International Journal of Signal Processing, Image Processing and Pattern Recognition
Vol.9, No.3 (2016), pp.399-412
http://dx.doi.org/10.14257/ijsip.2016.9.3.34

A Sensor Cloud Based Traffic Control System Using War State Battle Field

Kapil Kumar and Pankaj Deep Kaur

Department of Computer Science & Engineering
Guru Nanak Dev University Regional Campus
Jalandhar, INDIA,
Department of Computer Science & Engineering
Guru Nanak Dev University Regional Campus
Jalandhar, INDIA
er_kapilkumar@yahoo.com, pankajdeepkaur@gmail.com

Abstract

Congestion control is one of the most important factors in ensuring secure traffic. This paper is a study of Congestion Control in War State Battle Field using cloud sensor for collision detection and prevention. Cloud sensor uses common parameters such as total nodes, minimum speed, maximum speed, available mines (bombs), and distance variation to prevent collision of tanks on the battlefield. The main advantage of cloud sensors is that it allows easily gathering, accessing, processing, storing, sharing and searching for sensor data. Cloud sensors will be placed in a particular space that will notice the fastness and voice of siren at a specific threshold. Existing cloud based traffic control schemes are susceptible to various congestions such as upcoming vehicle control and priority vehicle control. The main reason for success of collision attack is the highest congestion reuse rate. This research based on congestion control in War State Battle Field. Battle Field is the basement of military action and is very substantial for officers to considerate and establishes the entire use of it in the conclusion- making. For evaluation of this approach, a scenario of battlefield has been considered in experimental analysis.The objective of this paper is to develop a new technique for avoiding the traffic collision in battlefield and to evaluate the proposed technique in the Java virtual environment.

***Keywords**: War State Battle Field, cloud sensor, cloud computing, congestion control, collision detection & prevention*

1. Introduction

The Cloud computing is very famous in recent years. Many connected computers distributed over a network at the same time in cloud computing. It is the combination of Grid Computing and Cluster Computing [1]. Cloud computing provides services, shared resources or common infrastructure on demand through the internet. Service provider provides the facilities to pay per use policy. Cloud computing has been evolving as the future generation computing paradigm. Customer can use storage space, processing capabilities, servers, operating system and application development environments. The user can scale up and down the resources in an instant (timely) and on-demand manner in the cloud [2].Cloud computing allows the systems and users to use Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Software as a Service (SaaS) [3]. Based on resource ownership, Cloud computing comes in three forms: public clouds, private clouds and hybrid clouds [4].

In this paper traffic over-crowding is a critical trouble in many urban centers across the universe. The existing methods are not accurate in terms of performance and cost for

ISSN: 2005-4254 IJSIP

traffic management and control. Urban region have a more problem of traffic crushes, particularly when a bit of conjunctions takes into thoughtfulness. [5]. The traffic signal is typically controlled by a controller inside a cabinet climbed on a concrete grid. Some electro-mechanical controllers are still in use [6]. Traffic control will turn a real significant topic in the hereafter, when the number of road user's increases. There are several models for traffic simulation. Huge amount of traffic cause waiting and accidents. Due to heavy traffic emergency vehicles face adversities.

The traffic is not only the traffic, which in considered to be on roads consisting cars, trucks, bikes *etc*. The traffic can be in other means too, *e.g.*, air traffic where the airplanes and helicopters are considered to mean of communication, army vehicle traffic when going to wars *etc*. There are various numbers of traffic systems that can be considered for our research.

But in this research, we won't be considering the normal traffic, of which we were talking about earlier. In this research, we will try to bring the scenario of the battle field arena where the traffic consists of the vehicles called tanks. The tanks in the battlefield are considered to be in motion in one direction one after the other reaching the battlefield area and shelling from the present motioned place to the other side. So the main focus of this research is put on the collision detection of the tanks among each other by controlling the congestion in the battlefield by bringing the concept of collision detection and avoidance through the algorithm which takes the speed factor as the major priority. Not only the collision is detected and avoided also the whole battlefield scenario is brought to light where tanks are shelling too.

In Battlefield Monitoring System [7] Cloud sensors and moving tanks communicate with each other and the moving tanks pass the message to fusion centers. The cloud sensors and moving tanks are powered devices. The simulation is created using the Java code.

2. Literature Study

2.1. The distributed treatment of traffic information collection system is realized. In [8] paper author discussed the essential troubles in the effectuation and referred settlement schemes. This project used in working client's power, net analysis sites planning and time synchronization among nodes.

2.2. Self-scheduling collects incoming vehicles into critical clusters. Author proposes [9] unfolded conclusion insurances that besides integrate look-ahead of upcoming vehicle platoons. The simulation effect shows that the gain of this access is a simple queue solving. The formation of "green waves" vehicles run through the road network without halting and amending overall traffic runs.

2.3. The Intelligent Traffic Control Unit focuses on three areas-Ambulance, Priority vehicles and Density control [10]. In Ambulances radio frequency identification concept is applied to fix the Ambulances track Green. The outcomes distinctly state that gamiest priority is granted to the ambulance. Secondly, in priority vehicles, infrared transmitter and receiver are used to make the vehicle track Green. In the third part IR and photodiodes are used in the line of sight to detect the density at the traffic signal.

2.4. This theme [11] suggests a method for accurately calculating the routine of vehicles on a route at daylight. The running aims are evoked from a frame-differencing algorithm and the data from grain unit members. The algorithm acts well below hard road traffic conditions such as traces, flora and big trucks. The most significant trinket of the aimed method is the vestiges handling utilizing the sole strength of B&W icons and top hat shifts.

