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III. Tuesday, October 04, 2016

LIFE SCIENCE

ROOM : F-3-02 (Flamboyant Building, 3rd floor, room 02)

Moderator : dr. Tristia Rinanda, M.Si			
No	Time	Title	Presenter
1.	14.00-14.15	Invited speaker Life Science	Professor Graeme Martin
2	14.15-14.30		
3	14.30-15.00	The ability of <i>Leptosphaeria biglobosa</i> to infect oilseed rape and swede cultivars grown in New Zealand	Suhaizan Lob, Marlene Jaspers, Hayley Ridgway and Eirian Jones
4	15.15-15.30	Fusarium species associated with infected sea turtle eggs in Chagar Hutang, Redang Island	Siti Nordahliawate Mohamed Sidiq, Andrew A. Ngadin, Nurul Faziha Ibrahim, Juanita Joseph
5	15.30-16.00	Effect of Salinity on the Growth of Juvenile Giant Trevally (<i>Caranx ignobilis</i>)	Firdus, Sayyid Afdhal El Rahimi, Muhammadar A. Abas, M. Ali S, Samadi
6	16.00-16.15	Arbuscular Mycorrhizal Fungi Communities at University Farm of Ie Seuum Station	Fikrinda, Syafruddin, Sufardi, Rina Sriwati
7	16.15-16.30	The Correlation between the Level of Knowledge, Educational Degree and Family Support to Drug Compliance in Leprosy Patients in North Aceh District	Fitria Salim, Vera Dewi Mulia

IV. Tuesday, October 04, 2016

Social Science

ROOM : F-3-03 (Flamboyant Building, 3rd floor, room 03)

Moderator : Dr. Irsyadillah M.Sc			
No	Time	Title	Presenter
1.	14.00-14.15	Integration of Oil Palm and Cattle to Empower Farmers' Economic in East Aceh, Indonesia.	Saifuddin Yunus
2.	14.15-14.30	Behavior of Buyers in Shopping Online through The Internet in Cambodia and Indonesia	David Kadi
3.	14.30-14.45	Dividend Policy in Developed and Developing Countries	Husaini
4.	14.45-15.00	The Family Firm's Performance: A Literature Review	Iswadi Saadi
5.	15.00-15.15	The Factors that Influence Bank Performance - An Empirical Study on Banking Companies	Sukma Hayati

		Listed in Indonesia Stock Exchange Year 2010 – 2014	
6.	15.15-15.30	Critical theory and accounting research: A critical review	Irsyadillah
7.	15.30-16.30	Coffee Break and Praying	

Moderator : Dr. Heru Fahlevi M.Sc			
No	Time	Title	Presenter
8.	16.30-16.45	How the commitment to achieve Sustainable Development Goals impacts poor women in Aceh Province, Indonesia	Pocut Ismyati Vonda
9.	16.45-17.00	The Effects of Sukuk (Islamic Bonds) in the Economic Growth	Derry Fahrian
10.	17.00-17.15	The Role of Knowledge Management on the Performance of Coffee Company in Southeast Asian Countries: An initial meta-analytic Review	Hendra Syahputra
11.	17.15-17.30	Determinants of Consistency of Local Government Budgeting – A Case of Sabang Local Government Indonesia	Heru Fahlevi

V. Wednesday, October 05, 2016

SCIENCE AND ENGINEERING

ROOM : F-2-02 (Flamboyant Building, 2nd floor, room 02)

Moderator : Dr. Nasrul Arahman, ST, MT			
No	Time	Title	Presenter
1.	09.00-09.15	Synthesis of -Mn ₂ O ₃ @ -MnO ₂ Core/Shell Nanocomposite and Catalytic Oxidation of Phenolic Contaminants in Aqueous Solutions	Edy Saputra, Jhon ArmediPinem, Syaiful Bahri, Shaobin Wang
2.	09.15-09.30	Application of a water hyacinth (Eichhornia crassipes) for treatment of wastewater from a chicken Farm	Suhendrayatna, Marwan, Putri and Susanti Ria
3.	09.30-09.45	Rail Fence Cryptography in Securing Information	Andysah Putera Utama Siahaan
4.	09.45-10.00	The Priorities of Selection Suppliers	Ikhsan Siregar
5.	10.00-10.30	Coffee Break	

