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Analysis Of Service Quality Early Warning System Telecommunication Network Landslide Accident Due To Train

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ABSTRACT

The development of railways in Indonesia is becoming increasingly better on the contrary more alarming. Especially in the capital area are prone to accidents due to many factors. The Objective is study quality of service Knowing the early warning system crash due to a landslide on the railway technology using data sender SMS Gateway. Methods realtime create an early warning system for landslides that is easy to use and effective in detecting landslide. of the results of this study concluded that an early warning system works digitally. System uses arduino programming language. of the results of this study concluded that an early warning system. Average of SMS delivery by tree on the condition of the angle of 30˚ to the mass of the object avalanche 30Kg of 5.21 seconds, 5.19 seconds compared to Indosat Tekomsel on the condition of the angle of 45˚ to the mass of the object landslide 30Kg, Tree Indosat 5.27 seconds and 5.25 seconds, for the condition of the condition of the angle of 60˚ to the mass of the object landslide 30Kg, Tri Indosat 5.14 seconds and 5.12 seconds. QoS Testing showed that the network system provider to work with good quality.

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1. INTRODUCTION

Indonesia is a country that many valleys, hills and volcanoes. So every year, Indonesia has many natural disasters landslides. Landslides are forming material movements rocky slope, material destruction, soil, or the mixture of materials, move down or out the slopes, where landslides often take casualties.[1]
With the above considerations it would need for tools that can detect landslides. By using the early warning system is expected symptoms naturally arising in connection with natural disasters such as landslides can be detected as early as possible. Thus the possibility of casualties due to landslides can be avoided.[2,3,4]

The establish an early warning system by using microcontroller landslides ATMEGA8535. At the time of shifting ground of 4 cm and daily rainfall reached 100 mm / day, then this system will ring the siren of danger and will contact the village in order to evacuate citizens[5]

Early warning system is made very limited, this system only sirens, officials called for the evacuation and long penampilkan landslides. This system can only read 1 cm shift in the soil and develope an early warning system for landslides to be more effective, the system can send SMS (short message service) to the operator to cope with disasters and display high avalanche objects. This system can read 1 cm height of the object landslides.[6]

The quality of the communication network, namely rail train speed, number of trains, and topology placement of base stations. The placement of base stations placed near the trajectory or the train line so as not to lose the signal when the transmission as long as it remains at a given cell radius and get maximum results. Solving the traffic on the channel will give different results depending on each signal transmission due to the burst signal transmission, but will provide great efficiency gains achieved throughput. In the simulation scenario 40 node 100 kmph both KRL and Daop 8 has the highest throughput than other scenarios. Train speed is higher and the number of nodes that each can provide results of the higher throughput. For SNR obtained good results with an average above 30dB for transmission media in this simulation. Average delay time and delayed calls that occur on the Switch represents the accumulated delay of the delay given of the overall BTS responsible for the Switch.[7]

The measurement system of monitoring unit to the data collector is integrated with the software, the measurement data is stored to be used as decisions against the accumulation of the magnitude of landslides that occurred so that the danger of landslides can be seen early by the public and the authorities. Based on the results of measurements and system testing results obtained from the tool and the sensor shows the performance of the system, this system uses multiple methods of nodes and can show major changes landslides and chart the changes at a specific time duration, so it can serve as an early warning of landslides , Results information displayed on the PC in text format in the form of the value of the monitoring of landslides and the tools to monitor, there are three state condition in detecting the shift of land to the thresholds under different limit values under conditions ALERT = 100 mm, ALERT = 180 mm and CAUTION = 250 mm, the average response time of about 5 seconds depending SMS signal quality and traffic data from a provider by the user.[8].

The process water level data in a timely manner and make early warning of risk,mobile devices are proposed as collection, sending and early warning terminal of water level data, and the upper computer as the receiving and processing terminal of water level data. The water level access algorithm is studied, and the stripping method is used to obtain the high-accuracy water level information. [9]

The circuits to fulfill the control strategy are more complicated. It is an improved unipolar modulation control strategy has been performed in this paper. control strategy of improved unipolar modulation that ensures the compensation effect of control strategy of unipolar modulation optimizes circuit design of one-cycle control.[10]

Studies of this paper proposes an online early warning techniques and the probability distribution function based icing image recognition for the electricity transmission network. The purpose of early warning system for the transmission lines must identified based on the characteristics of the transmission line and the environment. The scope of the transmission lines disasters, including disasters caused by hurricanes, lightning, fire mountain, tree growth and engineering konstruksi.Metode, using local meteorological data and data mechanical data analysis in real-time monitoring of the transmission channel with the remote measurement and terminal controllers installed in each tower and timely information is transferred to the optical fiber communication technique.[11].

Based on previous studies paper is still an early detection system has not been using the train. This paper discusses the quality of the telecommunications network in a landslide early warning system on the train using SMS in order to reduce accidents such as train transportation in figure 1 below

Figure 1 EWS hardware implementation

The Objective is study quality of service Knowing the early warning system crash due to a landslide on the railway technology using data sender SMS Gateway).

