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Flight Control System into Arduinoa Mega Getting Information and Visualization on The Aircraft Without Passengers and Crews

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Abstract

Indonesian is the best and beautiful country. They have thousand islands, to protect from others nation who wants to take one of the island. We must to save and keep on eye our lands of islands. Even though with our neighbourhood of approximately beside of Indonesian.Such as our friendship countries on Association of South East Asian Nation. Many border district to be side of Indonesian likes : Melaka Strait on Sumatera Island with Malaysia, Singapore and Tahiland and Hindia Ocean, Land on Kaliimantan Island with Malaysia, and Brunei, Land on Sulawesi with Philipine, South Chine and Pacific Ocean, Land on Papua with Papua New Guini and Land on Nusat Tenggara Timur with Timor leste and Australian. Indonesain is in center of there are countries also Hindia Ocean, Pacific Ocean. Inodonesian People must protect themselve's land, island and ocean from whom to steal. By flight was made of Indonesian product such as Indonesian Dirgantara Company Holding can develop and create some the aircrafts to keep on eye there, without Crews. With knowledge and technology. Can be build the aircraft using new components and electrical and electronics aviation might be done. Likes robot, aircraft or flight has automation smart control in their system. Driving and moving by command given of sensors and transducers input to fly and take off or land. It must be controlling by himself too. Unmanned Aerial Vehicle *(UAV)* needs electronics brain or Flight Controller (FC) to process the systems. UAV get command of it, receiving data and information from sensors. By Flight Controller Sensors *(FCS)* using into arduino mega 2650 microcontrollerdeveloping to be aircraft prototype. To detect movement, it is using the *IMU GY-87 sensor* of *MPU6050. PWM pulse* received command from Navigation System Transmittter of Ground Control Station (GCS). But at the mean time the aircraft prototype control manually by remote control on motor in 900 – 1800 ppm of PPM.

Kata kunci : Flight Contrloller Sensor, IMU, PWM Pulse, Remote Control,UAV.

Introduction

Now, the Unmamnned Aerial Vehicle (UAV) is increasing on the a*eromodelling and flights*. The Vehicle can be a solution watching the district where border of land in Indonesian with others countries. And to get tasking for specially of mean operation with the higher risk. UAV is an aircraft without crews and passengers by controlling with radio control. It is used in the UAV *Fixed-wing*. The Fixed Wing is a kind of UAV look likes an aircraft had flying characteristic similarity of flight. The UAV needs a controlling system by doing all of the systems.

Airframe UAV's Configuration

1. *Fixed-wing*
2. *Rotary-wing*.

Figure 1 *Rotarywing*(up)dan*fixed-wing*(down)

Methodology

The Creating and Developing Airframe Unmanned Aerial Vehicle will be explaining Figure 2.

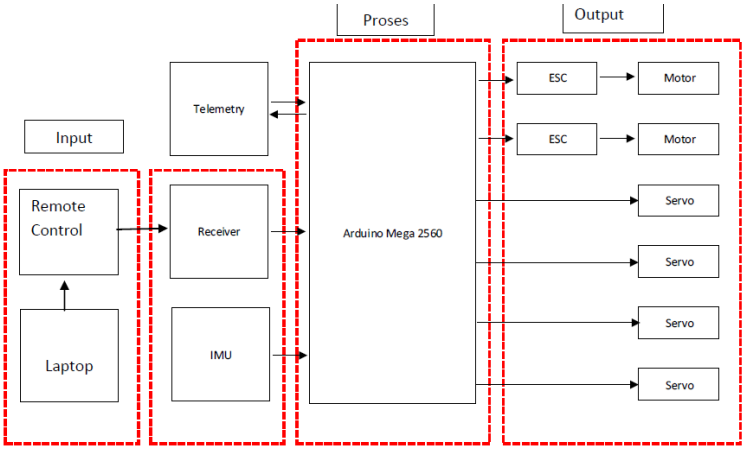

Figure 2.1 Diagram Blocks System

Table 1 Harrdware Components

No.	Materials	Unit
1	Arduino Mega	1
2	Servo	4
3	*Motor Brushless*& ESC	4
4	*Remote Control*	1
5	Gy 87	1
6	GPS	1
7	*Humidity sensor*	1
8	Baterai	1
9	*Telemetry*	1
10	*Module Power*	1

Hardware System.

