

## Analysis Of Mapping Multicopter Drones In The Entrance Area Of Prospective New Airports In Congot, Temon, Kulonprogo, Yogyakarta

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### Abstract

The research use multicopter drone. This mapping was carried out at the entrance area of the prospective new airport precisely at the Congot beach area, Temon district, Kulonprogo district with a multicopter drone. This drone is capable of recording an altitude of 100 meters above ground level and can photograph an area of 1.5 km. This study used a drone type multicopter. The vehicle specifications are as follows: Frame: F450; Flight Controller: DJI Naza M-Lite; Propeller: 1045 Prop; motorbike: brushless sunnysky 980 kVa; ESC: Skywalker 40 Ampere 3s; Battery: Ace 3s Gens 5000mAh; Remote: Turnigy 9XR with Frsky Tansiver; and camera: Xiaomi Yi 4k International edition. The height of a multicopter drone reaches 30 meters, can take an area of up to 1 km and a flight time of 15 minutes. The advantage of this multicopter is that it uses a DJI Phantom camera classified as stable for the light weight drone class. So for terrain with high wind speed, this multicopter drone is still able to maintain its position in the air. The Kulonprogo Regional Government and the Congot Radar really appreciate this mapping because it is very helpful in mapping this research.

**Keywords:** Drone, UAV, Mapping, Multicopter, DJI Phantom, Congot

## 1. Introduction

### 1.1 Type of UAV

Since 2016 the government has accelerated the registration of land systematically complete until in 2025 the whole plot of land in Indonesia registered. In 2018 alone the government is targeting 7 million fields, and 2019 is targeting 9 million. To achieve these targets is required technology that can overcome this. Drone, better known as Unmanned Aerial Vehicle (UAV) or unmanned aircraft technology as a solution for mapping of land with a large target, time and area flexibility desired shooting, and detailed shooting spatial resolution results as well as a relatively cheaper cost than the recording price with satellite. This study aims: to determine the level of accuracy of the drone generated mapping, and to compare the price of aerial photography produced by the drone with the image produced by the satellite. This research uses qualitative method. Since 2016 the government has accelerated the registration of land systematically complete until in 2025 the whole plot of land in Indonesia registered. In 2018 alone the

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Fig 1. Fixed Wing  
(Gross, 2016)



Fig.2. Multicopter  
(Juang and Tung, 2016)

## 1.2 UAV Development

Drone multicopter for researching pipes with multimodal sensor arrays. The method used is probabilistic parametric method. (Guerra, et al., 2018) UAV propellers with airflow patterns are used to take isokinetic samples with air volume 2 m<sup>3</sup>/minutes as shown Fig.3. (R Crazzolara et al., 2019)



Fig.3. Multicopter  
(R Crazzolara et al., 2019)

Drone type fixed wing can fly 100 meters to 200 meters until 30 minutes. Load drone is 2.8 kg. Drone type fixed wing can operate 20 hectare after 50 hectare.(Suroso, I and Irmawan, E., 2018)



Fig.4. Aerial Photos in Kotabaru, Lampung  
(Suroso, I and Irmawan, E., 2018)

Hexacopter and decacopter planes have the advantage of heavy aircraft, flying the fastest due to small aircraft planes. (Niemiec, et al., 2018). This study uses three color markers on UAVs and one external USB camera is used to reach mapping areas with locations that are difficult to reach. (Yamashiro, 2018). Topographic mapping with Airborne Synthetic Aperture Radar Sensors (SAR) with AiR-based UAVs with polarimetric SAR systems. (Lort, M., et al., 2018) Hexacopter drones are safe for various slopes, fields for terrain estimation that will be carried out mapping. DroneGear has eight propellers suitable for drone hexacopter. (Sarkisov, et al., 2018) Hexacopter with a ZED stereo camera was installed by the DJI to view aerial photographs. The algorithm is used to represent the results of mapping the farthest aerial photography. (Perez, E., et al, 2018). The work of hexacopter is tested with a single rotor, if the front rotor fails then the drone cannot be rotated but if only one of the hexacopter rotors can still be controlled by pilot on land. (McKay, et al., 2018)

## Method

- A. Location: Congot Beach, in front off Radar and Navigation Air Force in Congot, Temon, Kulonprogo in Fig 5.

