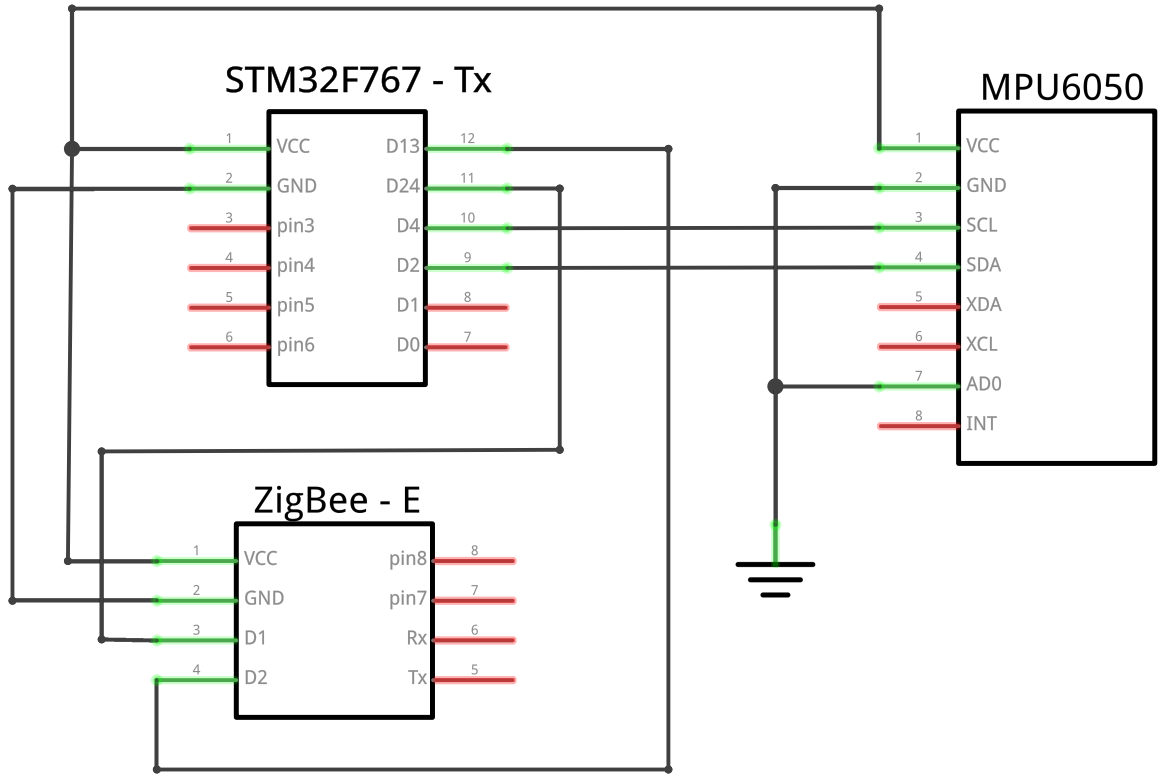
GYROSCOPE BASED REMOTE CONTROLLED BOT

Objective

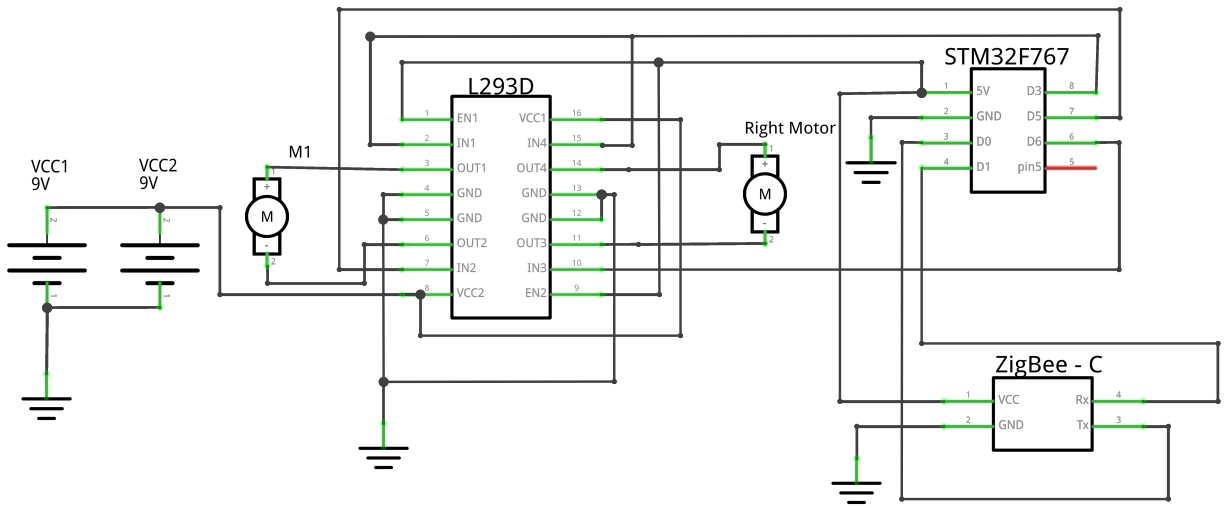
This project is dealing with inertial sensors, capable of detecting simple gestures such as rotation, elevation, movement etc. System will be based on STM32 platform, which will guarantee sufficient performance to evaluate the captured motions. Gyroscope values from the sensor were used to detect vertical and horizontal movements.

