# **Problem Statements**:

To implement the following on a cheap mini-drone

* Global Pose Estimation and Odometry using Monocular Camera Images
* **Stabilization using Optical Flow**

<https://www.youtube.com/watch?v=7Uvj2LYbyAY>

* **Human re-identification and tracking**

<https://medium.com/@niruhan/a-practical-guide-to-person-re-identification-using-alignedreid-7683222da644>

<https://arxiv.org/pdf/1905.03422.pdf>

* **Human Pose Estimation and Gesture Control**

<https://www.youtube.com/watch?v=RHRQoaqQIgo>

* **Depth map using Monocular Camera images for obstacle avoidance**

<https://www.youtube.com/watch?v=KNft4RFsK28>

<https://www.youtube.com/watch?v=jI1Qf7zMeIs>

Implementation : <https://github.com/OniroAI/MonoDepth-PyTorch>

<https://github.com/alwynmathew/monodepth-pytorch>

<https://www.youtube.com/watch?v=NhxmBg-dvL0>

We have planned to implement these on DJI Tello, a small 100$ quadcopter with live 720p video feed very good camera quality with image stabilization and ROS support. We can get the raw video feed from the drone over wifi, process the video and send high-level commands like Up, Forward, Righ, etc.

This will serve as a platform for further research in drone autonomy. Like

<https://www.youtube.com/watch?v=T0A9voXzhng>

# **Ordering:**

Around 11K - <https://store.dji.com/product/tello-boost-combo?vid=45701>

Around 17K - <https://www.amazon.in/DJI-Tello-Drone-Boost-Combo/dp/B07H4W5YWB?tag=googinhydr18418-21&tag=googinkenshoo-21&ascsubtag=_k_EAIaIQobChMI-OGU1aG24wIVw4BwCh3CIA8cEAYYASABEgJfvPD_BwE_k_&gclid=EAIaIQobChMI-OGU1aG24wIVw4BwCh3CIA8cEAYYASABEgJfvPD_BwE>

Around 12K - <https://www.indiamart.com/proddetail/dji-tello-boost-combo-drone-21119107448.html>

<https://www.amazon.com/dp/B07HLL7KFJ/ref=cm_sw_r_cp_api_i_i3XfCbTQX02W5>

# **Brief Specs about Tello Drone:**

Charging time: 1.5 hours

Flight time: 13 minutes

Max Distance: 40-50 meters effective

Altitude: 10 Meters above the take-off position

No SD card

Tello in-depth review: <https://www.youtube.com/watch?v=yQoC_n6126A>

# **Programming Tello Using Python:**

<https://www.youtube.com/watch?v=zNyvbDGcR9E>

<https://www.youtube.com/watch?v=kcXN7CYgQ0g>

<https://github.com/dji-sdk/Tello-Python>

# **Using Tello with a router:**

<https://www.youtube.com/watch?v=cIsddY4SKgA>

# **Custom code to orbit a person:**

<https://tellopilots.com/threads/active-orbit-orbiting-a-walking-person-dji-ryze-tello-sdk.3904/>

# **Deep Learning is done using Tello:**

<https://www.youtube.com/watch?v=4KiH3Fq3olM>

<https://www.youtube.com/watch?v=esw88_gKOpA>

# **Miscellaneous Links:**

<https://www.youtube.com/watch?v=zIVgvrEcNcQ>

<https://www.youtube.com/watch?v=C95bngCOv9Q>

Precision Landing: <https://www.youtube.com/watch?v=iezU2PR0hBk&list=PLuteWQUGtU9BEMX3CTXxxSLb4XTByCiPI&index=2>

<https://www.youtube.com/watch?v=fGKR1G7orKA>

# **Estimated Budget on building our own drone:**

|  |  |
| --- | --- |
| Raspberry Pi 3B+ | 3000 |
| Pixhawk | 6000 |
| Camera |  |
| Battery | 1800\*2 |
| Miscellaneous | 5000 |
| Replacement Parts | 5000 |
|  |  |
| Total | 25000 |
|  |  |

