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# Simulating Energy Efficient Cloud Environment using Advanced Mechanism

**Ritu Rani, Vinod Kr. Saroha, Sanjeev Rana**

***Abstract:*** ***The objective of research is to propose energy efficient model for cloud computing [1]. As energy is divided symmetrically then load of traffic will be disseminated in network. Thus there is need to put minimum load over network. The same occurs during packet transmission. Reducing the size of packet using advanced logic resolves the issue of space and time consumption. These advanced techniques help in minimizing the energy consumption [3]. Appropriate load balancing is maintained by well managed cloudlets and virtual machine. This research states the impact of number of cloudlets and size over virtual machines.***

***Keyword: Energy Efficient cloud; packet size; load balancing, cloudlet; virtual machine.***

## I. INTRODUCTION

***KKMJK***

### I. CLOUD COMPUTING[1]

The approach by which direct price benefits can be obtained is called Cloud computing .It has been prospective to change an information center by a capital concentrated set up into a flexible environment of price. It is the idea which depends upon the basic rules of reusability of abilities of IT. The dissimilarity that cloud computing is bringing in comparison of old parts of grid computing, dispersed computing, the utility computing or computing of autonomy. This is to widen horizons across boundaries of organization. The Cloud computing has been described like: Able of hosting end customer applications, a pool of abstracted, managed compute infrastructure, highly scalable and billed by consumption.

## II. TYPES OF CLOUDS[2]

***PUBLIC***

Public clouds have been owned and managed by third parties. These are delivering better economies of scale to the client. This is due to cost of infrastructure. The expenses have been divided in users. This is low cost model for client. There is need of privacy protections. Other is issue is that configuration has been limited for users.

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***** Correspondence Author
**Ritu Rani** M.Tech Scholar Assistant Professor Profesor Department of CSE&IT Department of CSE&IT Department of CSE,MMC BPSMV BPSMV MM Deemed University Khanpur Kalan Khanpur Kalan Mullana
**Vinod Kr. Saroha** M.Tech Scholar Assistant Professor Profesor Department of CSE&IT Department of CSE&IT Department of CSE,MMC BPSMV BPSMV MM Deemed University Khanpur Kalan Khanpur Kalan Mullana
**Dr. Sanjeev Rana** M.Tech Scholar Assistant Professor Profesor Department of CSE&IT Department of CSE&IT Department of CSE,MMC BPSMV BPSMV MM Deemed University Khanpur Kalan Khanpur Kalan Mullana



***PRIVATE***

Private clouds have been designed for individual enterprise selectively. Its objective is to find relevance on security of data. It is offering greater control. This feature is not present in a public cloud commonly. Private clouds supposed to be hosted in individuals own data center [4].

Such model is providing protection.

Such model is providing protection. Little aspects of scalability and size are its limitation. IT departments would need incurring the capital and expenses. It would occur in case of physical resources.

It would be better for applications. These applications need management of infrastructure, overall control and secrecy.

Private cloud has been hosted by cloud provider [5] who is established at external area. Cloud provider is providing a cloud environment with more security in special way. It has been considered most suitable in case of enterprises. These enterprises are not considering public cloud responsible for sharing of resources that are in physical form.

***HYBRID***

Hybrid Clou ds is going to assemble private along with public cloud based models. Service providers are able to utilize Cloud Providers from third party. It has been utilized completely as well as partially. It results in the growing flexibility of computing. It is performed using Hybrid Cloud. Hybrid cloud environment has been considered capable to provide on demand services. There is capability to expand a private cloud with given resources of a public cloud. This capability is utilized in order to manage unexpected work pressure [6].

## III. LITERATURE SURVEY

**There have been several researches regarding energy efficiency in cloud**

In 2010 Rajkumar et al. [1] Proposed Energy-Efficient Management of Data Center Resources for Cloud Computing. They stated a vision, architectural Elements, and Open Challenges.

In 2011, Anton Beloglazov et al. [2] presented research on energy Efficient Resource Management in Virtualized Cloud Data Centers.

In 2011 Antti P. Miettinen et al.[3] wrote on energy efficiency of mobile clients in cloud computing,

In 2012 Toni Masteli et al. [4] proposed on recent trends in energy efficient cloud computing.

