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A framework synthesis by Ad-HOC based Cyber-Physical System for Performance Measure into Peak and off-Peak hours

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Abstract:
The cyber-physical system (CPS) is an advanced technology with the excellent quality to combine with the Ad-HOC network for executed work. The benefit of Ad-HOC Network efficient wireless technology for government work and military institute for secure communication. In this research, combine and propose AD-HOC based CPS framework for modeling and simulation to include cyber and examine node distance; the average speed rate in NS2 also consists of the Euclidean function for analysis outer node performance. The technology implements the CPS function for detection peak hours-off peak hours rate in wireless communication. The main objective of the paper frequency analysis and consider different time ratios for speed performance analysis. Also applicable for all industrial, official, educational institute area. This research will provide a new feature wireless network and the Internet of Things. The feature will benefit from advanced technology.

Keywords: CPS, NS2, Ad hoc, Euclidean distance, average speed.

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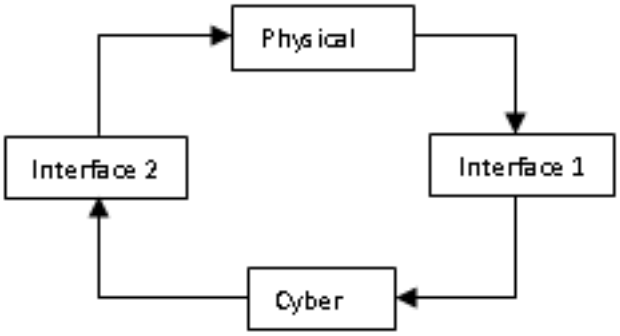
Introduction

The world becomes closer to online wireless communication facilities, such as faster download speeds at peak times 524.7 megabytes per second and faster upload speeds at peak times 379.1 megabytes per second in New Zealand. Many applications and dynamic topology develop by the AD-Hoc network nowadays. There are Ad hoc network offices, schools, conferences (Alam & Aljohani, 2015). A faster and useful technology needs measurement frequency in network communication for peak hours and off-peak hour rates. CPS is one of the types of efficient technology. A peak hour off Peak hour's rate indicates that the energy mode availed rate. The system will be useful; the researcher collects outer nodes between end to end device communications, simulates different value results, examines time always, and provides the available low-cost mechanism. The structure combines ad hoc based CPS function and output seen by simulation. The design of the simulation platform for Ad-HOC based CPS is describing her

Physical: Include plant or process or system or structure.

Interface 1: It connects to physical to cyber parts.

Interface 2: It connects cyber to physical parts.



Figureure 1: Basic block diagram cyber-physical system (CPS) for modeling and simulation.

Cyber: Implement coding parts to add software or computation.

We find in this paper those challenges,

1. According to figure 1, develop a framework for modeling and simulation,
2. Synthesis four significant parts and simulate in NS2. Briefly describe cyber such as computing part
3. Analysis of average speed for real-time implementation peak hours and off-peak hours rate.

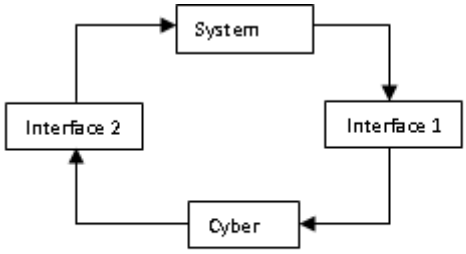
RELATED WORK

Application in the urban emergency system contribute Ad hoc function into the sensor node, actuator node, a sink node, dispatch nodes. Discuss the benefit of Ad hoc network is no fixed network center, easy to develop fast configureure dynamic topology (Wang et al., 2011). Wang et al. (2011) provides ad hoc interfaces. Apply Euclidean distance for clustering based VANETs Routing Algorithm. The protocol has an existing Ad-Hoc On-demand Routing Protocol (ADOV) and shows the result in NS2 (Tian et al., 2010).In this paper, the Euclidean method and ADOV protocol for simulation and efficient result. Propose SecRoute authentication TESLA based and discuss malicious node. Evaluate nodes distance and speed rate accuracy in NS2, (Hatzivasilis et al., 2017). Geetha et al. (2006) compare performance

