Hexapod-Drone

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Project objective

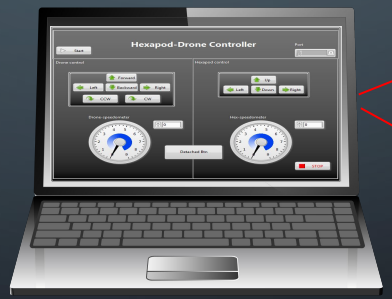
- Build a prototype of an affordable robot that can fly and walk with a transmitter station which can control both, drone and hexapod.

Project significance

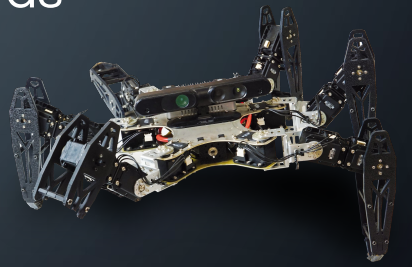
- Prototype can be used by developers to create an advance model which supports remote operation with a camera.
- Prototype is fully compatible with any other drone and hexapod.
- Also, the communication between transmitter and receiver supports full range of 100m.

Project novelty :

- A device that has the ability to walk like a robot or fly like a drone instead of having one or the other and can be controlled from one control station/transmitter.
- The budget for communication and final prototype was comparatively low than the market.



Radio Connection



Approach, Methods and Procedures:

Approach:

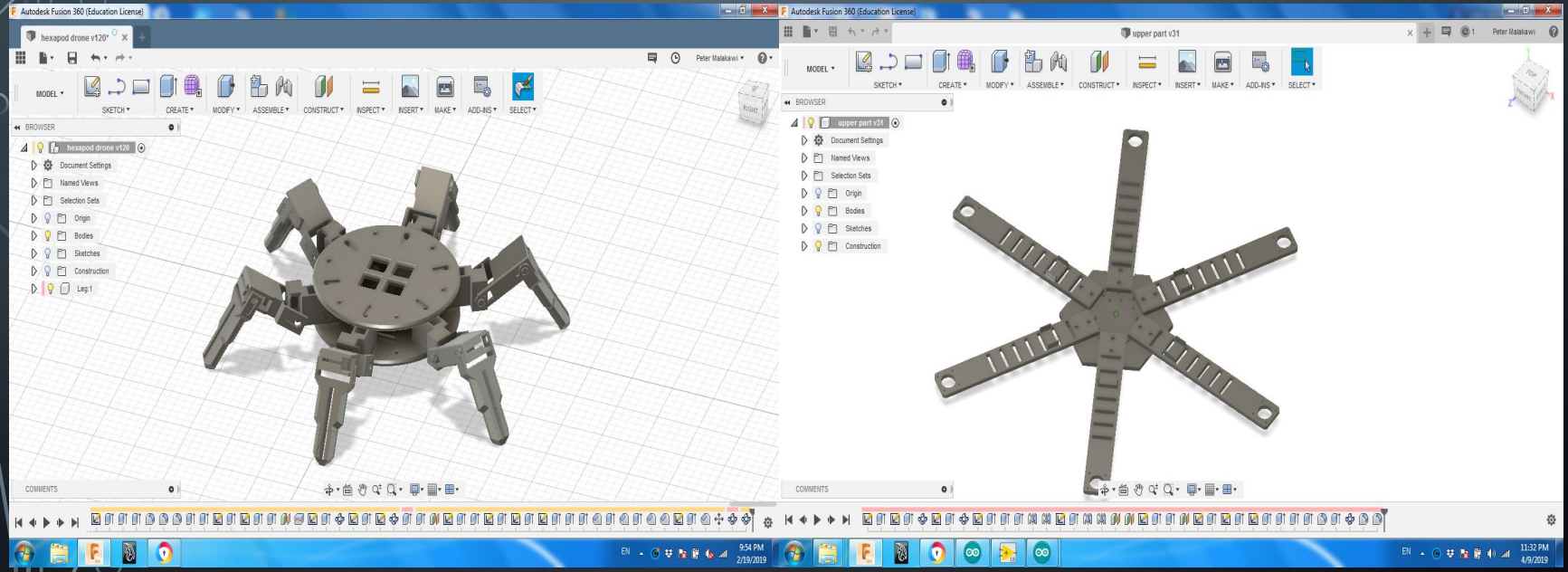
1) Controlling the two parts of the project using one controller.