In 2013 Ms.Jayshri Damodar Pagare, , et al.[5] Energy-Efficient Cloud Computing: A Vision, Introduction, andOpen Challenges.

In 2015 Harmanpreet Kaur, et al. [6]A Survey on the Power and Energy Consumption of Cloud Computing.

In 2016 Banashankari, et al. [7]A Survey on Power Efficiency in Cloud Computing to Optimize the Cost
In 2013 Abusfian Elgelany, et al.[ 8] wrote on Energy Efficiency for Data Center and Cloud Computing.
In 2013 Arindam Banerjee, et al. [9] proposed on energy efficiency model for cloud computing.
In 2013 Karim Djemame, et al. [10] presented his view on efficiency embedded service lifecycle that is towards an energy efficient
cloud computing architecture energy
In 2014 Mehiar Dabbagh, et al. [11] stated towards energy-efficient cloud computing: prediction, consolidation, and over commitment,
In 2014 Nader Nada, et al. [12] proposed on green technology, cloud computing and data centers as well as the need for integrated energy efficiency framework and effective metric.
In 2014 Renuka M. Dhanwate, [13] et al. did review on Improving energy efficiency on Android using Cloud based services.
In 2015 Dejene Boru, et al.[14] stated Energy-efficient data replication in cloud computing datacenters.
In 2015 Pragya, et al. [15] et al made Analysis of energy efficient scheduling algorithms in green cloud computing .
In *2018* Fuqing Zhao, et al. [16] had a review of Differential-based Harmony Search Algorithm with Variable Neighborhood Search for Job Shop Scheduling Problem and Its Runtime Analysis.
In *2018* Sumedha Garg , et al. [17] studied A K-Factor CPU Scheduling Algorithm**.**
In *2018* Manoj Hans , et al. [18] proposed on Energy Management of Smart Grid using Cloud Computing.
In *2018*Amit R. Gadekar , et al. [19] made research on Cloud Security and Storage Space Management using DCACrypt.
In *2018* Ubale Swapnaja , et al. [20] proposed Block Level Design for Secure Data Sharing in Cloud Computing.
In *2018* Prasad S. Halgaonkar , et al. [21] implemented security in Vehicular Adhoc Network using Cloud Computing by secure key Method.
In *2018* V. Seethalakshmi , et al. [22] did review of job scheduling in big data.
In *2018* Wojciech Bożejko , et al. [23] proposed cyclic job shop scheduling problem.
In *2018* Fuqing Zhao , et al. [24] had a review of A Differential-based Harmony Search Algorithm with Variable Neighborhood Search for Job Shop Scheduling Problem and Its Runtime Analysis.
In *2018* Sumedha Garg , et al. [25] proposed A K-Factor CPU Scheduling Algorithm.
In *2018* Shuhei Kawaguchi , et al.[26] introduced Improved Parallel Reactive Tabu Search Based Job-Shop Scheduling Considering Minimization of Secondary Energy Costs in Factories. In *2018* Shota Suginouchi , et al. [27] proposed Utilization of Pheromone in Production Scheduling by Negotiation and Cooperation Among Customers.

## IV. PROPOSED WORK

In proposed work data and control packet have been considered as the data used for transmission in traditional protocol. The data packets are transmitting information to destination. This information has six elements. Buffer structure of nodes is having common elements. This is because information packets are transmitted over network. Type of packet is configured by the T_DATA value. It is to check packet format. This checking is made by neighboring nodes. In our proposed work T_Data value would be replaced by XT_Data using encoding scheme. Here we would check the frequency of repeated data in T_Data and then replace with corresponding data having less length before packet transmission. The size of packet automatically gets reduced. Then packets would be grouped using clustering base in fuzzy system. The control packets have been utilized to transfer RTS and CTS packets. This transmission is made among nodes in order to report neighborhood information. It has seven elements. Packet type has been set by T_RTS value in order to check RTS packets in this format. T_CTS value is used to confirm CTS packets. These packets are received from neighbors. After receiving xT_Data, information would be decoded to T_Data.

**Proposed Algorithm**

1. At the beginning consider Data and control packet that would be required.
2. Reduce Data Packet by replacing of T_Data with xT_data.