2.5. This system based on UML. Author provides this proficiency for manipulating the traffic in the main road networks utilizing signs [12]. These signs are mechanically moderated aside sensors. To afford well advancement to vehicles through the road network these detectors coordinates the operation of the traffic signals in the entire area. The signal timing varies throughout the day while coordinating all the signals. It withdraws the addiction on less spoiled schemes on sign designs.

2.6. Author presented a vehicle sensing and active traffic signal time handling is used in priority based traffic light controller system [13]. The project is also designed to follow international standards for traffic light operations and control over multiple intersections. Both single and multiple intersections are dynamically adaptive to traffic conditions in these techniques.

2.7. In [14] context author presents an approach for evaluating the best energy motes for energy consumption in Battlefield Monitoring System using simulation along with three modes *i.e.*, transmit mode, receive mode and idle mode. Also, it evaluates the best routing protocol among which performs best in that energy motes.

3. Proposed Technique

Based on the survey a traffic control algorithm can be implemented by using the different parameters. Good traffic control system contains the following characteristics. It must focus on:

(i) Energy efficiency and traffic load of the data centers.

(ii) The execution time, cost can be determined for using Quality of Services Parameters.

(iii) It should satisfy traffic security features.

In this the proposed technique has been divided into various sections in accordance with the traffic control system in war state battlefield.

3.1. Procedure to Process Vehicle Node Information at Server Side.

This can be used for collecting all the information from the tanks. All the data are stored in this cloud server. They can store neighbor detection information from one tank to the other tank, collision prevention from one tank to the other tank, mines (bomb) covers information from one tank to the other tank. The IP address of all the tanks is same and the node id is different. When tanks send the request to the cloud server using cloud sensors of any type of help in in war the cloud server can check the node id for requesting tank and then immediate send response to another tank for protecting this tank. All the information in the war is shown on the server side.

3.2. Procedure to Update Vehicle Information

This procedure is used when all the information on the tanks are updated, *e.g.*, Neighbor detection, mines cover, collision prevention. All the information can be updated for using cloud server.

3.3. Procedure to Find Neighbors for Vehicle Update

(i) Set list of the neighbors
(ii) Neighbor List for Update node
(iii) Set total distance = 10000 // It may vary as per choice in meters
(iv) Set collision distance = 10 // it may vary as per choice in meters
(v) Set neighbor distance = 50 // it may vary as per choice in meters

3.4. Protection from Collision between Two Vehicles (Tanks)

This procedure is used to prevent collision between two tanks. When any neighbor tank is found, the collision prevention service is activated and they send the request to the cloud server for using cloud sensors and cloud server is changing the route to the other tanks. Using this the collision between two tanks is avoided.

3.5. Protect Tank Update by other Tank

Protect Tank (Update, tank). This procedure provides cover to neighbor tank Update. In this way the one tank help to the other tank. When any type of protection they require this procedure is used. On the other, this procedure is also helpful in road side traffic for protecting any type of road accident.

3.6. Procedure to Protect Collision between Two Tanks

This procedure is used when collision occurs in two tanks. For using this procedure, we prevent the collision between two tanks. They can also check the remaining distance from the source to the destination point.

3.7. The Procedure to Change the Speed of the Tank

This procedure is helpful for changing the speed of the tanks for controlling the traffic collision between two tanks. In this the wait statement is used for sleep the tank for one second and get the random value between 1 to 5. This can also be used for getting the current speed to variable speed. Increment the speed by using the value. When the speed is greater than the maximum speed,then set the speed equal to the maximum speed. On the other hand, when the speed less than minimum speed, then set the speed equal to minimum speed. For using this procedure the speed of the tanks can be incremented or decremented.

3.8. Procedure to Speed up the Tank.

This procedure is used to speed up the tanks. When one tank neighbor to the other tank,then this procedure is used.

3.9. Procedure to Speed Down the Tank

This procedure is used to speed down the tanks. When one tank neighbor to the other tank, then this procedure is used.

3.10. Procedure to Shoot Mines (Bombs) Randomly for Tank Vehicle.

This procedure is used to shoot bombs randomly for the tanks. When protection from the other side require, then this procedure is used.

4. Experimental Setup

The main objective of the proposed system is a collision detection and prevention of tanks (traffic) flow, aiming to maximize tanks throughput and safety of all tanks participants. It is realized by a distributed cloud sensor system based on cloud computing. The system operates by means of interaction between its components, called cloud services, using cloud server architecture.

4.1 War State Battle Field Services

The Services required for the system to function have been termed core services:

(i) Sensor Service: A Sensor Service (SS) provides data about the current road situation, such as cameras and in-road induction loop. It is a wrapper for these devices. The SS is based on associated Sensor Node. Sensor Node is able to determine the geographical position of detected objects.

(ii) Neighbor Detection Service: Neighbor Detection Service improves the routing performance in tanks, especially in meshs with softened or high mobility. In neighbor detection scheme adopts the explicit handshake mechanism to reduce the latency.

(iii) Collision Prevention Service: Collision avoidance is a fundamental problem in navigation. When the tanks (Vehicle) are at risk of a collision, the system determines appropriate steering motions for both tanks at each time step, so that they can cooperatively change position to avoid collisions and return to their original position when the risk is averted.

(iv) Mines Cover Service: In this scenario mines represents bombs. When one tank finishes his mines,then the other tank protects this tank.

