APPLICATION OF GROUND CONTROL STATION FOR LOW SPEED EDF ROCKET

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ABSTRACT

Monitoring a rocket by utilizing the capabilities of the human eye is very difficult in terms of monitoring. Area / Trails rocket is an unguided air so that in this area is necessary to design a monitoring system that is able to communicate remotely with rockets and monitor any changes that occur as well as to determine whether or not the function devices are connected to the rocket system.

This paper describes the analysis of data visualization rocket at launch. The methodology used is a case study, the analysis is done on monitoring the rocket at launch text-based / numerical and visual. The results showed that by using visual observations can improve performance in terms of monitoring the movement of the rocket when it launched rather than by way of manually monitoring.

Keyword : Monitoring, Data Visualization, Ground Control Station, Sensor Data Processing

1. INTRODUCTION

1.1 Background

Monitoring a rocket by utilizing the capabilities of the human eye is very difficult in terms of monitoring. Area / Trails rocket is an unguided air so that in this area is necessary to design a monitoring system that is able to communicate remotely with rockets and monitor any changes that occur as well as to determine whether or not the function devices are connected to the rocket system.

Data sent a rocket at launch will be received by the monitoring system and processed, the resulting data will be analyzed to determine further decisions. So it is necessary to add features visualsasi data on the monitoring system to improve performance in terms of monitoring. Effective visualization help users in analyzing and reasoning about the data and evidence. Based on these assumptions data visualization through 3-dimensional graphics to be an alternative tool in monitoring the movement of the rocket during launch.

In this study, designed an application GCS (Ground Control Station) as a monitoring system that can visualize the motion of a rocket at launch. Before performing the visualization process sensor data observations do data processing stage first. Stage data processing done is tokenizing and
plotting. Configuration data input from the sensor consists of a 3-axis accelerometer (m/s), 3-axis gyroscope (rad/sec), compass magnetometer processing of sensor data, altitude, angle of roll, pitch, yaw. Furthermore, the visual classification stage which includes layout, colors, text and 3D visuals.

. 1.2 The Goal

The goal of this research is to provide a monitoring system as a visualization of data that represent the motion rocket at launch.

2. LITERATURE REVIEW

2.1 Monitoring

Monitoring is defined as a cycle of activities that include collecting, reviewing, reporting, and acting on information of a process that is being implemented [7]. Generally, monitoring is used in checking the performance and set targets. Monitoring in terms of the relationship to performance management is an integrated process to ensure that the process goes according to plan (on the track). Monitoring can provide information to establish the continuity of the process a step towards continuous improvement. In practice, monitoring is performed when a process is underway.

2.2 Data Visualization

Definition visualization is the use of computer technology as a support to conduct interactive visual depiction of the data to reinforce the observation. Meanwhile, according to (Mc Cormick, 1987) definition of visualization is the use of computer methods to transform the symbols into geometric and enables researchers observe sumulasi in terms of computing that can enrich the scientific discovery process so that it can develop a deeper understanding and unexpected. Based on the above definition can disimpulakan that visualization is a technique using the computer to find the best method of displaying data. By using visualization, data displayed to facilitate researchers to see the data that are hard to see with the thought that researchers were able to observe the simulation and computing, as well as ensuring that the process of invention ilmiah dan mengembangkan pemahaman yang lebih dalam contohnya adalah dengan display data or information in the

form of pictures, graphics example, tree structures, patterns, colors.

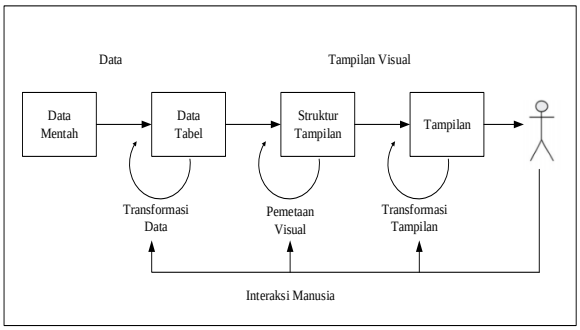


Figure 1. Process Data Visualization

- **2.3 Sensor IMU**

Sensor IMU (Inertial Measurement Unit) is an electronic device that is able to measure and report the speed, orientation and gravitational forces using a combination of accelerometer and gyroscope sensor. But sometimes uses sensor magnetometer and a barometer for other functions. Here is an explanation IMU sensor types of devices:

1. *Accelerometer*

Accelerometer is a device used to measure acceleration, detect and measure vibration (vibration), and measure the acceleration due to gravity.

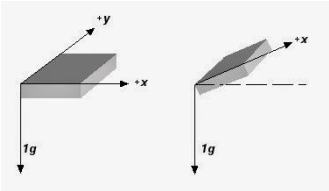


Figure 2. Illustration Pembacan Accelerometer Sensor

Description Figure 2. are as follows.