Packet Size Reduction Logic

3. Select CNs in case of neighbors along with (RE>REavg) & (ABS>ABSavg)

4. Set the NP based on sending node, SR along with base station. It helps in determining distance among CN and np, Determine number of neighbors at CN

5 Perform Fuzzification using Fuzzy set , cluster Base , Rule base in inference Engine, defuzzification of data and get minimum T(n) and chose the node accordingly.

## V. DIFFERENCE BETWEEN TRADITION AND PROPOSED WORK

**Following table is representing difference between traditional and proposed work**

**TABLE 1 DIFFERENCE BETWEEN TRADITIONAL AND PROPOSED WORK**

| | TRADITIONAL WORK | PROPOSED WORK |
|---|---|---|
| **PACKET SIZE REDUCTION** | NO | YES |
| **AUGMENT NETWORK LIFE TIME** | YES | YES |
| **ENHANCE PACKET DELIVERY RATIO** | YES | YES |
| **MINIMIZE PROBABILITY OF CONGESTION** | NO | YES |
| **SECURITY** | LESS | MORE |
| **ENERGY SAVING** | LESS | MORE |

## VI. KNN MODEL INTEGRATION IN PROPOSED MODEL

Here n cloudlets have been taken for processing and there are two categories of virtual machine that could be randomly seleced in order balance load. One is group regional virtual machines that are limited but could process cloudlet rapidly.

Second group is of virtual machine that could be used for load balancing. These virtual machines could be selected on KNN based selection when all cloudlet would be allotted to regional virtual machine and there would be need to reduce the processing cycle and balance the load on regional machine then the selection of virtual machine available in KNN list would be made.

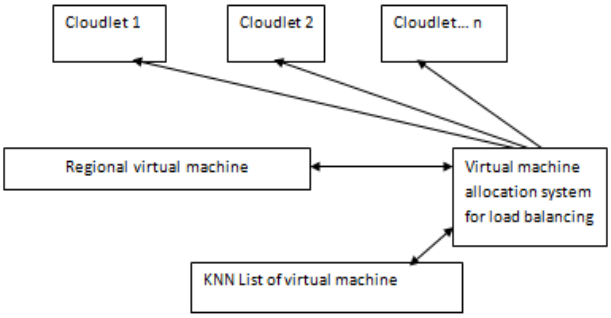


**Fig 1 KNN BASED VM SELECTION**

**Algorithm for integration model**

1. Get VMindex of selected region, T,knn_list
2if(VMindex of selected region, T) is found in knn_cache_list then return VMName otherwise
3. Region list= regionVirtualmachineIndex,get(region)
4. k=knn_list.size();
5. if regionlist is not NULL then
6. listsize=size(regionlist)
7. if listsize=1 then
7. dcName=regionlist.get(0);
8. elseif listsize<=k then
9. Intrand=(int)(Math.random()*listsize);
10.VMName=regionallist(rand);
11.else
12.Intrand=(int)(Math.random()*knn_list.size());
13 VMName=knn_list(rand);
14.end if
15.end if
16. store VMName,VMindex of selected region, T to knn_cache_list.
17. return VMName

## VII. STATISTICAL DATA

Statistical data for Comparison of Time consumption in tradition & proposed comparison system has been represented in this section. Following data is representing Time consumption in tradition & proposed comparison system

**TABLE 2 TIME CONSUMPTION IN TRADITION & PROPOSED COMPARISON SYSTEM**

| PACKETS | TRADITIONAL | PROPOSED |
|---|---|---|
| **10** | 5 | 2 |
| **20** | 5 | 2 |
| **30** | 8 | 3 |
| **40** | 8 | 3 |
| **50** | 10 | 4 |
| **60** | 10 | 4 |
| **70** | 11 | 5 |
| **80** | 11 | 5 |

**Comparative analysis of Queuing delay in tradition & proposed comparison system**

**TABLE 3 QUEUING DELAY IN TRADITION & PROPOSED COMPARISON SYSTEM**

| FILE SIZE | TRADITIONAL | PROPOSED |
|---|---|---|
| **10** | 6 | 3 |
| **20** | 6 | 3 |
| **30** | 9 | 4 |
| **40** | 9 | 4 |
| **50** | 11 | 4 |
| **60** | 11 | 4 |
| **70** | 13 | 5 |
| **80** | 13 | 5 |