ADOV and DSDV and examine that ADOV better for routing overhead and packet delivery ration than DSDV. Also, better for an average end to end delay. Lei et al. (2015) analysis DSDV, DSR, ADOV, and develop AOMDV . Tung et al. (2006) Such as security-aware Ad-hoc Routing (SAODV). Include in this paper, the ADOV protocol, Benefit of ADOV, has a short lifetime, temporally structured, and better performance. Kawamoto et al. (2013) provides a technique for a network environment. The structure has Connected wireless mobile devices into the two significant parts of CPS, physical and the other is cyber . Lecce et al. (2018) design with System 10SBCs based Arduino-Uno type . Lei et al. (2015) design is an existing Resources Network Simulator (NS 2).contribute four-layer application layer, network layer, link layer, and physical layer. Include the function sensor Model, actuator model, sink node model, dispatch node model. It has a new approach, describes controlling protocol existence, and also elaborates on the CPS functions.

MODELING AND ANALYSIS

According to figure 1, Modeling of CPS



Figureure2: Block Diagram Ad hoc based Cyber-physical system.

A. System Here, the physical environment creates. Include the sensor and actuator, sink node, and dispatch node to communicate with the controlling process. Sensor and actuator: create interfaces in actuator receive the signal in the sink node by controlling process and sensor transmit data by dispatch node in the controlling process. There are two interfaces for executing modeling and simulation by CPS Sink node and dispatch node: Algorithm, equation, function. Examine it for frequency analysis in Data measurement, and frequency level depends on distance and time ratio simulate in NS2. In this research paper, The result strong foundation of the framework in cyber and physical parts provides one portion of the logical part, and another area interfaces studied for implement in CPS. Controlling: Execute the working process by computer type memory. The total environment is Ad-Hoc same as Wang et al, 2011.

B. Standard Interface 1 The interface executes between the system and the cyber path. Represent network converter from analog to digital (ADC).

C. Interface 2 Interface 2: The interface executes between cyber to the system path. Represent network converter digital to analog (DAC). Both interfaces would be the standard interface.

D. Cyber, the central computing part of function execution here. Data collection: we collect end to end devices' outer nodes, find node distance.

Data measurement: order nodes, Euclidean function for analysis node distance. The average speed of nodes for frequency analysis. User terminal; the end to end device devices interact within CPS. Also, create one type of interface. Collect outer nodes from the interaction with that type of interface. Design modeling and simulate it NS2.

IMPLEMENTATION AND ANALYSIS

A. Euclidean function Euclidean Distance: According to the calculation of the Euclidean function between x point and y point. Example: x(x1, x2) and y (y1, y2)

B. Order of Nodes Where xRy if x—y. R is an equivalent relation on set N. Where (1,1) = NULL, (2,2) = NULL, (3,3) = NULL, (4,4) = NULL.

C. Wireless Nodes Distance

According to the Euclidean function

$XY = \sqrt{(x1 - y1)^2 + (x2 - y2)^2}$ (1)

$xnyn = \sqrt{(xn1 - yn1)^2 + (xn2 - yn2)^2}$

D. Define Average speed (AS)

d=total distance, t=total time V= distance between nodes,

Q = TOTAL no of sum distance between nodes.

$\sum_{v0}^{vn} v0 + vn$ (2)

$d = v/q$ (3)

$AS = d/t$ (4)