• + 1g, a stationary position sensor in the direction of the earth vertically and facing up.

• 0g, stationary position sensor horizontally in the direction of the earth.

The accelerometer sensor can also be used to measure the angle of an object when in a static state. The tilt angle can be calculated from the acceleration by using the following equation.

$$\theta x = \tan^{-1}\left(\frac{accelerometerX}{accelerometerZ}\right) \quad (1)$$

$$\theta y = \tan^{-1}\left(\frac{accelerometerY}{accelerometerZ}\right) \quad (2)$$

2. Gyroscope

Gyroscope is a device that serves to measure angular velocity or maintaining rotational motion. Unit of angular velocity is measured in degrees per second (°/s) or revolutions per second (RPS).

By leveraging the speed data can be known tilt angle (roll, pitch, yaw) of an object. To determine the value of the angle, the angle velocity data must be integrated. The equation is the following.

$$\theta(x,y,z) = \int gyro(x,y,z)\rangle\rangle \ dt \quad (3)$$

$$dt = T = tn\text{-}tn\text{-}1 \quad (4)$$

Where

T = sample time or cycle time

n = {1,2,3 ...} sample values

gyro (x, y, z) = Data gyroscope (°/s)

The mathematical equations that apply on the microcontroller are as follows.

$$\theta(x,y,z)tn = gyro(x,y,z) * T + \theta(x,y,z)tn\text{-}1 \quad (5)$$

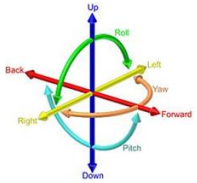


Figure 3 Illustration Movement Angle Roll, Pitch, Yaw

3. *Magnetometer*

Magnetometer is an electronic device that is useful to measure the strength of the magnetic field. The existence of Earth's magnetic field emanating from the north made a magnetometer sensor can be used to measure the angle of the directions in the north earth. The equation to determine the value of the compass is as follows.

$$sudut(\theta) = \text{arcTAN}(MagY/MagX) \quad (6)$$

Where

MagX = X axis magnetometer output value

Magy = Y axis magnetometer output value

Angle (θ) = angle sensor magnetometer results obtained utilization (degrees)

4. *Barometer*

Barometer is a sensor to measure air pressure to the value of the output of the unit Pa (pascal). By utilizing air pressure, the sensor can also measure altitude.

The equation to measure the height using the barometer sensor *is as follows.*

$$altitude = 44330*(1-(p/po)^{1/5.255}) \quad (7)$$

- Where :
- p = pressure (Pa)
- p0 = standard sea level atmospheric pressure (101325Pa)
- altitude = the value of altitude (masl)

- **2.4 Ground Control Station**

Ground Control Station (GCS) is the transmitter-receiver in the earth station equipped with a computer device that is used to control and monitor the spacecraft or rocket and payload gliding or [15].

Transmitter-receiver device consists of a 433MHz antenna as a transmitter of data from RF module along catudayanya then the data path TX / RX connected to a computer / laptop and then displayed and visualized.

3. ANALYSIS AND DESIGN

3.1 Solution Analysis

Problem solving is done by building applications Ground Control Station as a representation of the rocket when it launched and the input data in the form of text and then the data is sent and processed which will then be visualized as a representation of the actual rocket EDF. Here is an overview of the system built.

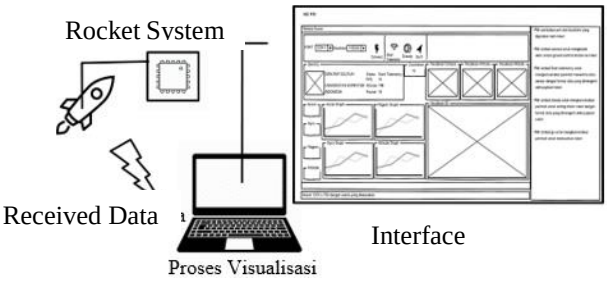


Figure 4. System Overview

Data input of sensor data on rocket systems that are processed by the data processing implementing a data input as a command. Visualization expected output in accordance with the movement of the actual rocket. Once the input data is recognized, then the next Ground Control Station can communicate with a rocket from the results of the data transfer can monitor in real time the rocket.

3.2 Process Analysis

The process is carried out in this application is divided into several sections diaman each process has its respective role in monitoring the rocket in real time. The following process is performed in Figure 3.2.

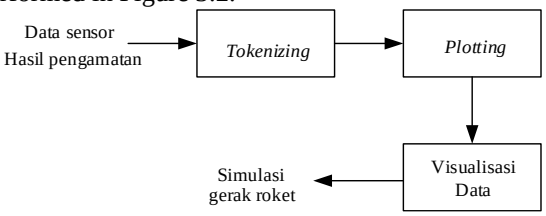


Figure 5. Process Analysis

In the block diagram above, the initial sensor data that is input monitoring results as an array of sensor data points from each rocket. The next step through the stages of data processing include Tokenisasi, Plotting and Data Visualization final results obtained in the form of rocket motion simulation.