(v) Distance service: Distance is a numerical description of how far apart objects are. In most cases, "distance from A to B" is exchangeable with "distance between B and A". In this scenario the distance between tank t1 from tank t2 is 100m.

4.2. Proposed Scenario

In this scenario T1,T2,T3,T4 Tn represents tanks, the difference between these tanks is 100m & the moving from start point to the destination point i.e. border line at a uniform speed. S1,S2,S3,S4,Sn represents speed in kmph. In this all the tanks connected with a cloud sensor, when any problem occurs, *e.g.,* neighbor tank detection, collision prevention mines cover, then the cloud sensor automatically solves these type of problems.

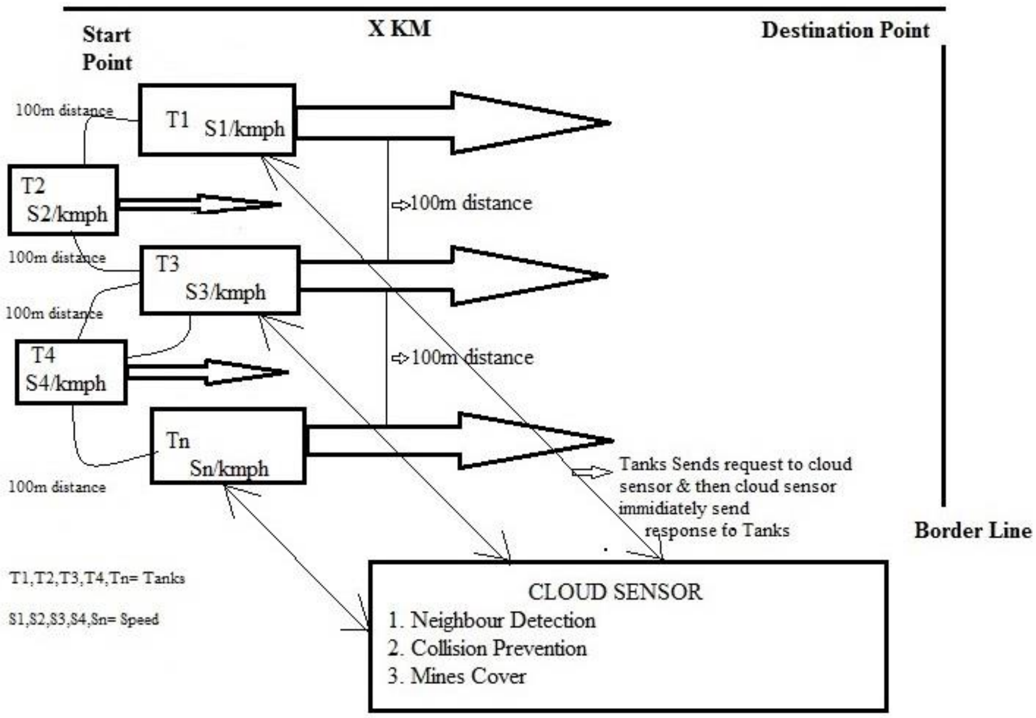


Figure 1. Scenario for Collision Detection & Prevention in War State Battle Field

5. System Design Parameters

The total nodes represent six tanks moving one after the other. Min speed and Max speed are the tanks speed. The tank's speed can change when the one tank moves neighbor to the other tank. The speed is in Km/h, they can up or down according to the node port address. In this way the collision detection and prevention is occurring in war state battle field.

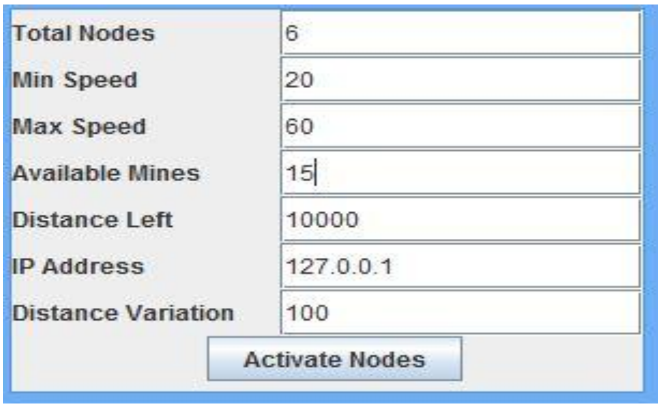
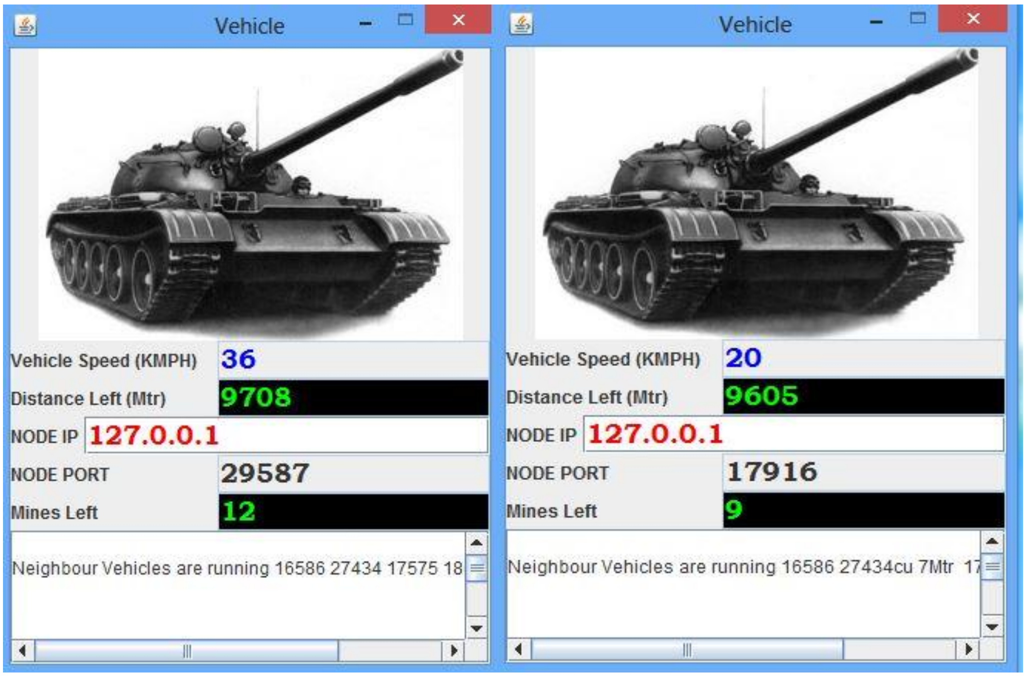