Developing airframe likes aircraft without crew and passenger to catch up video, audio and photograph into Arduino Microcontroller. They have some components and tools supporting.

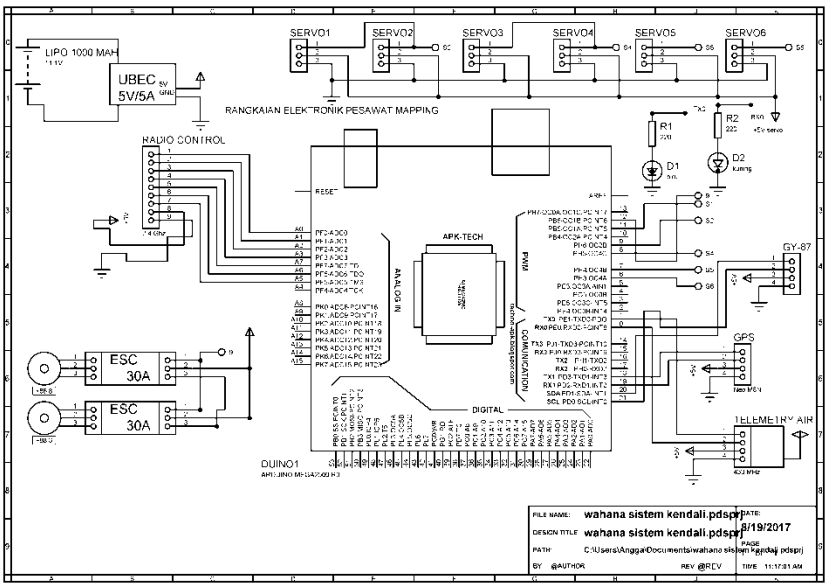

Figure 2.2 Airframe Electrical Circuit System

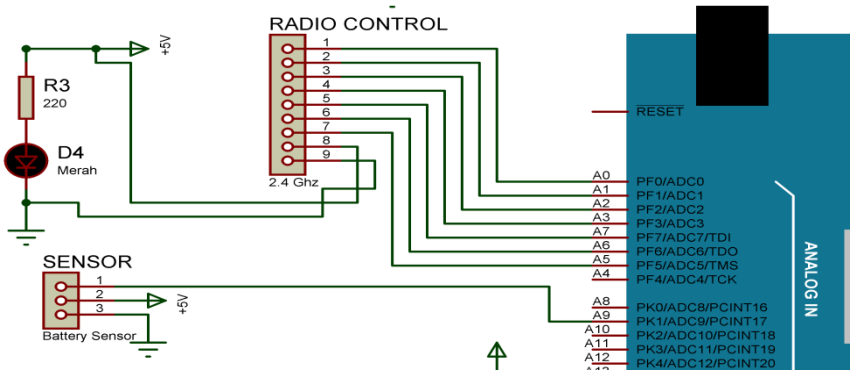

Figure 2.3 *Radio Control* Circuit and *Sensor Battery*

Flowchart of Aircraft System

Step on building to create and operate the aircraft or airframe are using *flowchart in software programming*, please look figure 2.4.