3.3 Input Data

The input data analysis describes how the data communication process performed by the user and rockets. Data obtained from the processing of the sensor on the rocket system in the form of text. Process data communication is done by sending the command line. The command line will be checked whether it has the same header. In addition, the data communications checksums helps to determine the completeness of the data being communicated.

In the process of sending and receiving data requires a data transmission format. It is intended to simplify the device in identifying the transmitted data. The following data formats are made to the process of sending data from the ground station to the rocket.

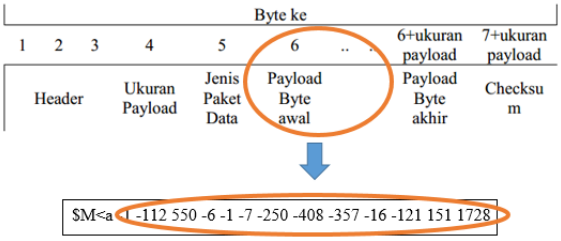


Figure 6. Input Data Format

Information

1. Byte to 1,2,3 or "Header" contains bytes that identifies the data packet to recognize whether the incoming data is the data that is supposed to be.
2. Byte to 4 or "Payload Size" contains byte that tells how many bytes of data on non-identifiers are sent.
3. Byte to 5 or "Type Package Data" contains bytes that can be identity package types for processing data received. Examples of packages.
   - "A": Communication rocket behavioral data
   - "B": The data communication control rocket
4. Byte 6 to "6 + payload" contains bytes used in the processing of the sensor system can be data or any other data.
5. Byte to "7 + payload" contains byte checksum used to check whether the data is received in full. The checksum is the result of the XOR of the received data except the header.

3.4 Tokenizing

Separating space rocket sensor data received serves to divide the received data into the array variable sensor data. This process will make it easier when you want to do the plotting data.

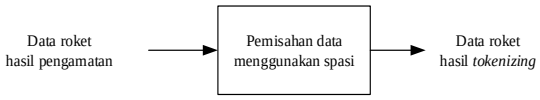


Figure 7. Tokenizing Process

The steps are performed as follows.

1. The sensor data is separated by spaces in the array of data received.
2. Then the data that has been separated was added variable data.
3. The value contained in the variable will be the output value before plotting data. From the sensor data received observations tokenizing process will be conducted by

separating the data into separate parts. Here are the results of tokenizing process.

Table 1. Tokenizing process results

Indeks	Data sensor roket	Hasil *tokenizing* data sensor roket
A	-1	data sensor accelerometer sumbu x
B	-112	data sensor accelerometer sumbu y
C	550	data sensor accelerometer sumbu z
D	-6	data sensor gyroscope sumbu x
E	-1	data sensor gyroscope sumbu z
F	-7	data sensor gyroscope sumbu z
G	-250	data sensor magnetometer sumbu x
H	-408	data sensor magnetometer sumbu y
I	-357	data sensor magnetometer sumbu z
J	-16	data sudut pitch
K	-121	data sudut roll
L	151	data sudut yaw
M	1728	data sensor barometer

Table 1. is a result tokenizing process data received in the form of an array of all sensor accelerometer, gyroscope, magnetometer and a barometer separated into per the data, then the next process puts the data in accordance with the results of tokenizing the data according to the data received.

3.5 Plotting

Putting the data that has been separated into variable data and customize the data received. Figure 8. is a block diagram plotting process.

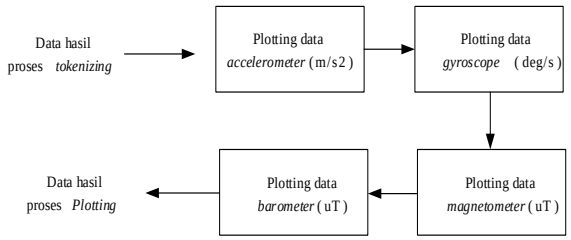


Figure 8. Plotting Process

In the block diagram above is a picture plotting process where the results of tokenizing process received data is then performed based on the value placed sensors shipped. Here is a plotting process is performed in Figure 9.