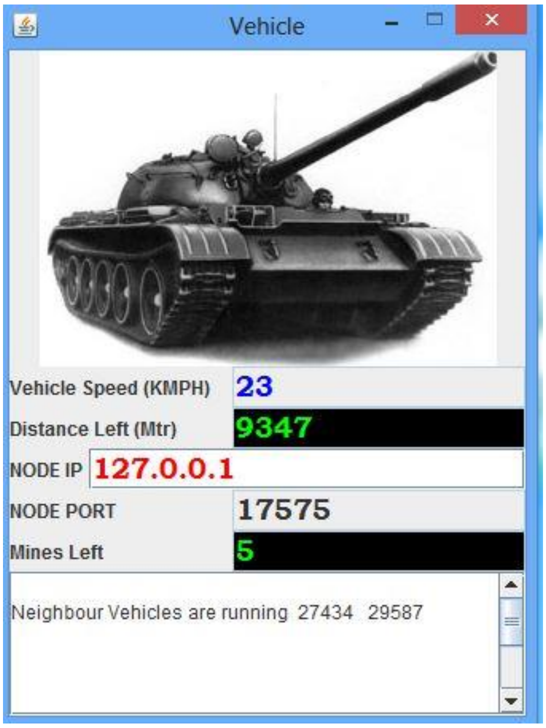
Figure 2. Optimization Parameters

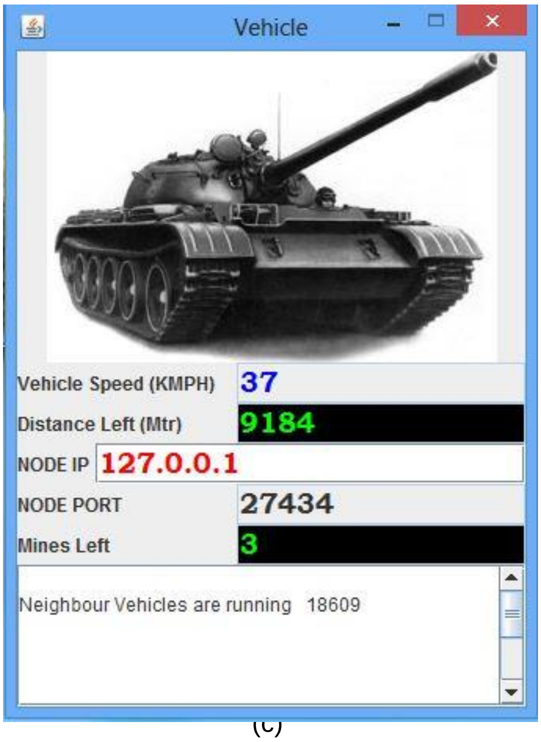
5.1. Simulation and Results

The inter vehicular communication is used to communicate the one tank to the other tank for using the Java simulation. 15 mines (bomb) are allocated to every tank for protection and firing in the war.in Java simulation the swing package is used like classes, j frame (window), buttons, menus and text areas. Socket programming is used for performing all the simulation results. The treads are used for the independent processes. In this simulation tank, traffic is controlled for collision detected between two tanks. When the collision occurs, the tank's speed up or down according to the requirement, the cloud sensor is used to speed up or down the tanks and neighbor tanks are detected for using cloud sensor. All the information can be stored in cloud sensor. They send the information or any requirement when the tanks send the message to cloud sensor and then the cloud sensor immediately send the response to tanks. According to the values given to the above parameters the six tanks can move from one source end to the destination end:



(a) (b)





(c)

(d)

(e) (f)