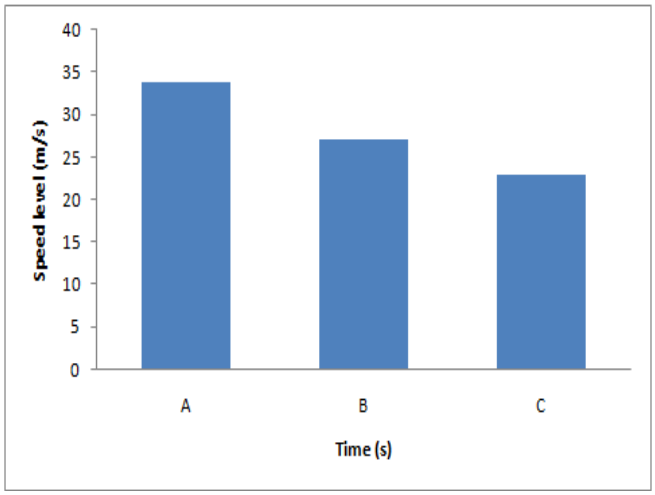
RESULTS AND DISCUSSION

Use network simulator NS-2 version 2.35

Table 1: SIMULATION ENVIRONMENT

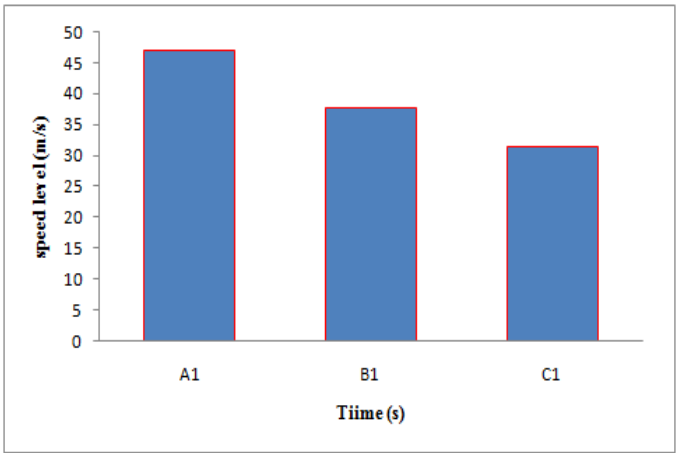
SN.	Parameter	Value
1	Simulator	NS-2
2	Maximum time	10 sec
3	Channel Type	Wireless
4	Terrain Dimension	1100*1100m
5	No of nodes	5,10,15,20
6	Traffic Model	TCP
7	Network interface type	MAC 802.11
8	Link-layer type	LL
9	Antenna model	Omni Antenna
10	Terrain Dimension	1100*1100 m
11	Routing protocol	ADOV

Source:NAM



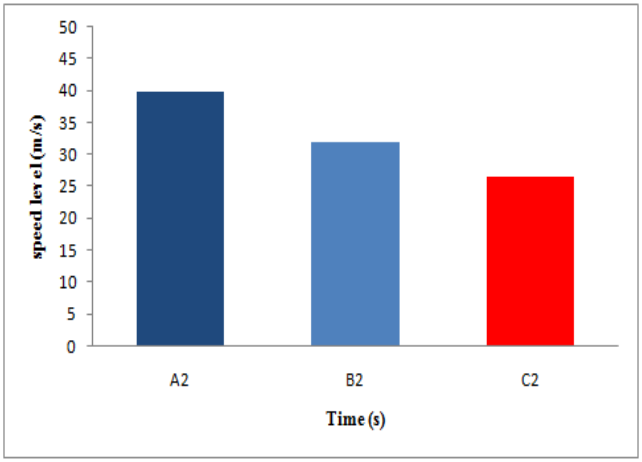
Figureure 3: the average speed between 5 nodes

Figure 3, According to equation (4), presents the average speed rate in 5 nodes. The maximum time rate of B=10(s). Also, include here A=8(s) and b=12(s) for performance measurement.



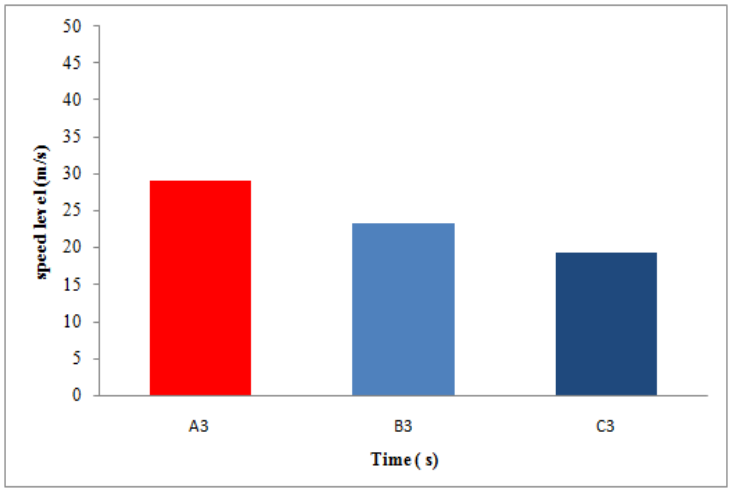
Figureure 4: the average speed between 5 nodes

Figure 4 shows the average speed rate with A1=8s, B1=10s, C1=12s)between 10 nodes. A1,b1,c1 shown different speed rates. Increased rate of speed A1.



Figureure 5: the average speed between 15 nodes.