**Comparative analysis of File Size in tradition & proposed comparison system**

**TABLE 4 COMPARATIVE ANALYSIS OF FILE SIZE IN TRADITION & PROPOSED COMPARISON SYSTEM**

| PACKETS | TRADITIONAL | PROPOSED |
|---|---|---|
| **10** | 4020 | 1020 |
| **20** | 8090 | 2050 |
| **30** | 12100 | 3600 |
| **40** | 16201 | 4201 |
| **50** | 20300 | 5100 |
| **60** | 24200 | 6300 |
| **70** | 29002 | 7210 |
| **80** | 33100 | 8543 |

**Readings of cycle performed by traditional and proposed**

**TABLE 5 READING CYCLE IN CASE OF MULTIPLE VIRTUAL MACHINE IN CASE OF TRADITIONAL AND KNN BASED WORK**

| Number of cloudlet | Traditional | Knn based |
|---|---|---|
| **8** | 3 | 2 |
| **12** | 4 | 2 |
| **15** | 4 | 2 |
| **20** | 6 | 3 |
| **25** | 7 | 4 |
| **30** | 8 | 4 |
| **35** | 9 | 5 |
| **40** | 11 | 6 |
| **45** | 12 | 6 |
| **50** | 13 | 7 |

## VIII. GRAPHS

Here in this section different graphs plotted on basis of statistical data in matlab are represented

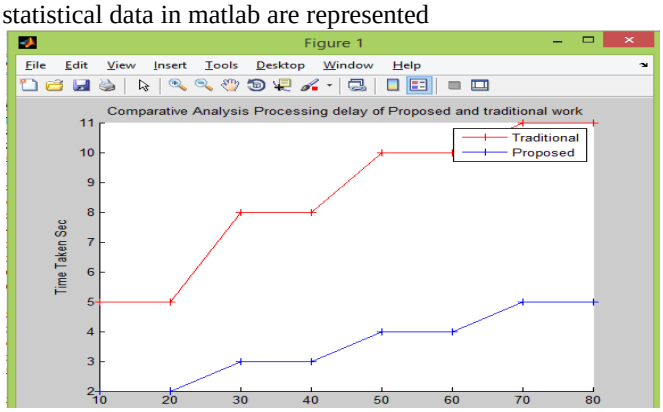


**Fig 2 Comparative analysis of overall Time consumption**

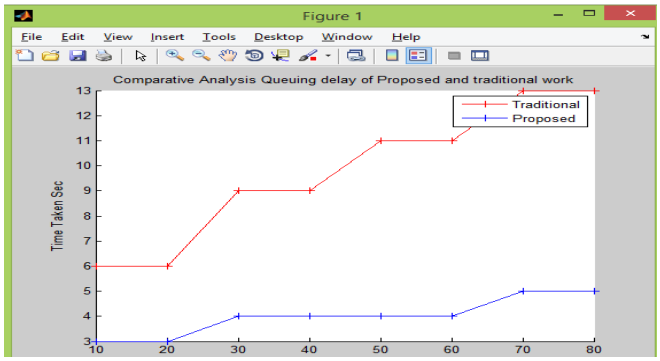


**Fig 3 Comparative analysis of Queuing delay in tradition & proposed comparison system**

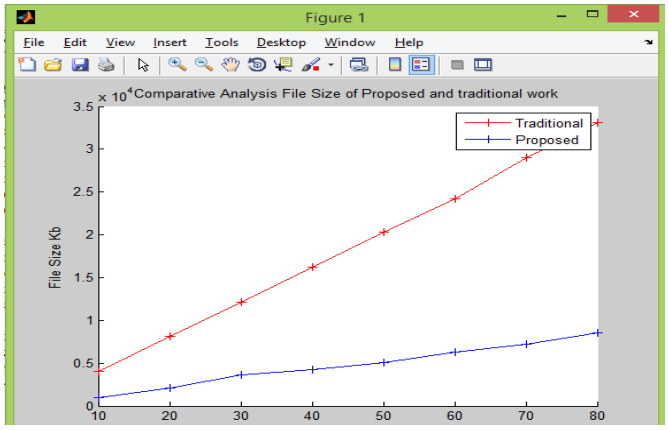


**Fig 4 Comparative analysis of File Size in tradition & proposed comparison system**

Matlab based simulation of time taken between tradition and proposed work after load balancing