Figure 3. Six Tanks (a,b,c,d,e,f) Moving using Above Parameters

5.2. Simulation Plots

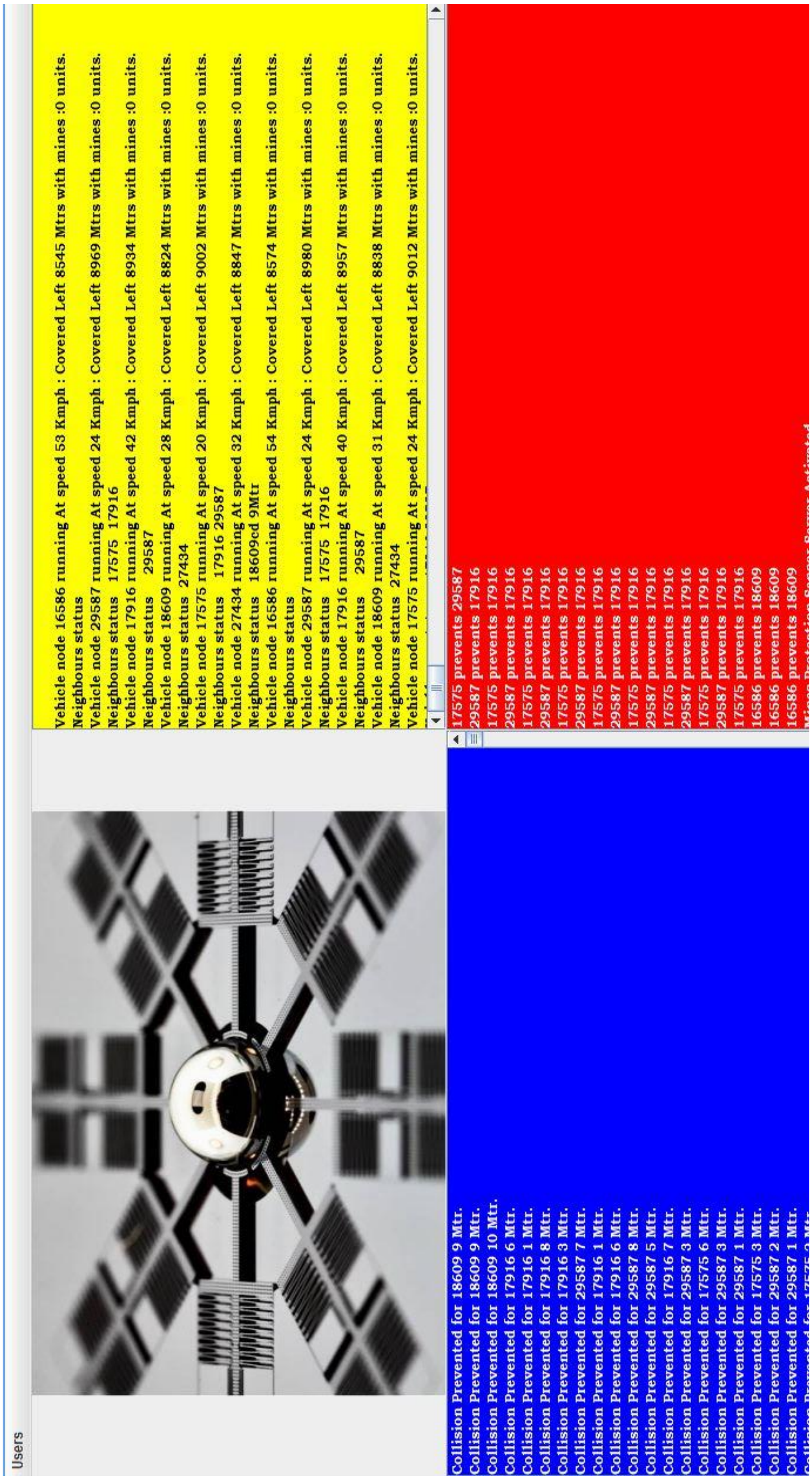


Figure 4. Optimization Results

Table 1. Results Obtained by using Collision

collisions

nodeid	collfrom
16586	27434 17575cu 2Mtr
16586	27434 17575cu 2Mtr 18609cu 9Mtr
16586	27434 17575cd 1Mtr
16586	27434 17575cd 1Mtr 18609cu 8Mtr
16586	27434 17575cd 8Mtr
16586	27434 17575cd 8Mtr 18609cu 6Mtr
16586	27434 17575 18609cu 1Mtr
16586	27434 17575 18609cd 4Mtr
16586	27434 17575 18609cd 4Mtr 17916 29587cu 10Mtr
16586	27434 17575 18609cd 9Mtr
16586	27434 17575 18609cd 9Mtr 17916 29587cu 2Mtr
16586	27434 17575 18609 17916 29587cd 6Mtr
16586	27434 17575 18609 17916cd 5Mtr
16586	27434 17575 18609 17916cd 5Mtr 29587cd 8Mtr
16586	27434 17575 18609 17916cu 1Mtr
16586	27434 17575 18609 17916cu 1Mtr 29587cd 6Mtr
16586	27434 17575 17916cu 7Mtr
16586	27434 17575 17916cu 7Mtr 29587cd 4Mtr
16586	27434 17575cd 10Mtr
16586	27434 17575cd 10Mtr 17916 29587cd 1Mtr
16586	27434 17575cd 4Mtr
16586	27434 17575cd 4Mtr 17916 29587cu 3Mtr

Table 2. Results Obtained by using Mines Cover Parameters

minescover

nodeid	minescover
17916	17575m
17916	17575m 29587m
17916	17575m
17916	17575m 29587m
17916	17575m
17916	17575m 29587m
17916	17575m
17916	17575m 29587m
17916	17575m
17916	17575m 29587m
17916	17575cd 10Mtr m
17916	17575cd 10Mtr m 29587cd 9Mtr m
17916	17575cd 7Mtr m
17916	17575cd 7Mtr m 29587cd 7Mtr m
17916	17575cd 5Mtr m
17916	17575cd 5Mtr m 29587cd 7Mtr m
18609	16586m
18609	16586m
18609	16586m
29587	17575m
*	