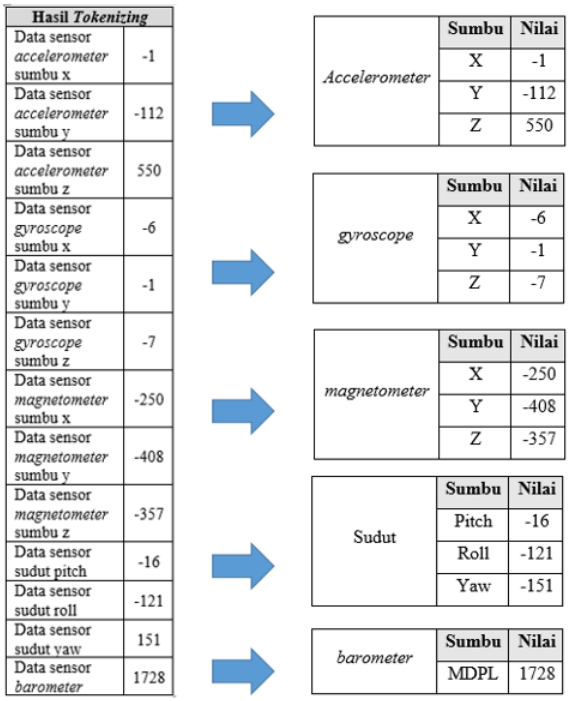


Figure 9. Plotting Process Results

In this case the sensor data used were 3-axis accelerometer / axis, 3-axis gyroscope, three-axis magnetometer / axis and placement of data by name barometer sensor, the axis / axis sensors and sensor values from each of the data transmitted. While the data obtained from the angle sensor accelerometer and gyroscope that pitch angle, roll and yaw.

After plotting the data is stored in advance before the process of data visualization. Data is saved as a .txt file data storage aimed to evaluate candidates in a format selanjutnya.Berikut trial data logging

Table 2. Format Data Logging

Data	Keterangan
310	Urutan data-ke
9:15:42AM	Data waktu
-0.84	Data *accelerometer* x
-0.48	Data *accelerometer* y
-0.84	Data *accelerometer* z
29	Data *gyroscope* x
67	Data *gyroscope* y
-45	Data *gyroscope* z
-209	Data *magnetometer* x
457	Data *magnetometer* y
-127	Data *magnetometer* z
-5	Data *roll*
-6	Data *pitch*
28	Data *yaw*
752	Data *barometer*
Steady	Data Status

3.6 Data Visualization

Data visualization semerta not necessarily turn data into visual charts, data visualization requires planning. Each type of data has a visualization technique based on his needs. Based

on the level of complexity of the data, to produce valuable solutions required from various disciplines, namely: statistics,

data mining, graphic design, and information visualization.

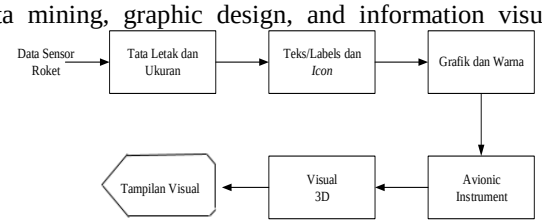


Figure 10. Process Data Visualization

In this visualization process of data per sensor that is already plotted can be visualized in the form of icons, text / label with color application, the form of graphs, avionic instruments and 3D visuals and layout settings that can affect the delivery of information. Here's a detailed explanation by the process in data visualization.

1. Layout

Placement, and positions that may be underutilized in the visualization. When this happens, the opportunity to communicate the information is lost or wasted, inefficient and more difficult to understand [12].

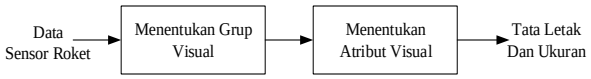


Figure 11. Layout Process

In this case the positioning in the process of visualization of all data dimensions to be considered for the monitoring and control of rocket EDF and values and the most important information such as control buttons, the direction of the rocket, the height of which refers to the rule book KOMURINDO 2015. Here is the layout of the process data visualization in Figure 12.

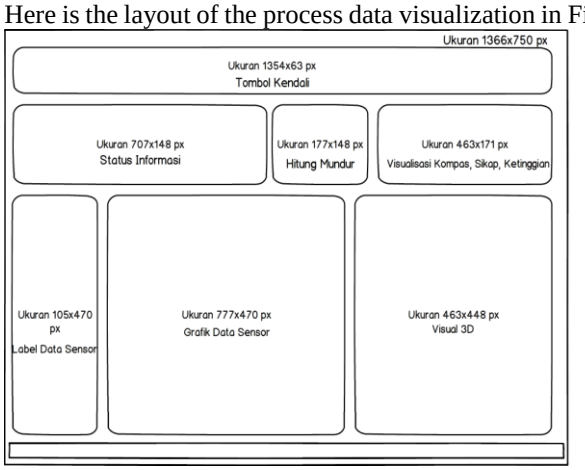


Figure 12. Layout Result

2. Icon

Icon is a variation of the shape and tend to have more detail than a simple circle or square, for example, the outline of a software tool tool bar, or even the buttons on most diremote control. In this case the use of icons as the control of rocket system [12].

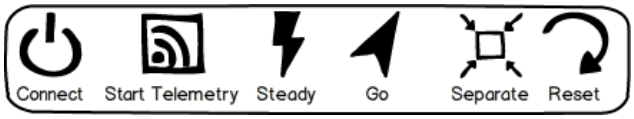


Figure 13. *Icon* Kendali Sistem Roket

3. Teks/Label

A useful visualization using words or any number as a title, axis labels, or any other type of label or indicator [12].