Moderator : Dr. Taufik Fuadi Abdidin, M. Sc			
No	Time	Title	Presenter
6.	10.30-10.45	Prototype of Vehicles Potholes Detection Based Blob Detection Method and Neural Network Backpropagation Model	Dewiani Djameluddin, Andani Achmad and Rivanto Parung
7.	10.45-11.00	CFD Simulation Of Lpg Combustion In Annular Combustion Chamber Of Micro Gas TurbinE	Asyari Daryus, Ahmad Indra Siswantara, Budiarmo, Gun Gun R. Gunadi and Rovida Camalia
8.	11.00-11.45	Performance of Network Mobile Multi Node Wireless Sensor For Application to Landslide Movements	Hafsah Nirwana, Eddy T, Muh. Ahyar and Ibrahim Abduh
.	12.30-14.00	Lunch Break and Praying	

VI. Wednesday, October 05, 2016
LIFE SCIENCE

ROOM : F-3-01 (Flamboyant Building, 3rd floor, room 01)

Moderator : Prof. Dr. Samadi, M. Sc			
No	Time	Title	Presenter
1.	09.00-09.15	Antioxidant activity and vitamin C of banana peel infused water basis on difference of infuse duration and water temperature using DPPH radical scavenging and UV-Vis spectrophotometer method	Manna Wassalwa, Supriatno and Hafnati Rahmatan
2.	09.15-09.30	Alterations of gut microbiota in pregnancy: Is diet still remain the major cause?	Marissa and Juita
3.	09.30-09.45	Another Way to Trace Microbes in Human Tissue Section	Wilda Mahdani
4.	09.45-10.00	Wound healing process of leaf extract of <i>Jatropha curcas</i> Linn in Mice	M. Nur Salim, Darmawi, Ummu Balqis, Cut Dahlia Iskandar, Dian Masyitha
	10.00-10.30	Coffee Break and Praying	
5.	10.30-10.45	Riboflavin deficiency: what do we really know?	Juwita and Marissa
6.	10.45-11.00	Sineresis and acidity evaluation on probiotics milk added by different level of lactic acid bacteria and carrot (<i>Daucus carota</i> L) puree	Yurliasni, Yusdar Zakaria, Zuraida Hanum and Raudhatul Jannah
7.	11.00-11.45	Antibacterial activity of the extract combinations of <i>Myrmecodia pendens</i> and <i>Zingiber officinale</i> var <i>rbrum</i>	Munira, Muhammad Nasir and Ainun Mardiah
8.	11.45-12.00	In vitro antimicrobial activity of ethanolic extracts of <i>Piper nigrum</i> L.	Noni zakiah, Yanuarman yanuarman, Miralena kartika

Performance of Network Mobile Multi Node Wireless Sensor For Application to Landslide Movements

^{1*}Hafsah Nirwana, ¹Eddy T, ¹Muh.Ahyar, ¹Ibrahim Abduh, ²Zahir

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Abstract

Landslides are the movement of slope-forming materials such as rocks, debris materials, soil, or a mixture of these materials, moving down or off slopes. In connection with an early warning of landslides, a very important thing to note is the process of collecting information or data on the occurrence of landslides (landslide). The more points of node sensors are installed on landslide-prone areas, the more accurate the quality of an early warning system is. The research was aimed at creating a model of landslide movement and creating and analyzing models of multi-sensor data communication based on ZigBee IEEE 802.15.4. The research was to create a model of landslide movement based on the speed rate of soil movement by using a mobile Wireless Sensor Network/WSN and make the laying model of some WSNs (multi nodes) for an area coverage $\pm 300\text{m}^2$. This modeling used the software of Network Simulator version 2 or NS-2 with a range of scenarios. The results revealed that based on the network quality, the delays of some scenarios were very erratic; the packet delivery ratio value decreased when the number of clusters and/or nodes increased; and when the number of clusters and/or nodes increased, the throughput got bigger.