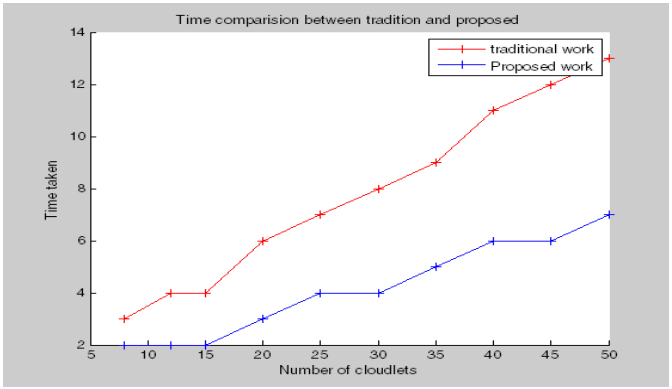


**Fig 5 time comparison between traditional and proposed**

## IX. CONCLUSION

Minimizing size of packet with the help of packet reduction logic saves space and time. This technique has minimized energy consumption. Matlab based simulation which is representing comparative analysis of time consumption by tradition and proposed work after load balancing has concluded that advance mechanism is working fast. Matlab based simulation of energy consumption in tradition and proposed work after load balancing concludes that advanced model is energy efficient.

## X. FUTURE SCOPE

Research would propose energy efficient model for cloud computing because energy would be divided symmetrically then load of traffic will be disseminated in network. Thus there would be requirement to put minimum load on network. Minimizing size of packet would resolve challenges of space and time consumption. These advanced techniques would help in minimizing the energy consumption. Appropriate load balancing would be maintained by well managed cloudlets along with virtual machine. This research would states influence of number of cloudlets.

## REFERENCE


1. Rajkumar Buyya, Anton Beloglazov, and Jemal Abawajy (2010) Energy-Efficient Management of Data Center Resources for Cloud Computing: A Vision, Architectural Elements, and Open Challenges
2. Anton Beloglazov and Rajkumar Buyya(2011) Energy Efficient Resource Management in Virtualized Cloud Data Centers,
3. Antti P. Miettinen, Jukka K. Nurminen(2011) Energy efficiency of mobile clients in cloud computing,
4. Toni Masteli, and Ivona Brandi (2012) Recent Trends in Energy Efficient Cloud Computing, Journal of Latex Class Files, Vol. 11, NO. 4, DECEMBER 2012
5. Ms.Jayshri Damodar Pagare, Dr.Nitin A Koli (2013) Energy-Efficient Cloud Computing: A Vision, Introduction, andOpen Challenges, International Journal of Computer Science and Network, Vol 2, Issue 2, April 2013
6. Harmanpreet Kaur, Jasmeet Singh Gurm(2015) A Survey on the Power and Energy Consumption of Cloud Computing, *International Journal of Computer Science Trends and Technology (IJCST) – Volume 3 Issue 3, May-June 2015*
7. Banashankari, Chandan Raj.(2016), "A Survey on Power Efficiency in Cloud Computing to Optimize the Cost", *National Conference on Advances in Computing, Communication and Networking (ACCNet – 2016)*
8. Abusfian Elgelany, Nader Nada(2013) Energy Efficiency for Data Center and Cloud Computing: A Literature Review, International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 4, October 2013
9. Arindam Banerjee, Prateek Agrawal and N. Ch. S. N. Iyengar (2013), "Energy Efficiency Model for Cloud Computing", International Journal of Energy, Information and Communications Vol.4, Issue 6 (2013)
10. Karim Djemame, Django Armstrong, Richard Kavanagh(2013), "Energy Efficienc Embedded Service Lifecycle: Towards an Energy Efficient Cloud Computing Architecture
11. Mehiar Dabbagh, Bechir Hamdaoui, Mohsen Guizaniy and Ammar(2014) Towards Energy-Efficient Cloud Computing: Prediction, Consolidation, and Over commitment,
12. Nader Nada, Abusfian Elgelany(2014) Green Technology, Cloud Computing and Data Centers: the Need for Integrated Energy Efficiency Framework and Effective Metric, *International Journal of Advanced Computer Science and Applications, Vol. 5, No. 5, 2014*
13. Renuka M. Dhanwate, Vaishali B. Bhagat(2014) A Literature Review on Improving energy efficiency on Android using Cloud based services, International Journal of Advance Research Computer Science and Management Studies, Volume 2, Issue 12, December 2014
14. Dejene Boru, Dzmitry Kliazovich, Fabrizio Granelli, Pascal Bouvry, Albert Y, Zomaya (2015), "Energy-efficient data replication in cloud computing datacenters", Springer Science+Business Media New York 2015
15. Pragya, Mrs Manjeet Gupta(2015), "Analysis of energy efficient scheduling algorithms in green cloud computing" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 5, May 2015[4]
16. Fuqing Zhao , Shuo Qin , Guoqiang Yang , Weimin Ma , Chuck Zhang , Houbin Song " A Differential-based Harmony Search Algorithm with Variable Neighborhood Search for Job Shop Scheduling Problem and Its Runtime Analysis" IEEE Access, Year: 2018 , ( Early Access ),Page s: 1 - 1
17. Sumedha Garg , Deepak Kumar" A K-Factor CPU Scheduling Algorithm" 2018 9th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Year: 2018, Page s: 1 - 6

