Realtime Measurement Integrated Hydrodynamic Conditions For Improving Port Performance

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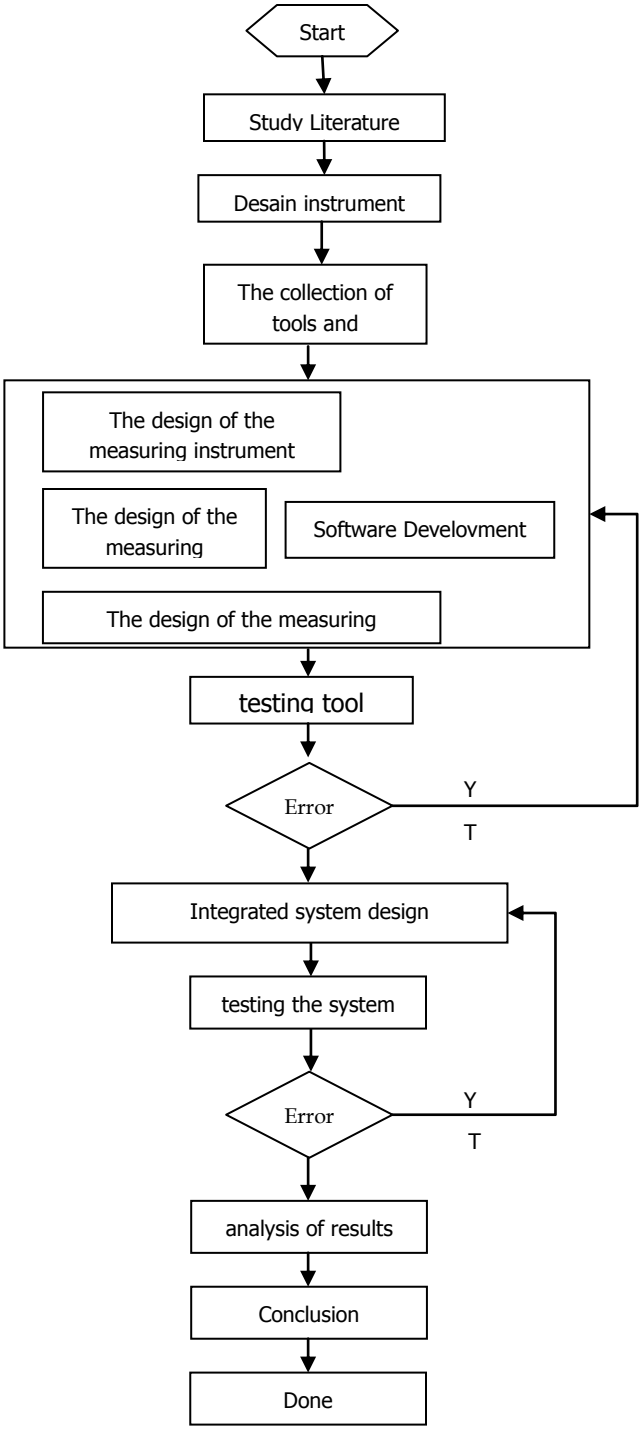
Abstrak: Piers is a subject very important in realizing the function of the sea as a bridge in Indonesia. Each port has a form of service business data which is important especially high hydrodynamic waves, tides, currents and speed. Many researchers who conducted the study to get a measurement tool that can measure the data hydrodynamics. Marine hydrodynamics of data is very useful for maritime traffic and can even be used as a disaster mitigation. Disaster mitigation at sea requires data that is especially important hydrodynamics of wave height, PASAG ebb and flow velocity. However, if the automatic measuring tools and realtime to get three important data hydrodynamics, namely wave, tidal. This study aimed to obtain accurate data on various aspects of marine hydrodynamics that can work in realtime with the output in the form of three types, namely hidodinamika prototype measuring instrument currents, waves measuring devices and measuring devices tide. Hardware or device used consisted of Arduino microcontroller with sensor buoy serves to measure waves, Arduino microcontroller also exists in the meter tidal using ultrasonic sensors, while the measuring tool flows using microcontroller Arduino with a speed sensor that uses two pairs of sensors untrasonik. Target publication of this study is reputable international proceedings in 2019.

Keyword: Measuring instruments, high wave, tidal, current speed.