Key words: Landslide, WSN, Mobile, Zigbee, Delay, PDR, Throughput

Introduction

Ground motion is the movement of land mass to a lower place due to gravitational force (Magetsari, 2001 in Ira, 2013). Landslides are defined as the movement of materials or soil from the surface of slopes downward slopes of the earth that is caused by gravity force (Sulistianto, 2001 in Ira, 2013). They are also defined as the movement of slope-forming materials such as rocks, debris materials, soil, or a mixture of these materials that move down or off slopes. The occurrence of landslides can be explained as follows. Water that seeps into the ground increases soil weight. If water penetrates soil until it is impermeable and turns to be slip plane, it becomes slippery and the weathering soil on it will move following and off the slope (VSI, 2011). In general, a landslide has a sliding area.

Early warning (Early Warning System) is a series of act of giving an immediate warning by an authorized agency to the public about the possibility of a disaster occurrence in an area. The early warning system for landslides can reduce or prevent the loss of lives and properties when landslides happen. In connection with the early warning of landslides, a very important thing to note is the process of collecting information or data on the incidence of landslides (landslide). The more points the sensor nodes mounted on landslide-prone areas, the more accurate the quality of an early warning system will be.

The research was aimed to create a model of landslide movement and create and analyze the models of multi-sensor data communication based on ZigBee IEEE 802.15.4.

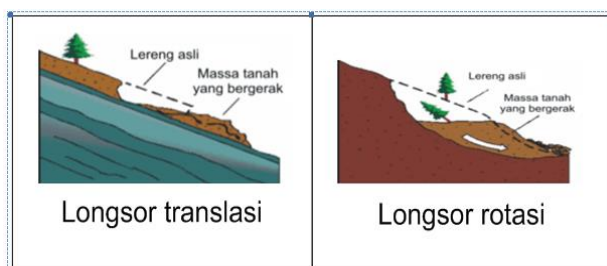


Figure 1. Landslide Condition

Wireless sensor network (Wireless Sensor Network/WSN) is a smart sensor in which each point on the sensor has the ability to sense its surroundings (sensing), and processes the data obtained as well

ascommunicates, but it is developed in a larger scale and can be connected to one another. Accordingly, it will be able to perform oversight function (monitoring) continuously (real time) on an environment that will be sensed by the wireless sensor network collectively. Wireless sensor network is a new generation of sensor systems (sensory system), although it is still limited to data processing ability only and has a limited bandwidth for communication (Ata E2005 & George A, 2009).

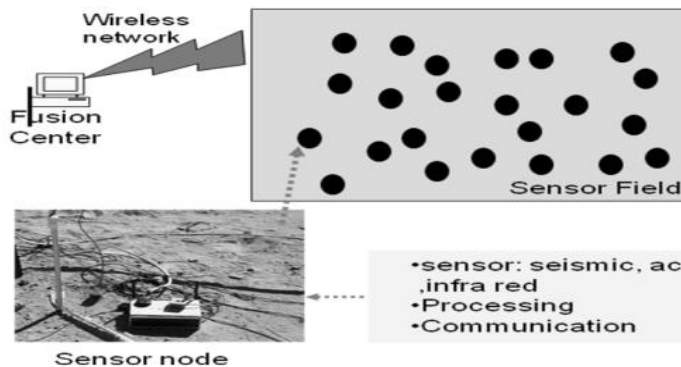


Figure 2. Wireless Sensor Network System (Abdul H dkk, 2009)

In a *Wireless Sensor Network* there are 2 kinds of topology (Sri A, 2011), namely:

1. *Hierarchical*
2. *Flat-type*

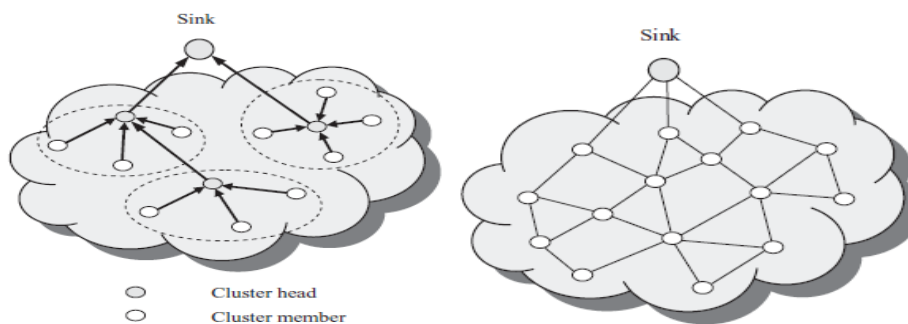


Figure 3. Single-hop cluster type Figure 4 Topology flat-type

The hierarchical architecture can be seen in Figure 3 and 4 above. In this topology, the sensor nodes are grouped in clusters. Sensor nodes are arranged in a hierarchical arrangement so that there are 3 kinds of nodes, i.e. the sink node, the cluster head, and cluster members. Sink node functions as a regulator of multiple cluster head in its application. Several cluster members become the members of a cluster head.

Research Methodology

The research was to create a model of landslide movement by using Wireless Sensor Network/WSN that is mobile and make the laying model of some WSNs (multi-node) for an area coverage $\pm 300\text{m}^2$. This modelling used the software Network Simulator version 2 or NS-2.

Data Communication Simulation Designing of Mobile Multi Node Wireless Sensor

For modelling the data communication path from the cluster node to the head node using ZigBee IEEE 802.15, the cluster head is positioned in the middle of the cluster nodes with a topology form of ad hoc type where one of the nodes will be assigned as a proxy to perform coordination among nodes in a group.

The concept of data communication path modeling consists of two nodes:

- a. Node point of landslide data of WSN; in this location several wireless sensor nodes are installed, which are divided in multiple cluster nodes. And each cluster node is equipped with a local alarm.
- b. Head node; this point serves as the data centre of avalanche that originate from some node clusters. This section is also equipped with an alarm and automatic stop signs for road users who will cross the road in the area.

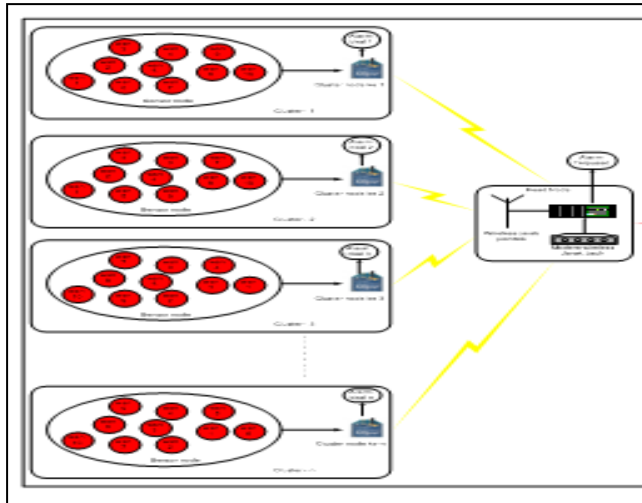


Figure 5. Model of data communication path of WSN *Multi Node* (Hafsah N, 2014)

The scenario rules of the research are as follows:

- a. The condition of WSN is mobile.
- b. The position of WSN is fixed
- c. The number of clusters ranges from 2 to 10 clusters.
- d. The number of nodes/WSN in each cluster varies, i.e. 3, 5, 7, and 10 nodes.
- e. The performance calculated is Delay, Packet Delivery Ratio and Throughput.

So, if scenario F1 has 10 clusters, it means that there is a WSN with 30 nodes. There is a situation where scenarios have the same number of nodes but the nodes are placed in different positions, for example scenario F1 with 10 clusters and scenario F4 with 3 clusters. Both scenarios have WSN with 30 nodes.

The designing of the mobile WSN consists of several stages: determining the parameters of communication devices, the position of the sensor nodes and their topology, and the number of clusters and nodes. Then the simulation was constructed with the simulator of Network Simulator 2 (NS-2) version 2:34 with a modification of PHY and MAC QoS support, language programming C++ and Tcl. The result of the simulation was file traces, which were displayed in the form of data and graphs using AWK scripts and Gnuplot application.