2. RESEARCH METHOD

Application design in a landslide early warning system there are several stages, namely: The first,Designing an early warning system crash due to a landslide on the railway.The Secound, To assess the effectiveness of early warning system software at railroad crossings through testing - testing that has been prepared.
Broadly speaking, a block diagram of hardware design tools can be seen in Figure 2.

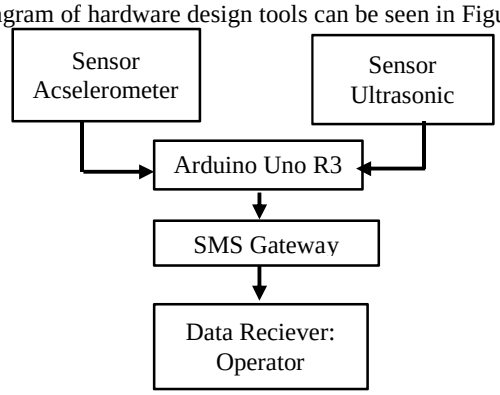

Figure 2. Block diagram of EWS caused by landslide

Figure 1 is a block diagram workflow Early warning system hardware. Arduino microcontroller connected to the ultrasonic sensor (PING) as a tool to measure the distance of the object level altitude landslides and accelerometer sensors as tools for measuring slope angles. Data processing such as elevation, slope angle made by the microcontroller as per the order desired by the user, after which the data will be sent in the form of SMS to the driver via a GSM modem in case of landslides, and SMS notification indicator as an indicator of the occurrence of landslides.

Equipment connected to one another, the center or the center of everything there is in the microcontroller. For ultrasonic sensor has 3 legs connected to the microcontroller include a trigger pin, ground pin and VCC pin. For the accelerometer sensor has a 4 foot pin among others, the TX pin, pin RX, ground pins and pin VCC to voltage, all connected directly to the microcontroller except GSM modem, wiring modem to microcontroller requires a converter serial RS232 because the GSM modem used type of serial , The converter is used manifold DB9 male to male converter. As for the power supply using a separate adapter of 5-7 volts to the microcontroller and GSM modem.

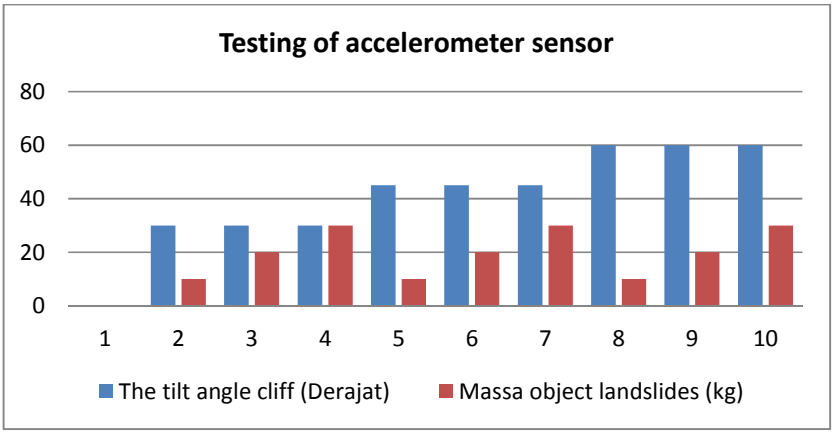

Figure 3. Testing result of Early Warning System on accelerometer Sensor

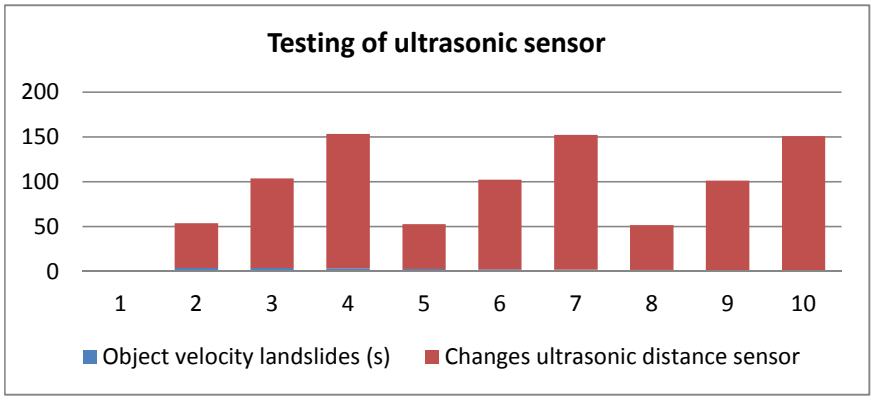

Figure 4. Testing result of Early Warning System on Ultrasonic Sensor

Results and Discussion

Testing QoS (Quality of Service) QoS Testing conducted consisted of: testing delay, jitter testing and testing packet loss.

1. Testing Delay

Delay is the delay time caused by the packet transmission process from one point to another point which it is intended. Delay send time obtained from the difference between a package with other packages. To calculate the average - average delay used the formula:

Testing of QoS (*Quality of Service)*

In this case the package is implemented as SMS received on a mobile phone operator. Table 3 is a table showing latency delay its great popularity.