1. INTRODUCTION

P iers is a subject very important in realizing the function of the sea as a bridge in Indonesia. The existence of the port, both in the ocean port, local port, even ports that are pioneers in small islands and outlying be very help smooth movement of shipping. Each port has a business in the form of ships. Ship services include pilotage where teams ports have to guide or pull the boat on every movement of the ship in the waters of the harbor, starting from when the ship is at the outer limit of the port and pulled in through the sea lanes in order to avoid disaster aground, and draw the ship when the ship moves from port basin to the dock (Sasono, 2012). In carrying out the good ship services, port requires good management anyway. One important aspect of port management is their accurate data on aspects of marine hydrodynamics. Marine hydrodynamics of data is very useful for maritime traffic and can even be used as a disaster mitigation. According to Abdul Muhari, tsunami experts from the Ministry of Maritime Affairs and Fisheries (MMAF), only eight of the 24 ports in Indonesia are located in relatively safe zones on the tsunami (Indonesia Maritime Magazine, 2015). However, disaster mitigation is still a concern of government. Disaster mitigation in marine hydrodynamics requires data which is important especially high waves, the ebb and flow velocity. With high data speeds of waves and currents can also be taken relationships with potential damage. Data hydrodynamics are also of great benefit to the vital role the port in regulating maritime trafficoften obtained from the data forecasting. To obtain more accurate data, this time the research to produce a measurement tool that works in realtime. However, measurements taken generally generate input and output data separate. It can be seen from previous studies often focused on just one element of the hydrodynamic although the use of the tool has been created automatically and in realtime. Research conducted by Lasminto (2013), has managed to produce a measuring tool that can monitor changes in sea surface elevation in real time by using a microcontroller ATMEGA 162. Similarly, research conducted by Khoir (2018) which also makes automated and realtime measurement tool to measure the tide using Arduino Uno microcontroller. However, if the automatic measuring tools and realtime to get three important data hydrodynamics, namely waves, tides, and currents are installed simultaneously to obtain optimal function then output the data obtained must be read on three different tools. Less efficient reading of data can reduce the quality of services performed by the harbor vessel. and these currents are installed simultaneously to obtain optimal function then output the data obtained must be read on three different tools. Less efficient reading of data can reduce the quality of services performed by the harbor vessel. and these currents are installed simultaneously to obtain optimal function then output the data obtained must be read on three different tools. Less efficient reading of data can reduce the quality of services performed by the harbor vessel. based on the description above, it is necessary to measure the hydrodynamic conditions which include waves, tides, and currents in realtime and integrated to improve the performance of the port. In this case, the third measuring tools hydrodynamic element can provide output in one reading in one application in one device. Realization of tools also tend to be more affordable and flexible for such tools is a private assembly without buying tools that have been finished and ready to use. Moreover, the purpose of this study was to determine the hydrodynamic conditions integrated realtime measurement of an effort to improve port performance and to determine the comparative measurement tools and automated realtime waves, tides, and currents measuring devices manually.

2 METHOD



Research stage begins with prototypes for each of measuring instruments, namely:

1. Wave measuring instrument

To obtain realtime measurement tool and automatic gauge can be given wave Arduino microcontroller with sensor buoys because of the principle that the movement of the rise and fall of sea levels could lead to a buoy on the surface of the part moves. According Lasminto (2013) buoy connected by a rope to the ballast and then wrapped around the pulley).

2. Tidal measuring devices

Similarly, wave measuring tools, the use of Arduino microcontroller also exists in the meter tides, but the sensors used to use an ultrasonic sensor which works by emitting ultrasonic waves from the reflection sensor (Noble, 2008).

3. Flow measuring instrument

Sea surface current measurements in real time in addition to using the Arduino microcontroller, also require a speed sensor. In this case, two pairs of ultrasonic sensors can be used in the measurement. Ultrasonic transmitter sends waves that penetrate the water flow and received by the ultrasonic receiver. Form and time shifting wave of both sensors are then compared using cross-correlation method (Artanto, 2007). The results will determine the magnitude of the speed and direction of flow

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Gambar 2.1 *Prototype*

These measuring tools will then be packaged wear 3D printer technology to make it more practical and protected from sea water, so that the existing components in becoming more secure and durable. Installation wireless fidelity (Wifi), wireless network technology, is done to facilitate the reception of data from the measuring instrument to Raspi. Raspi is a single board computer mini module equipped with input and output. Raspi will run programs that work this way is almost the same as the computer only on Raspi include pin input and output to bolster the performance of a mini-computer that can be used for interfacing with sensors, in this case is a measuring instrument that has been assembled and placed at sea with a different location. The data hydrodynamics enter into Raspi then validated with measuring devices that have been there before. Having obtained the correct data, this data can assist in regulating traffic harbor cruise.