Figure 14. Teks/Label Process

So we need to consider the words and numbers that will be used, how to text or words that can interact with visual elements. text and labeling purpose is to make things clear and easy to navigate for the readers.

Sensor	Sumbu	Nilai
Accelerometer	X	-1
	Y	-112
	Z	550
Gyroscope	X	-6
	Y	-1
	Z	-7
Magnetometer	X	-250
	Y	-408
	Z	-357
Sudut	Roll	-16
	Pitch	-121
	Yaw	151
Barometer	M	1728

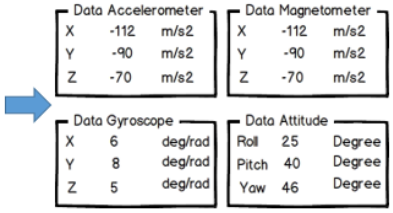


Figure 15. Results Visualization Text / Label

4. Graphic

The graph is a visualization of the table where the table of the numbers that may be presented or can be displayed in the form of a graph visualization image.



Figure 16. Graphic Process

1. Graphic *Accelerometer*

In the graph accelerometer data is used as an example only 6 of the data is retrieved based on its axis. The axis used is the x-axis, y-axis and z-axis. Here is an example of accelerometer data visualization into graphics.

Satuan / Time / Data Ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
Sumbu x	-1	-112	550	300	243	500
Sumbu y	-6	-90	100	450	213	560
Sumbu z	-8	-70	200	356	100	300

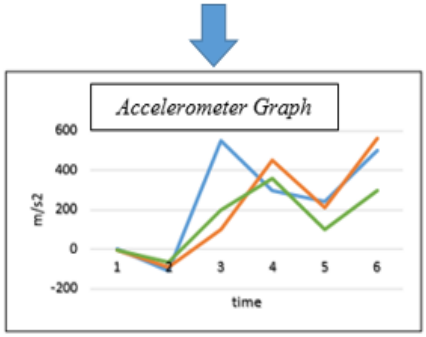


Figure 17. Graphic Design Accelerometer

1. Graphic *Gyroscope*

In the graph gyroscope data is used as an example only 6 of the data is retrieved based on its axis. The axis used is the x-axis, y-axis and z-axis. Here is an example of data visualization gyroscope into graphics.

Satuan / Time / Data Ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
Sumbu x	6	1	7	4	9	7
Sumbu y	8	3	4	5	2	3
Sumbu z	5	4	3	3	4	5

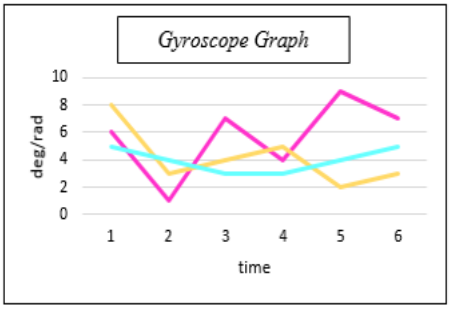


Figure 18. Graphic design Gyroscope

2. Graphic Sudut

At the corner of the chart data is used as an example only 6 of the data is retrieved based on its axis. Spoken axis is the roll axis, pitch axis and the yaw axis. Here is an example of data visualization into the corner of the chart.

Satuan / Time / Data Ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
Sumbu x	25	40	35	32	65	44
Sumbu y	40	32	64	56	23	45
Sumbu z	86	21	75	79	45	63

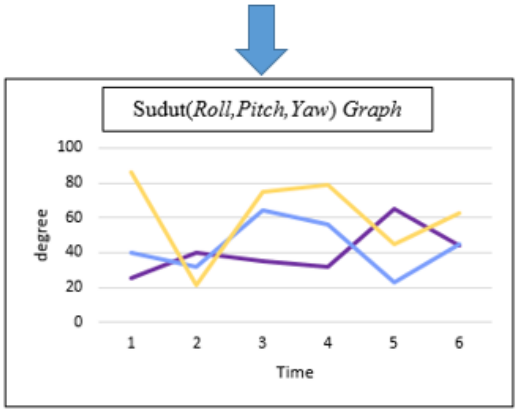


Figure 19. Graphic Design Sudut

3. Graphic Barometer

At the corner of the chart data is used as an example only 6 of the data is retrieved based on its axis. Here is an example of data visualization barometer in the chart.