Table 3. Results Obtained by using Simulation Parameters

simulation

nodeid	speed	distanceleft	minesleft	neighbors
16586	38	9949	15	
16586	37	9928	14	27434 17575cu 2Mtr 18609cu 9Mtr 17916 29587
16586	33	9909	14	27434 17575cd 1Mtr 18609cu 8Mtr 17916 29587
16586	30	9893	13	27434 17575cd 8Mtr 18609cu 6Mtr 17916 29587
16586	32	9878	12	27434 17575 18609cu 1Mtr 17916 29587
16586	30	9861	12	27434 17575 18609cd 4Mtr 17916 29587cu 10Mtr
16586	29	9846	12	27434 17575 18609cd 9Mtr 17916 29587cu 2Mtr
16586	29	9831	11	27434 17575 18609 17916 29587cd 6Mtr
16586	29	9816	11	27434 17575 18609 17916 29587
16586	33	9799	11	27434 17575 18609 17916 29587
16586	35	9782	11	27434 17575 18609 17916 29587
16586	38	9763	10	27434 17575 18609 17916 29587
16586	37	9743	10	27434 17575 18609 17916 29587
16586	36	9724	10	27434 17575 18609 17916 29587
16586	36	9705	10	27434 17575 18609 17916 29587
16586	34	9687	10	27434 17575 18609 17916 29587
16586	35	9669	9	27434 17575 18609 17916cd 5Mtr 29587cd 8Mtr
16586	33	9652	9	27434 17575 18609 17916cu 1Mtr 29587cd 6Mtr
16586	35	9635	9	27434 17575 17916cu 7Mtr 29587cd 4Mtr
16586	38	9616	8	27434 17575cd 10Mtr 17916 29587cd 1Mtr
16586	35	9598	8	27434 17575cd 4Mtr 17916 29587cu 3Mtr
16586	37	9579	8	27434 17575cu 3Mtr 17916 29587cu 10Mtr