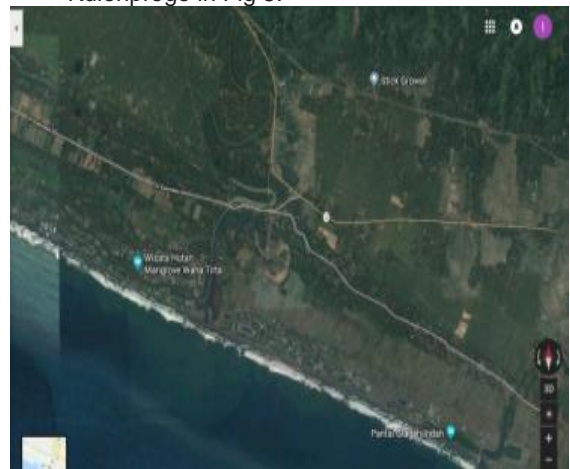


Fig 5. Google Maps in Congot Beach

- B. Instrument : Drone type multicopter

- C. Methode:

- 1) Preparation of multicopter four propeller assembly
- 2) Altitude can fly 1500m above ground level
- 3) Drone testing on land for security and check flight readiness
- 4) Camera of Calibration
- 5) The process of shooting in the air when the drone is flown
- 6) Result of aerial photos
- 7) Analysis of result aerial photos

Flowchart research as in Fig.6

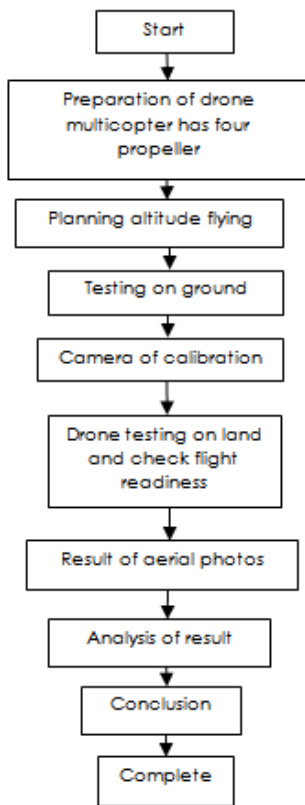


Fig. 6. Flowchart



Fig.7. Drone Multicopter



Fig. 8. Drone multicopter on ground

### 3. Result And Discussion

Mapping in this study on Friday, September 14, 2018 at Congot Beach, Kulonprogo. The mapping results are very good using the DJI Phantom Camera. The location of the mapping was held at Congot Beach, Temon Kulonprogo. Drones are able to operate for 15 minutes reaching altitudes up to 100 meters and covering an area of 1.5 km. The Kulonprogo Regional Government and the Congot Radar Unit really appreciate this mapping because it is very helpful in mapping the entrance of new prospective airports in Kulonprogo. Result of reasearch are Fig.7. Drone Multicpoter; Fig. 8. Drone multicopter on ground; Fig.9. Drone is flying in the sky; Fig. 10 Result of mapping from north Congot Beach and entrance area of New Yogyakarta International Airport (NYIA) in Kulonprogo in Congot Beach; Fig. 11. The research map is the place to fly a four-propeller drone at the entrance area of New Yogyakarta International Airport in Kulonprogo in from west Congot Beach;; Fig. 12.The mapping result is 100 meters above ground level on the Congot Temon beach in Kulonprogo and Fig 13. The mapping result is 100 meters above ground level at Congot Temon beach, Kulonprogo looks like trucks are picking up sand for NYIA construction.



Fig.9. Drone is flying in the sky

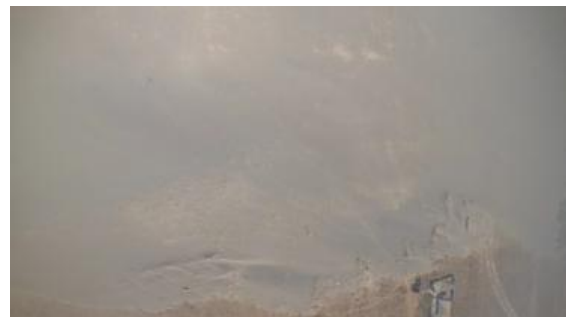


Fig. 10 Result of mapping from north Congot Beach and entrancearea of New Yogyakarta International Airport(NYIA) in Kulonprogo in Congot Beach



Fig. 11. The research map is the place to fly a four-propeller drone at the entrance area of New Yogyakarta International Airport in Kulonprogo in from west Congot Beach



Fig. 12. The mapping result is 100 meters above ground level on the Congot Temon beach in Kulonprogo



Fig 13. The mapping result is 100 meters above ground level at Congot Temon beach, Kulonprogo looks like trucks are picking up sand for NYIA construction

#### 4. Conclusion

Mapping in this study on Friday, September 14, 2018 at Congot Beach, Kulonprogo. The mapping results are very good using the DJI Phantom Camera. The location of the mapping was held at Congot Beach, Temon Kulonprogo. Drones are able to operate for 15 minutes reaching altitudes up to 100 meters and covering an area of 1.5 km. The Kulonprogo Regional Government and the Congot Radar Unit really appreciate this mapping because it is very helpful in mapping the entrance of new prospective airports in Kulonprogo.

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