Satuan / Time/ Data ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
MDPL	1728	1730	1742	1755	1756	1763

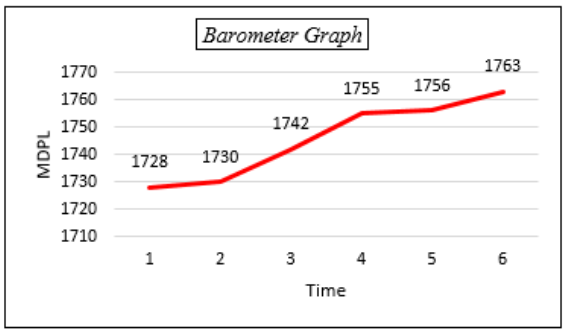


Figure 20. Graphic Design Barometer

In this case the chart used to use a line graph, the horizontal axis in the graph is a time / data-to. In the reception is a vertical axis sensors per axis sensor data with the unit. A line graph is used for the data angle sensors that transmit data continuously.

4. Avionic Instrument

Avionics means of electronic equipment for flights that covers all electronic systems designed for use in aircraft. The main system includes communication systems, navigation and indicators as well as the management of the whole system.

1. Compass Visualization

Compass aims to complement the needs of increasingly sophisticated robotics. The world is in dire need of robotics navigation tools effectively and efficiently.

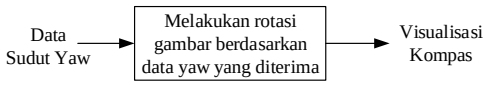


Figure 21. Compass Visualization Process

Here are the results of data visualization compass.

Sudut / Time / Data Ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
Yaw	45.15	47	79	43	96	87

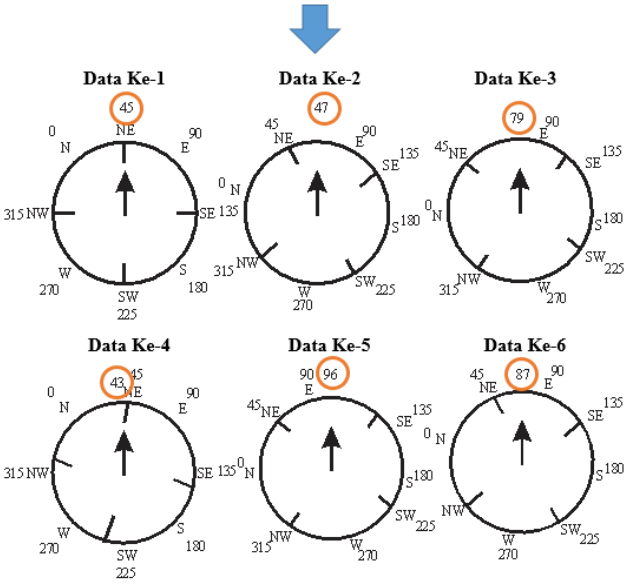


Figure 22. Result Visualization Compass Process

2. Rocket Attitude Visualization

Rocket attitude indicator also known as gyro horizon or kemiringian indicators are tools used in the aviation world to inform the pilot of the rocket orientation relative to the Earth. This shows tilt forward and back and side to side tilt.

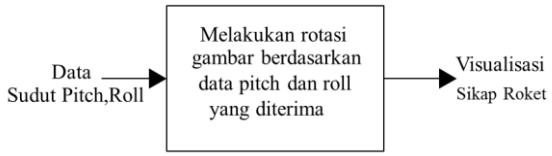


Figure 23. Proses Visualisasi Sikap Roket

Here are the results of data visualization rocket attitude

Sudut / Time / Data Ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
Roll	25	28	30	32	45	21
Pitch	40	47	65	78	43	65

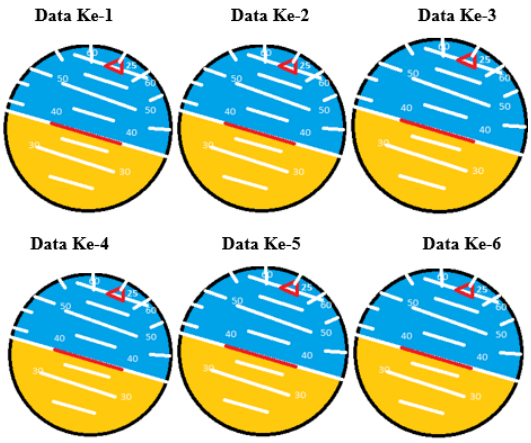


Figure 24. Result Visualization Rocket Attitude

3. Altitude Visualization

Barometer is a tool used to measure the air pressure. By utilizing air pressure, the sensor can also measure heights.

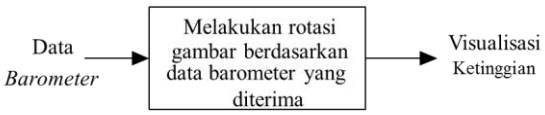


Figure 25. Elevation Data Visualization Process

Here are the results of elevation data visualization.