Figure 5 shows the average speed rate with (A2=8s, B2=10s, C2=12s) the same as Figureure 2, between 15 nodes. Speed rate is shown in A2(39.82 m/s), B2(31.85 m/s), C2(26.54 m/s)



Figureure 6: the average speed between 20 nodes.

They were shown in figure 6, the same as figure 3, figure4, figure5 the time decrease A3 the speed rate decrease (28.98 m/s). Their time rate decreases the speed rate C3output less than C3 and also low B3.

CONCLUSION

In the result, The average speed of nodes different performance rate finding, it helps for the network communication in peak hours and off-peak hours statically analysis. Performance depends on the time limit; while the time limit increases, the performance of the speed outer nodes rate decreases. CPS is one of the modern frameworks, and it combines the ADHOC environment. There simulate routing protocol ADOV. Their uses here for usability, efficiency, smoothness purpose, but also use DSDV, DSR OR hybrid protocols. The same types of analysis data found the result. Simultaneously, the efficiency of input ratio; applicable for power development and modification level because peak hours and peak hours rate are essential for technology. Our technology CPS provides higher quality and upgraded flexible data. The combined technology includes frame will useful for new development and also update old power technology. In this research paper, The result strong foundation of the framework in cyber and physical parts provides one portion of the computing part, and another area interfaces studied for implement in CPS.

REFERENCES

[1] Alam, T., & Aljohani, M. (2015). An approach to secure communication in mobile ad-hoc networks of Android devices. *2015 International Conference On Intelligent Informatics And Biomedical Sciences (ICIIBMS)*. DOI: 10.1109/iciibms.2015.7439466

[2] Wang, X., Zhang, Z., Dong, Y. & Li, X.(2011). Research and Application of the architecture of ad hoc based CPS. *2011 International Conference On Advanced Intelligence And Awareness Internet (AIAI 2011)*. DOI: 10.1049/cp.2011.1479

[3] Tian, D., Wang, Y., Lu, G., & Yu, G. (2010). A VANETs routing algorithm based on Euclidean distance clustering. *2010 2Nd International Conference On Future Computer And Communication*. DOI: 10.1109/icfcc.2010.5497808

[4] Hatzivasilis, G., Papaefstathiou, I., Fysarakis, K., & Askoxylakis, I. (2017). SecRoute: End-to-end secure communications for wireless ad-hoc networks. *2017 IEEE Symposium On Computers And Communications (ISCC)*. DOI: 10.1109/iscc.2017.8024587

[5] Geetha, V., Aithal, S., & Sekaran, C. K. (2006). Effect of Mobility over Performance of the Ad hoc Networks. *2006 International Symposium On Ad Hoc And Ubiquitous Computing*. DOI: 10.1109/isahuc.2006.4290661

[6] Lei, D., Wang, T., & Li, J. (2015). Performance Analysis and Comparison of Routing Protocols in Mobile Ad Hoc Network. *2015 Fifth International Conference On Instrumentation And Measurement, Computer, Communication And Control (IMCCC)*. DOI: 10.1109/imccc.2015.325

[7] Tung, Y., Alkhatib, M., & Rahman, Q. (2006). Security Issues in Ad-Hoc on Demand Distance Vector Routing (AODV) in Mobile Ad-Hoc Networks. *Proceedings Of The IEEE Southeastcon*. DOI: 10.1109/second.2006.1629376

[8] Kawamoto, Y., Nishiyama, H., & Kato, N. (2013). MA-LTRT: A Novel Method to Improve Network Connectivity and Power Consumption in Mobile Ad-hoc Based Cyber-Physical Systems. *IEEE Transactions On Emerging Topics In Computing*, *1*(2), 366-374. DOI: 10.1109/tetc.2013.2278707

[9] Lecce, D. V., Guaraganella, C., Palagachev, D., Dentamaro, G., Quarto, A., & Soldo, D. (2018). IoT based cooperative agents architecture: Lightweight applications for smart cities. *2018 IEEE Workshop On Environmental, Energy, And Structural Monitoring Systems (EESMS)*. DOI: 10.1109/eesms.2018.8405815

[10] Lei, D., Wang, T., & Li, J. (2015). Performance Analysis and Comparison of Routing Protocols in Mobile Ad Hoc Network. *Fifth International Conference On Instrumentation And Measurement, Computer, Communication And Control (IMCCC)*. DOI: 10.1109/imccc.2015.325

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