Ardupilot communication with raspberry pi

<http://ardupilot.org/dev/docs/raspberry-pi-via-mavlink.html>

<https://www.youtube.com/watch?v=DGAB34fJQFc>

<https://www.youtube.com/user/dennisbaldwin/search?query=raspberry+>

Battery

<https://robokits.co.in/11.1v-lipo-batteries-3-cell>

Propeller Guard

<https://www.amazon.in/Robocraze-Quadcopter-F450-Propeller-Guard/dp/B077ZSFJLY?tag=googinhydr18418-21>

<https://www.banggood.in/buy/propeller-guard-quadcopter.html>

Instructables

<https://www.instructables.com/id/Quadcopter-HACK-Universal-Prop-guard-for-any-frame/>

<https://www.instructables.com/id/Cheap-and-heavy-duty-Multirotor-landing-gear/>

Pichawx

<https://www.amazon.in/Readytosky-Pixhawk-Controller-Autopilot-Control/dp/B07CHQ7SZ4/ref=pd_sim_21_4/262-8903395-7248510?_encoding=UTF8&pd_rd_i=B07CHQ7SZ4&pd_rd_r=8d521156-608f-4d5f-8345-af1e4df78807&pd_rd_w=7qicN&pd_rd_wg=nePfe&pf_rd_p=3ba80840-2950-4d64-ba61-c68a14bd0939&pf_rd_r=8W25TC8HRS7C4B048TR2&psc=1&refRID=8W25TC8HRS7C4B048TR2>

Camera:

Eyantra ELP camera

Spacers

<https://www.amazon.in/Segolike-Hexagonal-Standoff-Support-Spacer/dp/B07145HZ6D?tag=googinhydr18418-21&tag=googinkenshoo-21&ascsubtag=_k_Cj0KCQjwyerpBRD9ARIsAH-ITn8z6BYhp_LDr1C4se0TeuUYYuBYNhkl1EYXgHmZ6W9jfvoG6dsHyRYaAp5fEALw_wcB_k_&gclid=Cj0KCQjwyerpBRD9ARIsAH-ITn8z6BYhp_LDr1C4se0TeuUYYuBYNhkl1EYXgHmZ6W9jfvoG6dsHyRYaAp5fEALw_wcB>

<https://www.amazon.in/Newlly-Hexagonal-Standoff-Support-Spacer/dp/B07QX8L6T6/ref=sr_1_5?adgrpid=60503624058&gclid=Cj0KCQjwyerpBRD9ARIsAH-ITn9GV3duPfASA5es_W7RSvxo-V5lMGI8wAYetiBn6JWTkU1HVMj37EEaAk6SEALw_wcB&hvadid=294122126537&hvdev=c&hvlocphy=9040217&hvnetw=g&hvpos=1t1&hvqmt=b&hvrand=1112622580615130372&hvtargid=aud-750571057909%3Akwd-1456868412&hydadcr=19940_1805821&keywords=spacer+screw&qid=1564200489&s=gateway&sr=8-5>

Pixhawk

<https://robu.in/product/pixhawk-px4-autopilot-pix-2-4-8-32-bit-flight-controller/?gclid=Cj0KCQjwyerpBRD9ARIsAH-ITn-dVKV7o43HuNIA2WByO-vW5rm_gHyP2Jkyht36SW8PT3oi1MX-dWgaAgcpEALw_wcB>

# **Using Pixhawk:**

<https://www.youtube.com/watch?v=EqXmg7ne0gU>

<https://www.youtube.com/watch?v=uH2iCRA9G7k&list=PLYsWjANuAm4r4idFZY24pP6s1K6ABMU0p>

<https://www.youtube.com/watch?v=eojFschdvkU>

<https://www.youtube.com/watch?v=Hdhn0E1hEYc>