Result And Analysis

A mobile condition is the visualization of condition of sensor that has a movement, which means that land movement takes place. The land movement is observed in terms of distance so that the condition can be calculated if it is still secure, unsecure, or a landslide is taking place. Making a decision on the condition is based on the speed rate of the land movement.

1. Results of mobile Zigbee WSN network performance

The parameters used for measuring the results of mobile Zigbee WSN network performance were Packet Delivery Ratio (in %), Throughput (in bps), and Delay (in milliseconds). Each table of the measurement results includes the three parameters for comparing the results with a variety of scenarios. The performance measurement results in Table 1 and the graph shapes for the results of performance measurement of the data communication systems from the table are displayed in some images below.

Table 1. WSN mobile Zigbee

Amount of Cluster (WSN)	PDR (%)				Traoughput (bps)				Delay (mili detik)			
	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
2	96.55	98.69	93.44	70.12	4.97	8.29	10.87	10.60	25.51	74.11	118.99	46.76
3	100	99.19	85.28	60	7.52	12.09	12.87	13.33	46.76	34.02	46.11	444.93
4	99.41	89.49	77.77	46.74	9.52	13.62	14.87	13.49	21.69	91.06	52.17	134.63
5	90.94	75.68	61.06	38.97	11.66	15.01	16.31	15.16	94.71	121.74	122.79	203.08
6	83.39	62.03	48.32	30.73	11.43	14.91	16.29	14.08	141.5	248.29	230.87	115.35
7	85.48	61.41	50.86	32.76	13.11	15.95	18.44	17.75	229.94	135.46	309.17	221.69
8	75.06	52.67	48.36	30.40	13.67	16.12	19.83	18.24	218.02	463.52	158.15	163.75
9	74.47	49.02	37.55	24.59	15.61	17.30	18.34	16.00	527.11	215.93	323.68	220.16
10	66.59	47.76	37.31	22.52	15.33	18.13	19.05	17.01	398.48	244.85	185.63	301.67

After having conducted the simulation with NS-2, one of the outputs was in the form *file Namtrace* that was used as an input for graphical display of simulation called *Network Animator (nam)*. The result was a form of WSN positioning condition in landslide-prone locations. Below is a form of namtrace outputs from the scenario of fixed position of 10 clusters and 10 nodes/clusters, which was scenario F4.

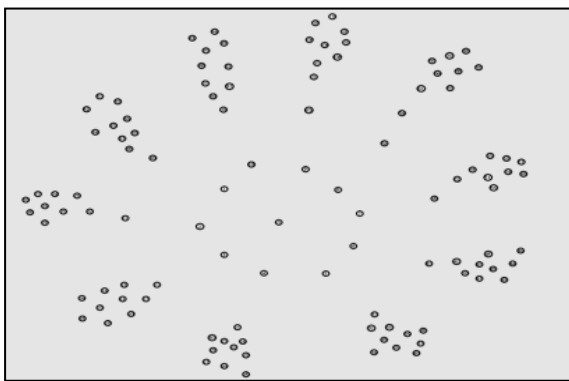


Figure 8. Wireless Sensor Network (WSN) positioning

2. QOS Measurement of Networks

a. Delay performance

- ✓ For all scenarios F1, F2, F3 and F4, the delay values varied when the number of cluster or WSN increased. Sometimes the delay values increased when the number of cluster or WSN increased, but sometimes reduced as well.
- ✓ The shortest delay, which was 21:49 ms, happened to scenario F1 with a number of 4 clusters, while the longest delay occurred to scenario F1 with 9 clusters.

Based on the results obtained, the delay performance graph is shown in Figure 9.