Table 1 major categories delay

Category latency	the amount of delay
Very good	< 9 ms
Good	9 s/d 50 ms
Bad	50 s/d 450 ms
Very bad	> 450 ms

a. Delay Testing Provider Tree and indosat

Table 2 Delay overage on Tree and Indosat

Testing average delay provider				
No.	The tilt angle cliff (˚)	Massa object landslides	Speed acceptance sms	
			Tree	Indosat
1	30	10	6.33	6.33
2	30	20	4.66	4.66
3	30	30	5.66	5.66
4	45	10	3	3
5	45	20	2.33	2.33
6	45	30	3.33	3.33
7	60	10	6	6
8	60	20	4	4
9	60	30	1	1

Each test in all conditions and the tilt angle of the object landslide mass, can be classified into the category of very nice. From the testing that has been done on all the conditions of tilt angle and the mass of the object landslides, fall neatly into the category of very nice.

2.Testing of Jitter

Jitter is defined as delay variation caused by the long queue in a data processing and reassemble packets - the data packets at the end of the delivery as a result of previous failures.

Table 3 Category of jitter

Degradation Category	Jitter
Very good	0 ms
Good	0 s/d 75 ms
Moderate	75 s/d 125 ms
Bad	125 > 225 ms

Table 4 Testing of *jitter provider* Tree and Indosat

Testing average jitter provider			
No.	**The tilt angle cliff (˚)**	**Speed acceptance sms (ms)**	
		Tree	**Indosat**
1	30	2.0812	2.0812
2	45	1.0825	1.0825
3	60	1.377	1.377

Jitter test results can be seen from Table 5 between the provider and the provider's Tree Indosat that there is no difference, proving jitter on both the provider in the category of good.

c.Testing of packet loss

Packet loss is the number of packets lost at a certain time that can be caused by a number of factors, including a decrease in the signal network media, network saturation exceeds the limit, the packet is corrupted refusing to transit, and network hardware errors.

Table 5 Degradation Category *Packet Loss*

Degradation Category	Jitter
Very good	0%
Good	3%
Bad	15%
Very Bad	25%

Table 6.Testing of p*acket loss* Tree and Indosat

No.	**Title angle cliff (˚)**	**Testing of *packet loss* (%)**	
		Tree	**Indosat**
1	30	0	0
2	45	0	0
3	60	0	0

Test results can be seen from Table 8 packet loss between the provider and the provider's Tri Indosat that there is no difference, this proves packet loss on both the provider in the category of very nice.

The average term of SMS delivery is highly dependent on the quality of company service provider GSM network as well as an outline of sending SMS is also dependent on the angle of the cliffs and the mass of the object landslides, both in the Tree and Indosat send sms quicker on condition of tilt angle precipice with the masses landslides heavy objects rather than the condition of the angle of the ramps with the mass of the object cliff landslide light. Average of SMS delivery by tree on the condition of the angle of 30˚ to the mass of the object avalanche 30Kg of 5.21 seconds, 5.19 seconds compared to Indosat Tekomsel on the condition of the angle of 45˚ to the mass of the object landslide 30Kg, Tree Indosat 5.27 seconds and 5.25 seconds, for

the condition of the condition of the angle of 60˚ to the mass of the object landslide 30Kg, Tri Indosat 5.14 seconds and 5.12 seconds. The results of the different readings at each height level object landslides or experiencing a fluctuating values caused by many factors that can affect delivery of SMS. The example is the noise on the network or signal strength is weak or strong is able to affect the speed of sending text messages to the operator. Time sensor readings and sending SMS category is because the effective delay time SMS delivery is too long or under 8 seconds, global SMS delivery time by hardware in a landslide early warning system include fast and does not take long for the operator to determine the landslide. From the test results are contained in Table 4.3 it can be seen that the early warning system of accidents due to landslides arduino based microcontroller with accelerometer sensor, ultrasonic sensor and SMS can work well. For Quality of System of any delay testing has shown good results for a system. System works well without experiencing disruption both for the provider and Indosat Tri each test condition.

Conclusion

Based on the analysis and testing of the early warning system in a landslide accident it can be concluded: The First, Equipment early warning system crash due to a landslide on the railway use arduino microcontroller brain as a whole system to determine the reading of the accelerometer sensor and ultrasonic sensor readings to the surface of the landslide to update in realtime successfully designed using SMS as an output or an early warning of landslide hazard by testing 2 provider different GSM as well as quality of service testing to determine how much the quality of the service provider. The Second, Early warning system crash due to a landslide on the railway is progressing well and effective for use mainly in the railway in Indonesia. The Third, System do the reading surface of the avalanche conditions in real time and average speed of sending SMS to all providers of early warning system operator by accidents due to landslides through GSM modem under 8 seconds, the system is running fast, precise and efficient. The Fourth, the quality of system of any delay testing has shown good results for a system. System works well without experiencing disruption both for the provider and Indosat Tree weather in each category.

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