Circuit Diagrams

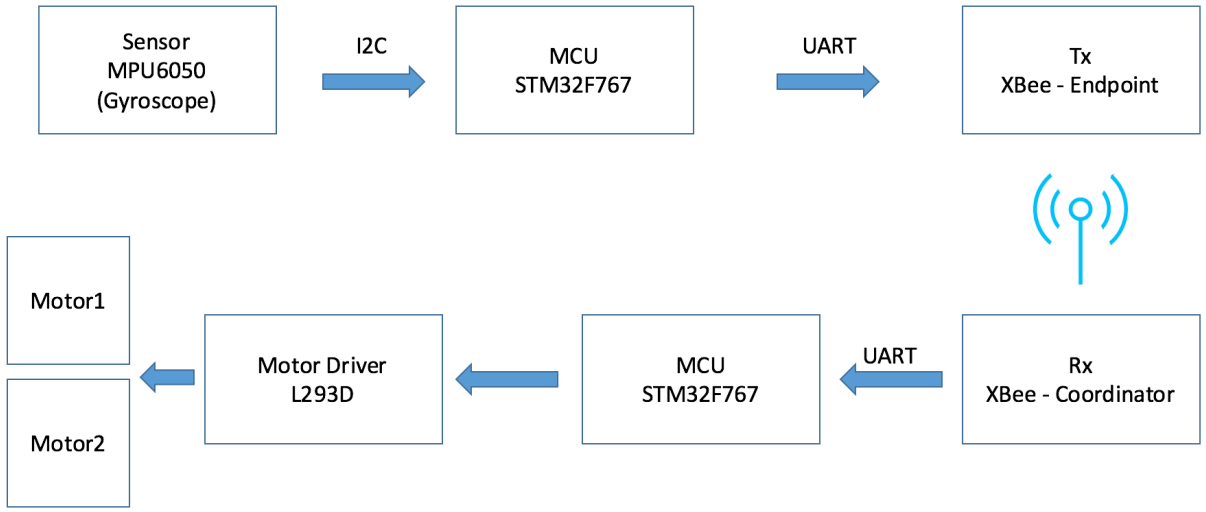
Transmitter Side (Tx) with End Point and Sensor



Receiver Side (Rx) with Coordinator and Bot



Block Diagram



Errors Encountered

The following were the errors encountered during the course of the project and how they were rectified.

1. To understand which registers need to be initialised to get the gyroscope data.
2. To understand the optimum frequency to operate I2C bus.
3. Finding out the appropriate registers in order to read the gyroscope values.
4. The values that were extracted from the sensor were 2's complement, converting it as necessary was essential.
5. Initially the values received were not as expected, it changed momentarily as the MPU6050 was rotated, but settled to zero in some time. It was later realised that the angular velocity was extracted rather than the required angular displacement, for which integration was performed as necessary.
6. It was also required to enable the data pins in the XBee end point to appropriately send the data via frames and also extract them accordingly.
7. The received data on the coordinator is digital, and PWM had to be generated accordingly with range decided based on comparison with the movement made with MPU6050 with duty cycle 1,2,3 respectively.
8. The motor initially couldn't move properly in all directions as it should've according to the PWM inputs, then it was later rectified by giving enough power through extra batteries.

Final State

In the final stage we were able to make sense out of the output given by the MPU6050 sensor on the endpoint and they were processed accordingly and transmitted through XBee (Wireless Modules) and received on the coordinator side. The frames were extracted and the data was used to decide the duty cycles and the PWM signals were generated accordingly.

The PWM signals were given to the motors through the L293D (Motor Driver). We were able to successfully control the bot through the inertial sensor's data remotely/wirelessly.

Future Scope of the Project

- The Endpoint side could be made compact and designed as a wearable.
- The Accelerometers of MPU6050 could be used to accelerate the bot accordingly.
- There could be indicators (LEDs) connected on the bot and when turning left or right, they could be made to turn on respectively.

Team Members

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