Flowchart Sistem Pesawat

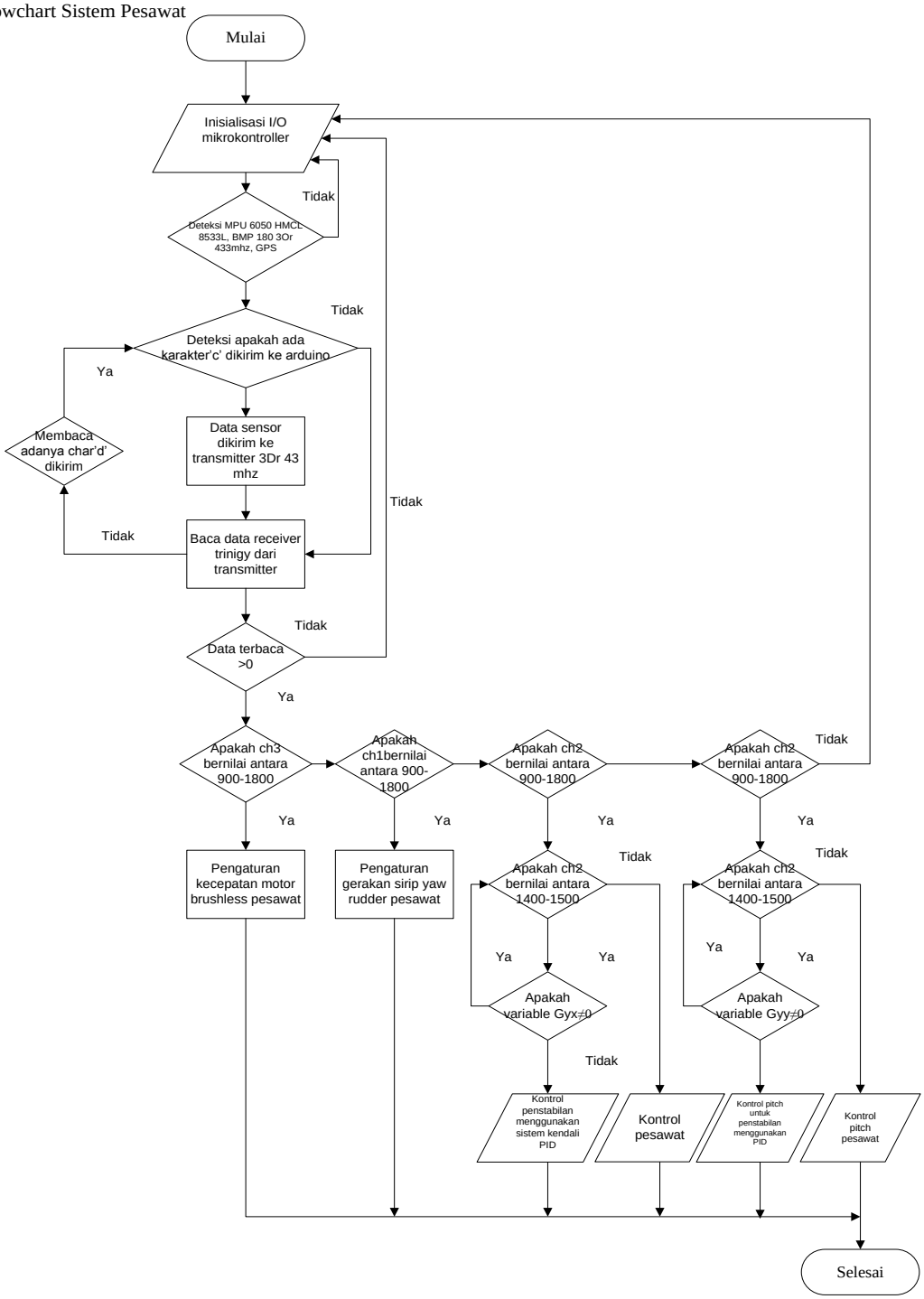

Figure 2.4 Flowchart of aircraft system**.**

a. Flowchart Software

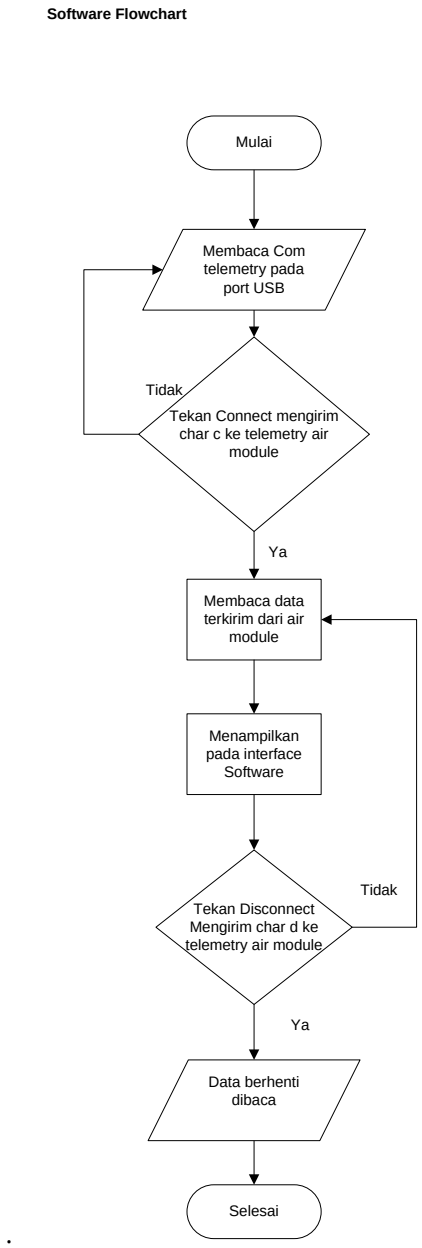

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Figure 2.5 Flowchart Software

Implememtation

Implemention of the aircraft creator built on to arduino microcontroller is processing and terminal. Their Components are GY-87, GPS, Telemetry, *Humidity sensor*, *Power module*, ESC, Sensor IMU, dan*sensor battery*. The UAV airframe are controlled by Remote Control.

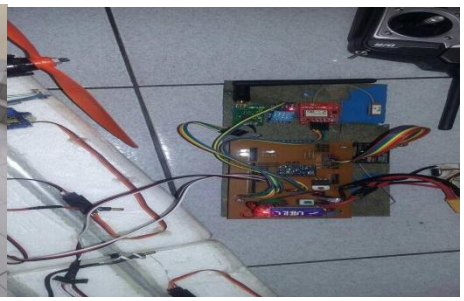


Figure 3.1 Creator of Airframe **Figure 3.2** Flight Controller Circuit

Figure 3.2.*Flight controller*on UAV airframe is functioning as a flight system to determine habitation of flight motion.Which is controlling by *remote control*.

Application

Movement UAV airframe test

Measuring with the remote control trinigy 5X.to count the number Rudder, Elevator and Aileron

Table2 Number*channel*RC on Airplane

NO.	Channel	Over (ppm)	Upstairs (ppm)	Downstairs (ppm)	Right side (ppm)	Between Right and left (ppm)	Left side (ppm)
1	Rudder(ch1)	-	-	-	900	1400	900
2	Elevator(ch2)	1800	1400	900	-	-	-
3	Aileron(ch4)	-	-	-	900	1400	900

Velocity of Motor Brushless UAV airframe test

Measuring the velocity of motor on brushless UAV airframe using *throtthel remote control*.Testing into number of time.To knowing the comparatively of motor velocity after measuring by number of time and battery capasities in operation.

Table 3 Measurement MotorVelocities

Experiment	Velocity (rpm)	Periode of Motor Motion (Menit)
1	417	1 Minute
2	447	1 Minute
3	470	1 Minute
4	475	1 Minute
5	475	1 Minute
Mean	**456.8**	**1 Minute**

The s*peedometer*on *software* of airframe showing that velocities on*motor brushless*airframe are 460 rpm, with temperatures are 42,13celcius, onto 46%.