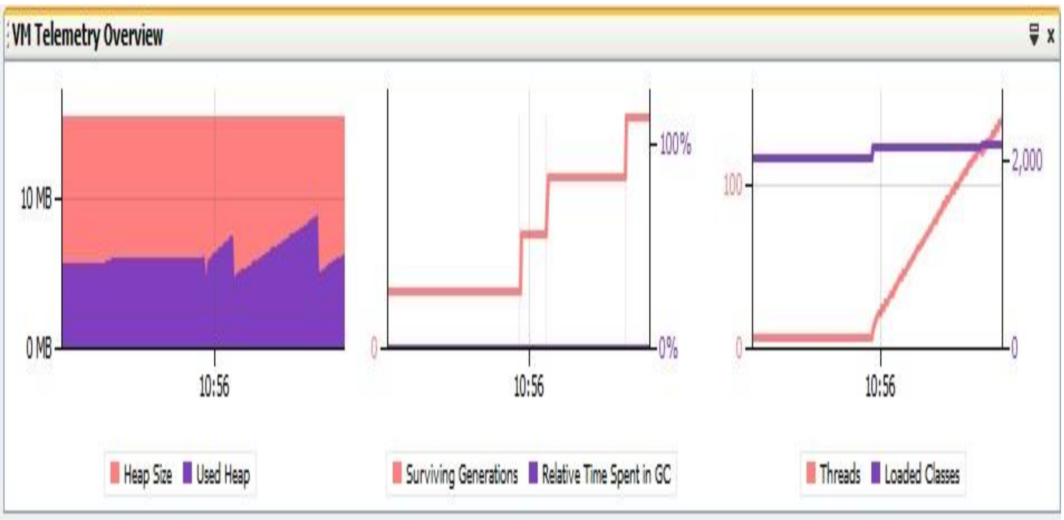


Figure 5. Graphical Representation of the Simulation Results

Table 4. Results When the Tanks Cover 1000 Distance

results

collpreventi	minescover	neighbours
180	5	283

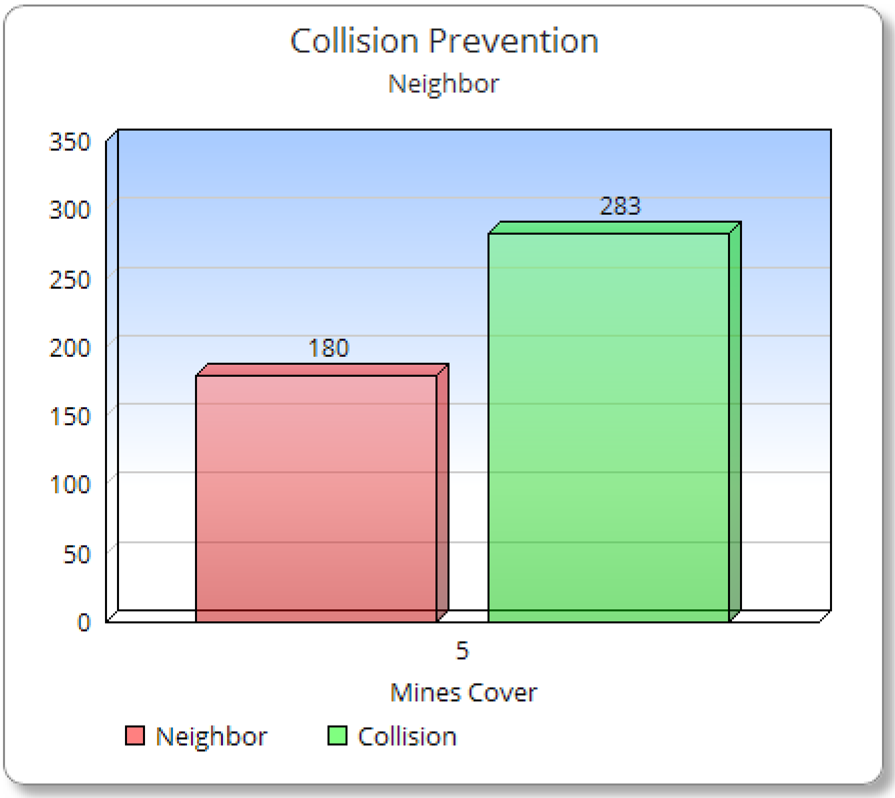


Figure 6. Graphical Bar Chart Representation

Table 5. Results When the Tanks Reach the Final 10000 Destination

results

collpreventi	minescover	neighbours
71	0	178

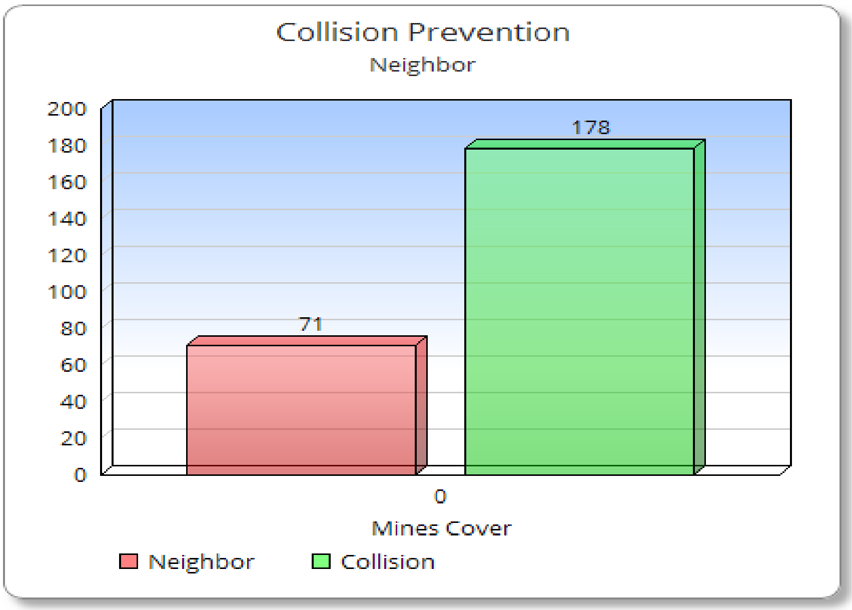


Figure 7. Graphical Bar Chart Representation

Table 6. Comparing Intial Results and Final Results

results

collpreventi	minescover	neighbours
180	5	283
71	0	178

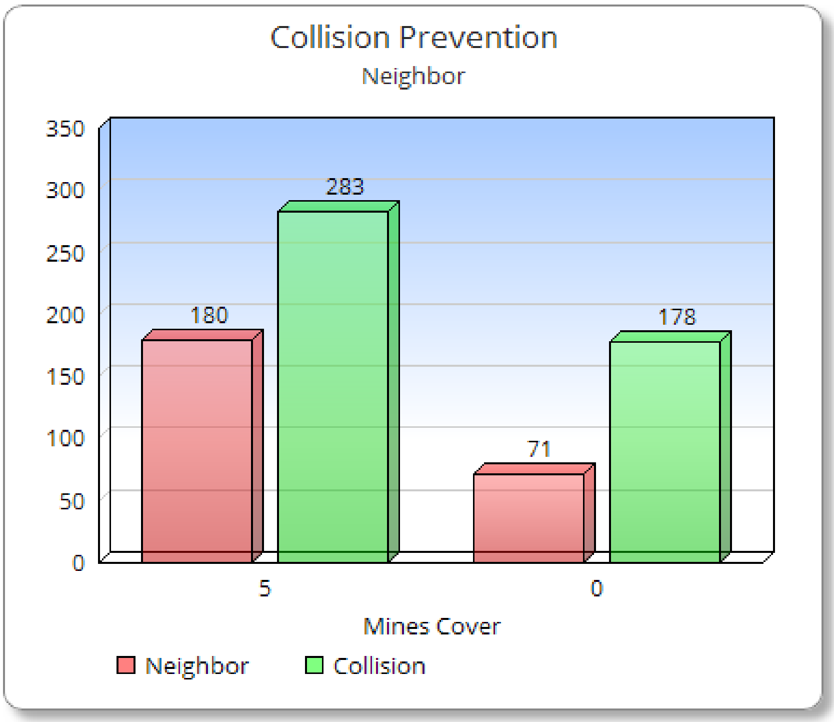


Figure 8. Graphical Bar Chart Representation

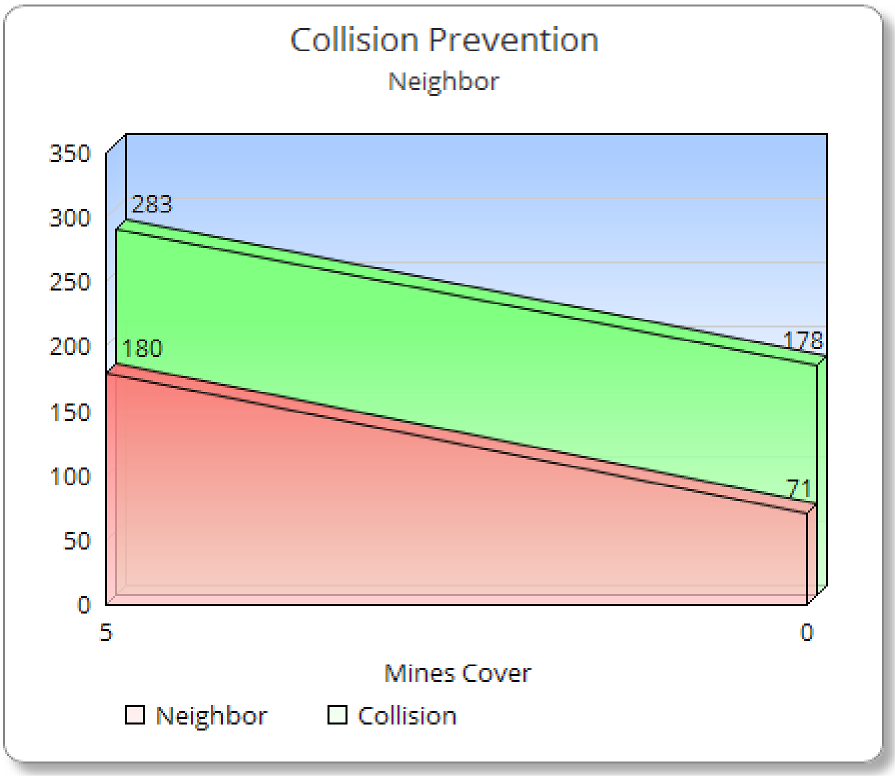


Figure 9. Graphical Area Chart Representation

6. Conclusion

In this paper, we have implemented War State Battle Field Using Cloud Sensor for Collision Detection and Prevention uses Java programming in real time. This system controls the change of tanks, speed at the intersection points & control the collision between two tanks. The use of this approach makes it economical, reliable and provides tanks range for communication.

References

[1] C.Germain-Renaud, O.Rana"The convergence of clouds, grids, and autonomics" IEEE Internet Computing, vol.13, no. 6, **(2009)**.

[2] H. Alhakami, H. Aldabbas, T. Alwada, "Comparison between cloud and grid computing : review paper," International journal on cloud computing: services and architecture (IJCCSA), vol. 2, no. 4, **(2012)**, pp. 1-21.

[3] H. T.Dinh, C. Lee, D. Niyato, and P. Wang, "A Survey of Mobile Cloud Computing: Architecture, Applications, and Approaches", Wireless Communications and Mobile Computing-Wiley Online Library, **(2011)**.

[4] P. Kaur, I. Chana "Unfolding the Distributed Computing Paradigms", International Conference on Advances in Computer EngineeringBangalore, **(2010)**.

[5] C. Kim, Y.-S. Hong "Traffic Signal Using Smart Agent System", American Journal of Applied Sciences, **(2008)**, pp. 1487-1493.

[6] L.-Okponglo, "Design and Development of Micro-Controller Based Traffic System Using Image Processing Techniques", University of Ghana, published in ICAST, 2012 IEEE 4th International Conference, **(2012)**.