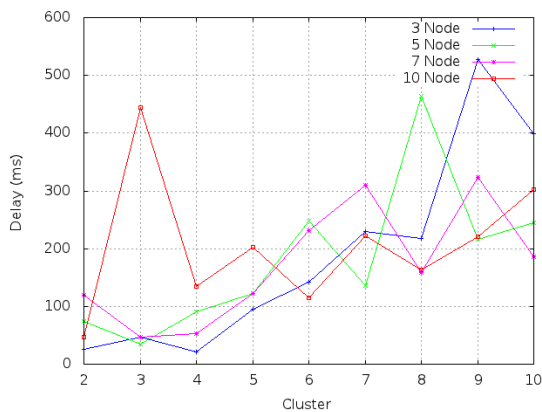


Figure 9. Delay graph of Zigbee Mobile WSN with a fixed position of WSN

b. Packet Delivery Ratio performance

PDR performance measurement is a parameter to determine the ratio of the number of packets received by the receiving node to the total packets sent in a certain time period. The results are shown in Table 1.

The bigger the number of nodes was, the smaller the PDR was; and the bigger the number of clusters was, the smaller the PDR was. This means that more data sent will be received successfully if the number of nodes or clusters is small. For more details, this is visualized in graphical form in Figure 10.

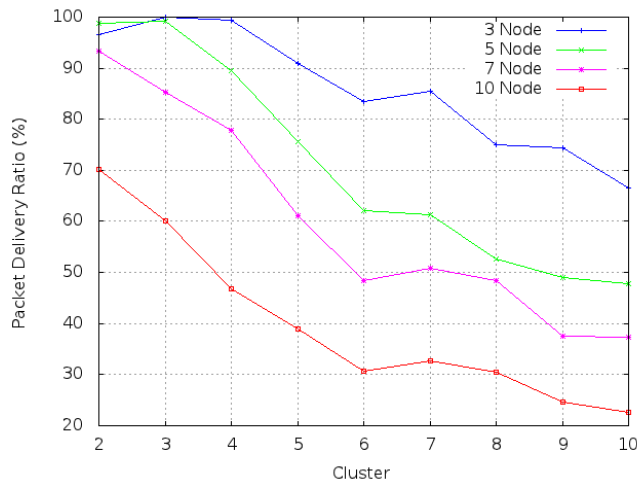


Figure 10. PDR graph of Zigbee Mobile WSN for fixed position of WSN

c. Throughput performance

Throughput is the total number of success full packet arrivals at the destination observed during a specific time interval divided by the duration of the time interval. The comparison of throughput of each scenario shows the amount of data that can be transmitted in a time unit.

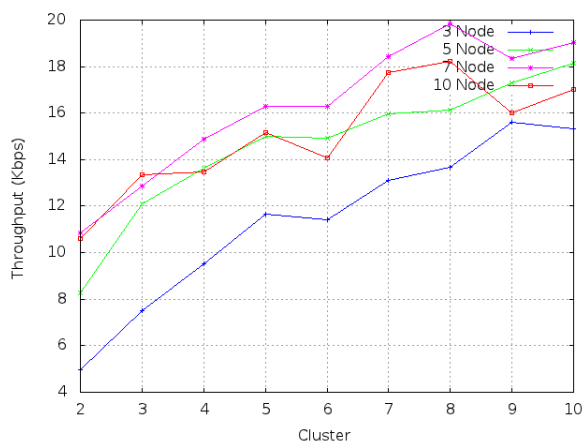


Figure 11. Throughput graph of Zigbee Mobile WSN for a fixed position of WSN

The bigger the number of cluster nodes and/or nodes was, the greater the throughput would be. However, although scenarios had the same number of nodes, they would result in different values of throughput when they had different topologies; for example, the results of scenario F1 with 10 clusters and scenario F4 with 3 clusters. Even though these two scenarios had the same node number of 30 WSNs, they resulted in different throughput, that is, 15.33 bps and 13.33 bps respectively.

Conclusions

1. Based on its quality, the Wireless Sensor Network using ZigBee could be used as a Landslide Early Warning.
2. The delivery time of information (delay) of the network was uncertain for a various numbers of clusters and nodes.
3. The Packet Delivery Ratio will decrease in value if the number of clusters and/or nodes increases.

4. Increased number of cluster nodes and/or nodes will increase throughput.
5. NS-2 can only model the soil movement speed rate at Grade/Category 5, 6, and 7, that is, big landslides, landslides, and landslides will occur.

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