3 DISCUSSION

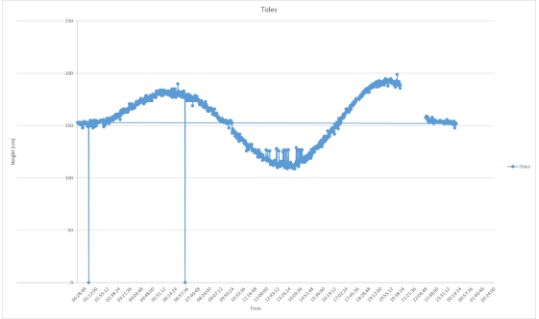
The study, entitled "Measurement of Hydrodynamic Condition Integrated Realtime as Improving Port Performance" produces output in the form of three prototypes intsrumen ie hydrodynamic flow measuring devices, wave measuring tools, and measuring tools tide. To get a wave measuring instrument that automatically requires palampung Arduino microcontroller with sensor because it has a principle that the movement of the rise and fall of sea levels could lead to a buoy on the sea surface part moves. Similarly, wave measuring tools, the use of Arduino microcontroller also exists in the meter tides, but the sensors used to use ultrasonic sensor that works with caraa emit ultrasonic waves. Meanwhile, the current measurement tool than using the Arduino microcontroller is

required also the speed sensor. During the research process to date has obtained the preliminary results in the form of the making tide gauges and current meter wave that has been made while the gauge is still in the process of assembly. While the tide gauge is a measure of the tide has been tested in the waters Puger, Jember. Although, the results still have not done the instrument calibration. The trial was conducted over one day, while their trial results can be seen in the chart below:

Tabel data sampel pasang surut air laut

Tanggal	Jam	Temp	Tides
8/10/2019	22:03:05	25.75	158
8/10/2019	23:03:15	25.75	154
9/10/2019	0:03:24	25.5	152
9/10/2019	1:03:33	25.5	151
9/10/2019	2:03:42	26	157
9/10/2019	3:03:52	25	163
9/10/2019	4:03:01	24.5	174
9/10/2019	5:03:10	23.75	180
9/10/2019	6:03:19	26.25	181
9/10/2019	7:03:28	43.5	178
9/10/2019	8:03:38	54	167
9/10/2019	9:03:49	69.5	154
9/10/2019	10:04:00	50.25	143
9/10/2019	11:03:10	42.75	128
9/10/2019	12:03:19	40.25	126
9/10/2019	13:03:29	38.5	112
9/10/2019	14:03:39	36.5	114
9/10/2019	15:03:49	35.25	128
9/10/2019	16:03:58	33.75	146
9/10/2019	17:03:08	31.25	163
9/10/2019	18:03:59	29.25	180
9/10/2019	19:03:08	29	188
9/10/2019	20:03:18	28.25	190
9/10/2019	20:26:21	27.75	189

That's a sample, so we can know:



Gambar 3.1 *Grafik Hasil data pasang surut*

Teresbut chart explains the data received by the tides ebb and flow gauge on Puger sea water for 24 hours. Acquisition of the data is taken from 22.00 pm on October 8, 2019 until 22:00 pm on October 9, 2019. The gauge tides looks that can read the data tide. However, at 20:38 pm on October 9, 2019 are the data gaps that cause the graph does not form a perfect sinusoidal pattern. This is due to the exhaustion of the battery power is used to power the tide gauge so that there is a delay of several minutes.

4 CONCLUSION

Thus, the use of the tool can be used to calculate reatime tide, waves, and currents. It looks that tides gauge is able to read data tide. However, there are data gaps that cause the graph does not form a perfect sinusoidal pattern. This is due to the exhaustion of the battery power is used to power the tide gauge so that there is a delay of several minutes.

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