   Solution → Building a labVIEW program with a cheap transceiver(nRF24L01), microcontroller(Arduino Nano).

2) Achieving the most optimum symmetrical design to avoid complexity in programing to balance the project while flying and walking.(Used 3D modelling software)
3) Optimizing the motion of the hexapod for better speed and avoiding obstacles.

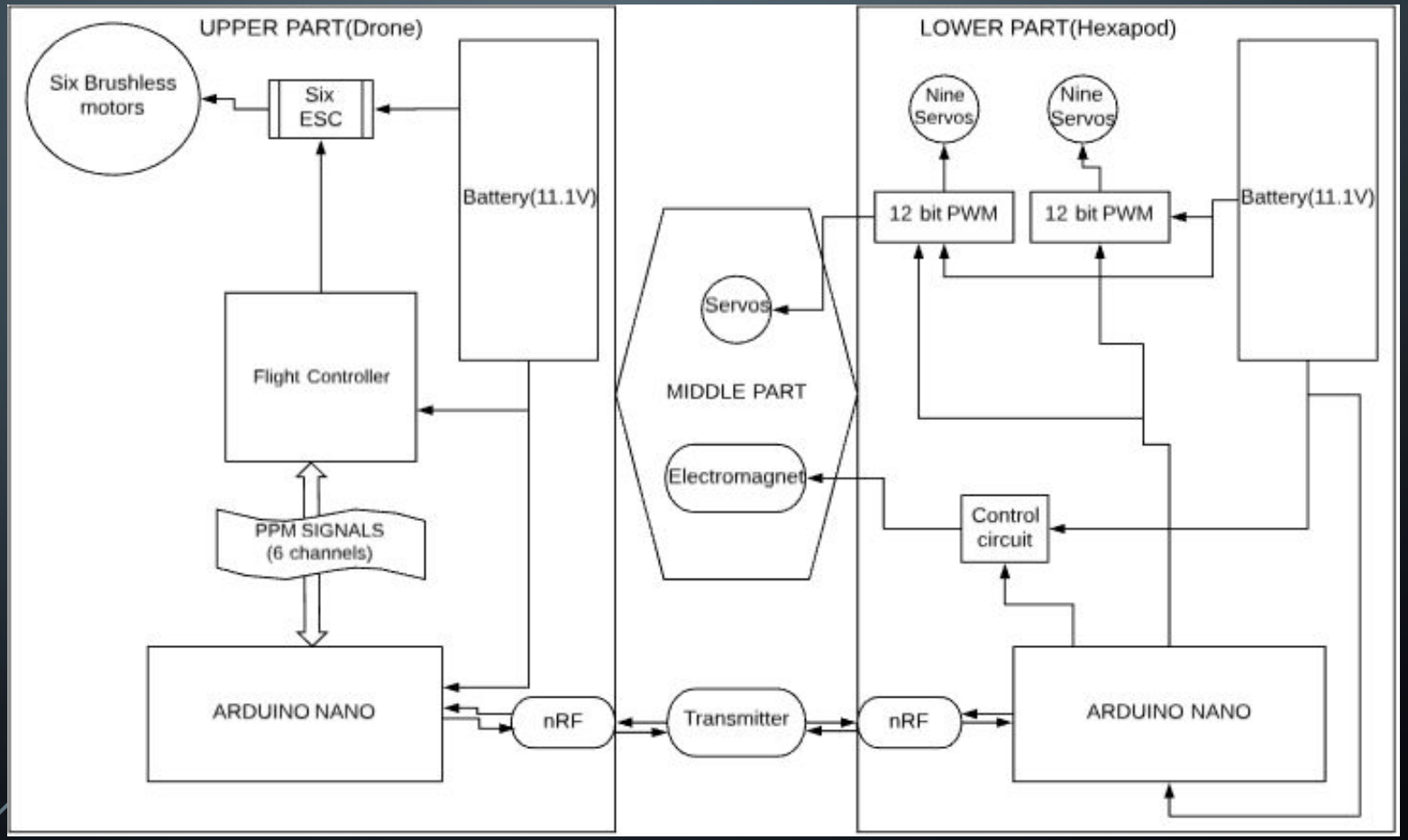
Methods & Procedures:

3D modeling and design



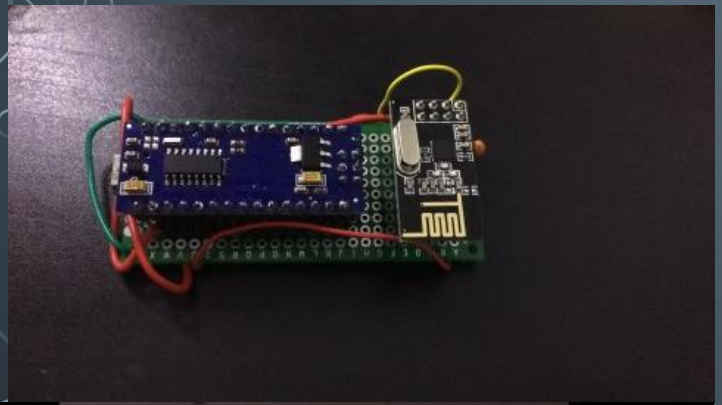
Transmitter : LabView interface

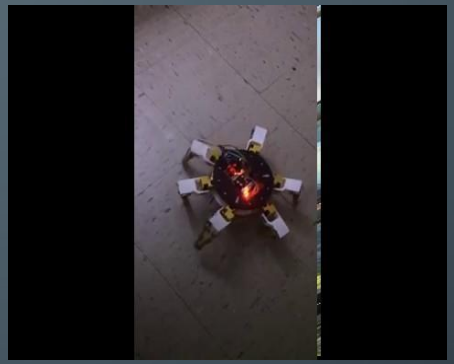
Block Diagram



Methods: Design

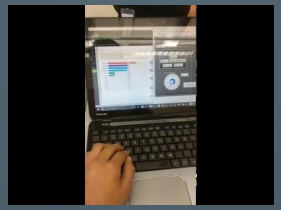
Lower part : Hexapod





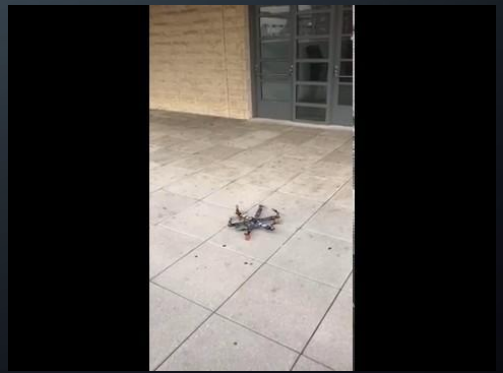
Testing, measurements and evaluations (include data you obtained).

Test1 :



Test2 :

Test 3:



Verification and validation:

The video shown above shows that our project works, and could be operated from one station. However, that satisfies the objective that we were working on.

Transmitter Prototype: Able to operate both parts.

Drone Prototype: Fly and controlled

Hexapod Prototype: Walks and controlled

BUDGET

Brushless motor	$25	Arduino-Nano	$15
Servos	$30	nRF24	$13
Propellers	$25	Flight Controller	$20
Electromagnet	$5	ESC	$25
Buck converter	$15	Voltage converter	$5
Battery (hexapod drone)	$65	Plastic (PLA Roll 1 Kg)	$20
Total	$263		

Learning experience:

We learned a lot through this project,

- Implementing **labVIEW** for communications
- Utilizing **3D printing** and **cad software (Fusion 360)**
- **Embedded systems** and programming
- Robotics dynamics
- Several **communications protocol** like I2C , SPI , PPM and serial (UART)

Future potential on the prototype:

- Camera for better control
- GPS
- Speakers and microphones for communications
- Drone : Different kind of connection between arduino and flight controller for more channels to work.

References:

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Questions ???