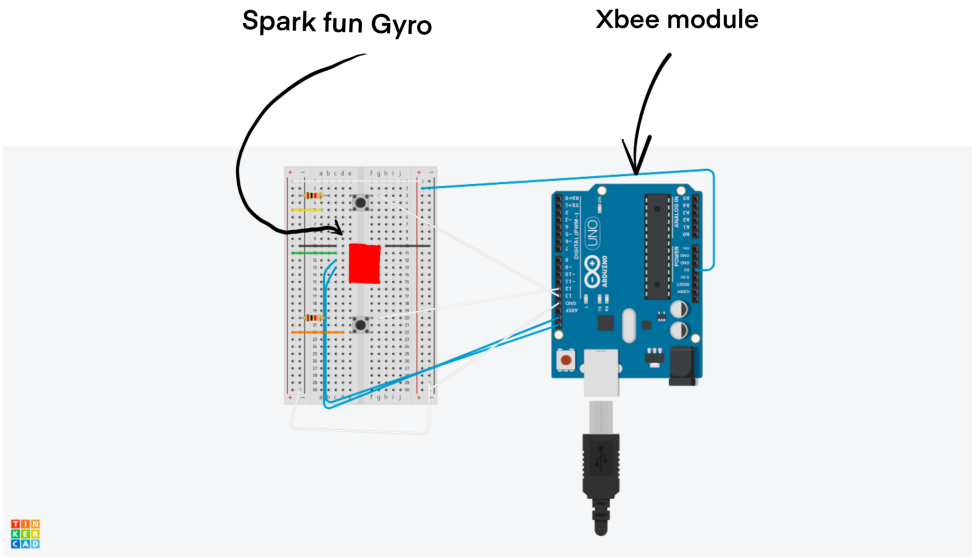

Arduino
Laptop
Drone
Land
Ready
TakeOff
Both buttons pressed
While tello is flying
Tello commands
Drone on
Tello command conformation
Both buttons pressed
Send Data
Send command based on Gyro
Read Gyro


Spark fun Gyro
Xbee module