Sensor Based Autonomous Color Line Follower Robot with Obstacle Avoidance

Kazi Mahmud Hasan¹, Abdullah Al-Nahid^{*}, K. J. Reza², S. Khatun², and M. R. Basar²

¹Electronics and Communication Engineering Discipline
^{*}Khulna University, Khulna 9208, Bangladesh
²School of Computer and Communication Engineering
Universiti Malaysia Perlis (UniMAP), Pauh Putra, Arau, Perlis 02600, Malaysia

Abstract

This paper introduces the multiple source Multiple Destination Robot (MDR-1) having the ability to choose a desired line among multiple lines autonomously. Every line has different color as their identities. The robot can differentiate among various colours and choose a desired one to find its target. Unlike any other simple line follower robot, this robot can be considered as a true autonomous line follower robot having the ability to detect presence of obstacle on its path. A powerful close loop control system is used in the robot. The robot senses a line and endeavours itself accordingly towards the desired target by correcting the wrong moves using a simple feedback mechanism but yet very effective closed loop system. The robot is capable of following very congested curves as it receives the continuous data from the sensors.

Keywords

Feedback, Sensors, Multiple sources multiple destinations, Color pass jilter, Obstacle detection.

References

[1] Pakdaman, M., Sanaatiyan, M.M., "Design and Implementation of Line Follower Robot", Second International Conference on Computer and Electrical Engineering ICCEE'09, vol.2, pp.585-590, 2009.

[2] Priyank Patil, "A VR Line Following Robot", Department of Information Technology K. 1. Somaiya, College of Engineering Mumbai, India. 2010.

[3] Dean A. Pomerleau, