TELKOMNIKA, Vol.9, No.2, August 2011, pp. 1~8
ISSN: 1693-6930
accredited by DGHE (DIKTI), Decree No: 51/Dikti/Kep/2010

Automated Navigation System based on Weapon-Target Assignment

Gayuh Titis Permana[1], Maman Abdurohman[1], Moh Khairudin[2], Mohammad Lutfi[1]

[1]Faculty of Informatics, Telkom Institute of Technology
Jl. Telekominikasi no.1 – Dayeuhkolot – 40257 tlp/fax 022-7565931
e-mail: mma@ittelkom.ac.id, m_abdurohman@yahoo.com

[2]Department of Electrical Engineering, Universitas Negeri Yogyakarta
Jl. Colombo 55281 Karangmalang-Yogyakarta, Indonesia, Telp/Fax +62274-548161
e-mail: moh_khairudin@uny.ac.id

Abstrak

Pengoperasian senapan pada tank masih digerakkan secara manual. Kondisi ini tidak ideal untuk operasi yang berbahaya. Diperlukan sistem pengendali otomatis untuk mengoperasikan senjata dengan tetap mempertahankan ketepatan target sasaran.Pada paper ini telah dirancang suatu sistem pengendalian senjata otomatis berbasis citra digital. Beberapa metode pengolahan citra digital digunakan untuk meningkatkan ketelitian arah senapan sehingga mendapatkan target yang dituju. Metode yang digunakan dalam pengolahan citra digital adalah motion tracking Camshift. Metode ini dibandingkan dengan metode motion tracking Lucas Canade. Perbandingan ini dilakukan untuk mendapatkan hasil yang lebih presisi diantara kedua metode tersebut. Hasil pengolahan citra digital ini digunakan untuk mengendalikan arah senapan sehingga menuju pada sasaran yang diinginkan. Hasil pengujian penelitian menunjukkan bahwa implementasi motion tracking dengan metode Lucas Kanade pada alat simulasi tembak telah berhasil. Kinerja metode motion tracking Lucas Canade lebih baik dibandingkan dengan metode Camshift. Penggunaan metode Lucas Canade untuk pengendalian senapan tank lebih baik dan telah memenuhi kebutuhan.

Kata kunci: *Motion Tracking, Lucas Canade dan Camshift*

Abstract

Operating of weapon on the tank is mostly by manually. It is not desired performance for a critical operation. Automatic control system is required to operate the weapon with the target while maintaining the accuracy. In this paper has designed an automatic weapon control system using object image proccessing. Various an image processing methods used to improve the weapon accuracy to obtain the intended target. The method used in digital image processing is the Camshift motion tracking method. This method is compared with the Lucas Canade motion tracking method. This comparison is conducted to found more precise results between the two methods. Results of object image processing are used to control the direction of the weapon that towards the desired goal. The results show that the implementation of the Lucas Canade motion tracking method using fire simulation tools have been successful. The performance of the Lucas Canade motion tracking methods is better than the CamShift method. Using Lucas Canade method for weapon controller is accordance with the purposes.

Keywords*: Motion Tracking, Lucas Canade and Object Image Proccessing*

1. Introduction

The military weapons develop rapidly in several countries. A battle tank is among of combat arms that are often used in the land. In the tank there is a weapon that is essamblied on top. A weapon–target assignment (WTA) problem is to obtain a proper assignment of weapons

Received May 9th, 2010; Revised August 3rd, 2010; Accepted August 16th, 2010

5. Conclusion

Based on the anlysis of the experiment result we conclude that Image-based motion tracking controller can be used as a rifle in the direction of motion do locking the target. Velocity gunshot effect on the success of locking the target. Fusil velocity with the speed of image processing on the PC must be balanced. Response time specification using by Lucas Kanade method is faster than using CamShift, due to Lucas Kanade feature color take on a pixel so the search window becomes smaller. Locking colors using CamShift and Lucas Kanade algorithm has a weakness, namely when the target is in an environment that has the same color value.

Future Works

There are many future works such : the control system on fusil refined to obtain high precision motion and, like the use of conservative and intelligent control method. Improved image processing capability per frame for the system to capture a more rapid movement. Distance measurement, the actual speed by adding a proximity sensor to obtain the value of the target range to shoot.

References

[1] Cai H, Liu J, Chen Y, and Wang H. Survey of the research on dynamic weapon-target assignment problem. *Journal of Systems Engineering and Electronics*. 2006; 17(3): 559-565.

[2] Lee Z. J., Lee C. Y. and Su S. F. An immunity-based ant colony optimization algorithm for solving weapon–target assignment problem. *Journal of Applied Soft Computing*. 2002; 2: 39-47.
[3] Shang G. Solving Weapon-Target Assignment Problems by a New Ant Colony Algorithm. *Proceeding of International Symposium on Computational Intelligence and Design*. 2008. 221-224.
[4] Wacholder E. A neural network-based optimization algorithm for the static weapon-target assignment problem. *ORSA Journal on Computing*. 4(1989): 232-246.
[5] Zhou H., Yuan Y. and Shi C. Object tracking using sift features and mean shift. *Journal of Computer Cision and Image Understanding*. 113(2009); 345-352.
[6] SLi S. X., Chang H.C. and Zhu C. F. Adaptive pyramid mean shift for global real-time visual tracking. *Journal of Image and Vision Computing*. 28(2010): 424-437.