Satuan / Time / Data ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
MDPL	728	730	742	755	756	763

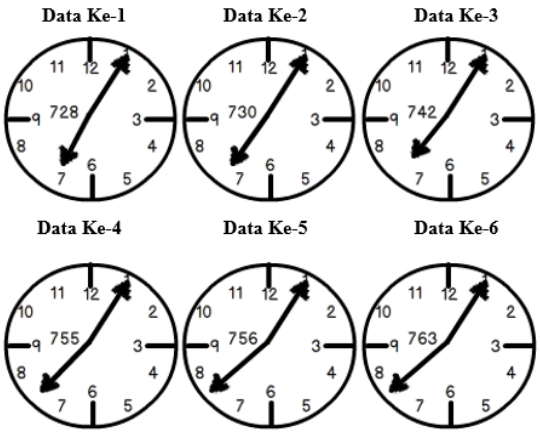


Figure 26. Results Data Visualization Altitude

2. 3D

3 dimensional 3D or abbreviated called space, Is a form of objects that has length, width, and High. The term is usually used hearts division singer art, animation, computer and mathematics.

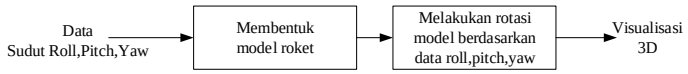


Figure 27. 3D Process

Here is an example of 3D data visualization.

Sudut / Time / Data Ke	30ms/ 1	60ms/ 2	90ms/ 3	120ms/ 4	150ms/ 5	180ms/ 6
Roll	25	28	30	32	45	21
Pitch	40	47	65	78	43	65
Yaw	45.15	47	79	43	96	87

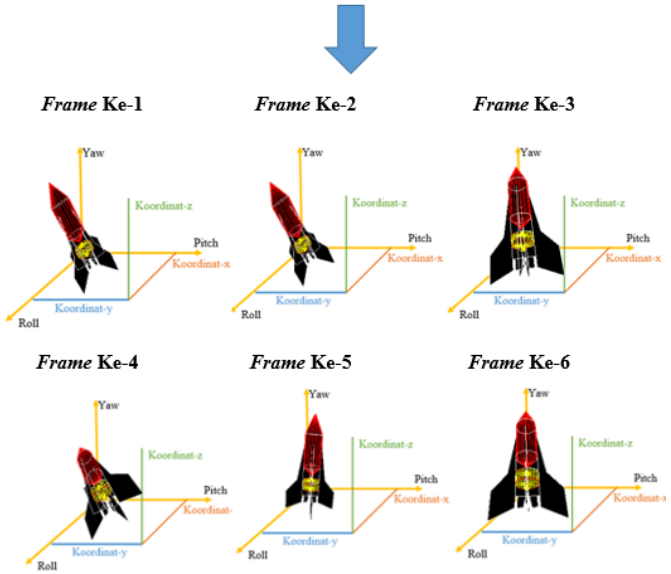


Figure 28. Results 3D Visualization

4. IMPLEMENTATION AND TESTING

4.1 Interface

When first run the application it will immediately display the Main. In the main view of the user. Figure 29. The following are the main display interface.

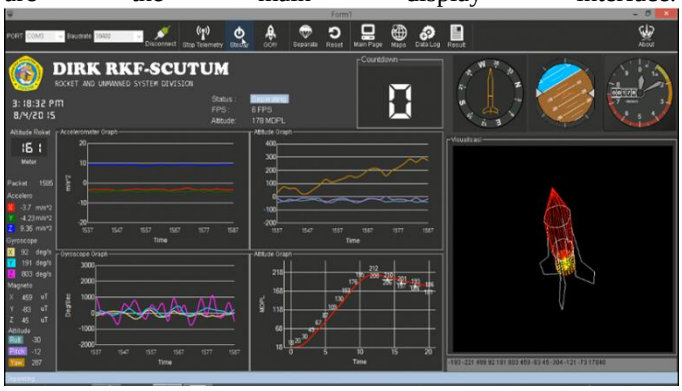


Figure 29. Interface

4.2 Testing System

System testing phase aims to find errors or deficiencies in the system tested. The test aims to determine whether the application is made is in conformity with the purpose of research.

1. Black Box Testing

Black box testing is used to test the specific functions of the software designed perangakat. Here is a table of black box testing plan.

Table 3. 1 Black Box Testing

No	Komponen Yang Diuji	Butir Uji	Jenis Pengujian
1	*Tokenizing*	Melakukan proses *tokenizing* data hasil pengamatan	*Black box*
2	*Plotting*	Melakukan proses *plotting* data hasil *tokenizing*	*Black box*
3	Visualisasi Data	Melakukan proses visualisasi data *accelerometer*	*Black box*
		Melakukan proses visualisasi data *gyroscope*	*Black box*
		Melakukan proses visualisasi data *magnetometer*	*Black box*
		Melakukan proses visualisasi data *barometer*	*Black box*
		Melakukan proses visualisasi data *roll,pitch* dan *yaw*	*Black box*

Results of black box testing that has been done indicates they are built has good functionality, since almost all of the testing conducted to produce results in line with expectations.