18. Manoj Hans , Pallavi Phad , Vivekkant Jogi , P. Udayakumar "Energy Management of Smart Grid using Cloud Computing" 2018 International Conference on Information , Communication, Engineering and Technology (ICICET). Year: 2018, Page s: 1 - 4.
19. Amit R. Gadekar , M V. Sarode , V M. Thakare "Cloud Security and Storage Space Management using DCACrypt" 2018 International Conference on Information , Communication, Engineering and Technology (ICICET), Year: 2018, Page s: 1 - 4.
20. Ubale Swapnaja , B. Ghadge Mayuri ,S. Apte Sulabha" Block Level Design for Secure Data Sharing in Cloud Computing" 2018 International Conference on Information , Communication, Engineering and Technology (ICICET), Year: 2018,Page s: 1 - 5
21. Prasad S. Halgaonkar , Atul B. Kathole , Jubber S. Nadaf , K P. Tambe "Providing Security in Vehicular Adhoc Network using Cloud Computing by secure key Method" 2018 International Conference on Information , Communication, Engineering and Technology (ICICET), Year: 2018, Page s: 1 - 3
22. V. Seethalakshmi , V. Govindasamy , V. Akila "Job Scheduling in Big Data - A Survey" 2018 Internat2018 International Conference on Computation of Power, Energy, Information and Communication (ICCPEIC)ional conference on computation of power, energy, Information and Communication (ICCPEIC), Year: 2018, Page s: 023 - 031
23. Wojciech Bożejko , Mieczysław Wodecki"On Cyclic Job Shop Scheduling Problem" 2018 IEEE 22nd International Conference on Intelligent Engineering Systems (INES), Year: 2018,Page s: 000265 - 000270
24. Fuqing Zhao , Shuo Qin , Guoqiang Yang , Weimin Ma , Chuck Zhang , Houbin Song" A Differential-based Harmony Search Algorithm with Variable Neighborhood Search for Job Shop Scheduling Problem and Its Runtime Analysis" IEEE Access, Year: 2018 , ( Early Access ), Page s: 1 - 1
25. Sumedha Garg , Deepak Kumar"A K-Factor CPU Scheduling Algorithm" 2018 9th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Year: 2018, Page s: 1 - 6
26. Shuhei Kawaguchi ,Yoshikazu Fukuyama" Improved Parallel Reactive Tabu Search Based Job-Shop Scheduling Considering Minimization of Secondary Energy Costs in Factories" 2018 57th Annual Conference of the Society of Instrument and Control Engineers of Japan (SICE), Year: 2018, Page s: 765 - 770.
27. Shota Suginouchi , Toshiya Kaihara , Nobutada Fujii , Daisuke Kokuryo "Utilization of Pheromone in Production Scheduling by Negotiation and Cooperation Among Customers" 2018 57th Annual Conference of the Society of Instrument and Control Engineers of Japan (SICE), Year: 2018, Page s: 773 - 778