[7] N. Lanjwar, D.j Nitnaware, "Performance Analysis of Routing Protocols for Battlefield monitoring System", International Journal of Scientific Engineering and Technology, **(2012)**.

[8] X. Chen, J. Zhang, S. Qian, P. Xu, "Applied Research on Traffic Information Collection Based on Wireless Sensor Networks", Elsevier 2012 International Conference on Future Electrical Power and Energy Systems.

[9] X.-F. Xie, G. J. Barlow, S. F. Smith, and Z. B. Rubinstein, "Platoon-Based Self-Scheduling for Real-Time Traffic Signal Control", IEEE International Conference on Intelligent Transportation Systems (ITSC), Washington, DC, USA, **(2011)**.

[10] S.Jaiswal, T. Agarwal, A. Singh and Lakshita "Intelligent Traffic Control Unit", International Journal of Electrical, Electronics ISSN No. (Online): 2277-2626 and Computer Engineering, vol. 2, no. 2, **(2013)**, pp. 66-72.
[11] P.F. Alcantarilla, M.A. Sotelo, L.M. Bergasa "Automatic Daytime Road Traffic Control and Monitoring System", Intelligent Transportation Systems, 2008. ITSC 2008. 11th International IEEE Conference, **(2008)**, pp. 944–949.
[12] K. Ranjini, A. Kanthimathi, Y. Yasmine "Design of Adaptive Road Traffic Control System through Unified Modeling Language", International Journal of Computer Applications, vol. 14, no.7, **(2011)**.
[13] K. R. Shruthi & K. Vinodha, "Priority Based Traffic Lights Controller Using Wireless Sensor Networks", International Journal of Electronics, Signals, and Systems, vol-1, no. 4, **(2012)**.
[14] R. Bagga(saini), M. Bala, V. Sahni, " Energy Models with Different Routing Protocols in BMS Using Qualnet Simulator", International Journal of Advanced Research in Computer Science and Software Engineering, vol. 4, no. 11, **(2014)**.

Author

Kapil Kumar, He was born on March 4 1993 in Nakodar city District Jalandhar Punjab India. Completed his B.Tech (CSE) from CTIT Shahpur Jalandhar in year 2013 and Completed M.Tech in computer Science and Engineering GNDU Regional Campus Jalandhar, Punjab in year 2015. Area of interest in technology is Cloud Computing, Traffic Control of Cloud Computing, Sensor Cloud. Many research papers have been published of the author in the different conferences like IEEE, International Conferences and different Journals. Looking forward to go for Doctorate in the same field to continue his research.