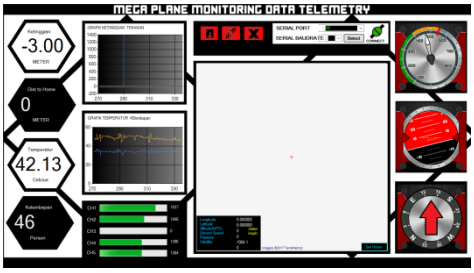


Figure 4.1 S*peedometer* are460 rpm.

4.4 UAV Airframe Stability Test

The stability of UAV airframe test is using balance of the airframe.

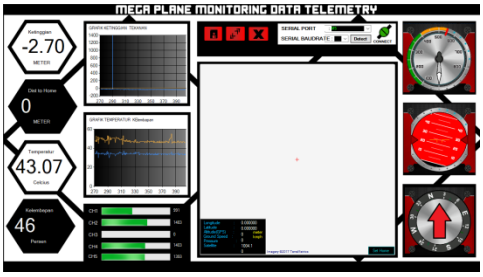
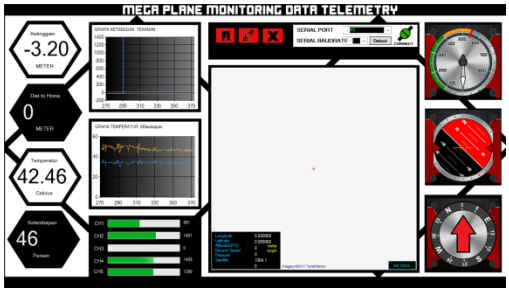


Figure 4.2 The airframe move to over head.



Figyre4.3 Move the airframe sloping to the right

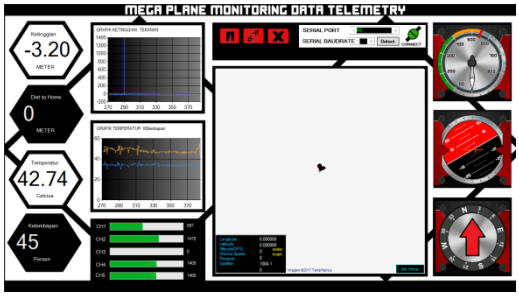


Figure 4.4 Move the airframe sloping to the left

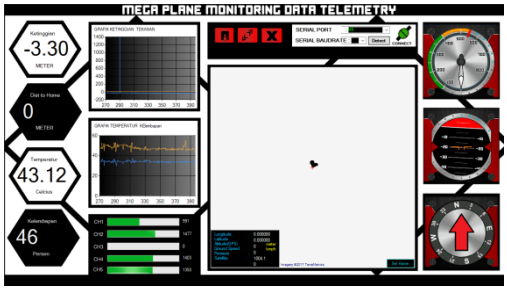


Figure 4.5 Move the airframe to down.

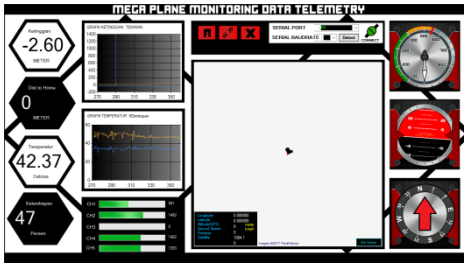


Figure 4.6 The airframe si stabilize condition.

Table 4 The airframe stabilizing

NO.	PosisiPesawat	Temperatur	Kelembapan
1.	Over the head	43,07 celcius	46%
2.	Sloping to the right	42,46 celcius	46%
3.	Slopng to the left	42,74 celcius	45%
4.	Down	43,12 celcius	46%
5.	Stabilizing	42,37 celcius	47%

Conclusion

1. From center point of remote control move the servo motor motion about 900-1800 ppm. Showing that number is over then center point value, It will be over head value causing error for servo motor unless stabilize
2. Output of Speedmotorby *Remote control*about 900-1800 ppm are lower then 980 ppm, medium about 1354 ppm and higher 1834 ppm.
3. Maximize of velocity for DC motor DC was about 475 rpm and Velocity minimumwas about 417 rpm. Moving is about 1 minute

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