2. Usability Testing

In testing the usability testing in this research is using questionnaires with the user response of all ages. Respondents were used mainly in usability testing numbered 17 people. This amount is selected in accordance with previous studies of the number of respondents, who said that the respondent usability testing should not be too much [18]. Respondents were selected from various ages with considerations have come to understand about the desktop-based application, but not yet use applications that previously tested. Technically usability testing is done on campus UNIKOM with tools such as laptop task sheet and questionnaire, as well as a stationery. The following table question aspects of usability testing.

Table 4. Plot Questions Usability

NO	Pertanyaan	Aspek *Usability*				
		Learn	*Effic*	*Memor*	*Errors*	*Satisf*
1	Apakah aplikasi ini dapat dikenal dan mudah dipelajari dari *interface* awal ?	✓				✓
2	Apakah aplikasi ini dapat memberikan informasi yang merepresentasikan gerak roket yang sebenarnya ?	✓				✓
3	Apakah aplikasi ini dapat membantu memberikan solusi terhadap hasil pengamatan ?		✓			✓
4	Apakah simbol- simbol gambar mudah dipahami ?				✓	✓
5	Apakah dengan adanya penambahan fitur 3D mempermudah dalam pengamatan gerak roket ?		✓			✓
6	Apakah desain warna aplikasi ini nyaman dilihat ?				✓	✓
7	Apakah pemetaan konten dan pemilihan *font* memudahkan dalam menagkap informasi yang ditampilkan ?				✓	✓
8	Apakah dengan adanya fitur tampilan *responsive* pada aplikasi meningkatkan pengalaman pengguna (*user experience*) dibandingkan penelitian sebelumnya ?		✓			✓
9	Apakah dengan perubahan *user interface* aplikasi mampu meningkatkan kualitas aplikasi dibandingkan pada penelitian sebelumnya ?			✓		✓
10	Apakah anda dapat mengingat kembali menu-menu dan tampilan halaman yang ada pada aplikasi ?			✓		✓

Of the ten questions, each question has a separate section to represent every aspect of usability. aspects of usability testing include five programs.

1. *Learnability*, Explain the level of ease of use to meet the basic task task- when they first saw or using apps.
2. *Efficiency*, Explain the rate of speed of the user in completing the task-task after learning the result of design.
3. *Memorability*, explain the level of user convenience in using a good draft, after a certain period of use.
4. *Errors*, explain the likelihood of errors made by the user when using the application.
5. *Satisfaction*, explain the level of user satisfaction in using applications that have been created. It can be measured from the ease and convenience of users in achieving the goals of the system is run.

Table 5. Result Percentage Usability

No	Pertanyaan	Persentase
1	Apakah aplikasi ini dapat dikenal dan mudah dipelajari dari interface awal ?	94.1%
2	Apakah aplikasi ini dapat memberikan informasi yang merepresentasikan gerak roket yang sebenarnya ?	97.6%
3	Apakah aplikasi ini dapat membantu memberikan solusi terhadap hasil pengamatan ?	90.5%
4	Apakah simbol- simbol gambar mudah dipahami ?	90.5%
5	Apakah dengan adanya penambahan fitur 3D mempermudah dalam pengamatan gerak roket ?	92.9%
6	Apakah desain warna aplikasi ini nyaman dilihat ?	94.1%
7	Apakah pemetaan konten dan pemilihan font memudahkan dalam menagkap informasi yang ditampilkan ?	92.9%
8	Apakah dengan adanya fitur tampilan responsive pada aplikasi meningkatkan pengalaman pengguna (user experience) dibandingkan penelitian sebelumnya ?	90.5%
9	Apakah dengan perubahan user interface dan user experince pada aplikasi mampu meningkatkan kualitas aplikasi dibandingkan pada penelitian sebelumnya ?	91.7%
10	Apakah anda dapat mengingat kembali menu-menu dan tampilan halaman yang apada pada aplikasi ?	92.9%

Based on the results of the above percentages obtained from testing keberguanaan, it can be concluded that the applications built is in conformity with the objective to provide a monitoring system as the visualization of motion rocket at launch that can help in terms of monitoring.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on test results monitoring system in case a rocket that is being launched by using the techniques of the obtained data visualization monitoring system which represents the motion of a rocket at launch. Based on the results of usability testing, this monitoring system has a level of usability is quite good, as evidenced by the percentage table, all attributes of usability has an average percentage of 50% (Strongly agree).

5.2 Recommendations

Subsequent research on rocket motion monitoring system can help in terms of monitoring, the following are suggestions that can be done as follows.

1. The system can read the log file to play back the results of observations, so as to facilitate the observation repeated by using the source code open source mission planner.
2. The addition of 3D features were made in the solid model that describes the rocket using the OpenGL library.

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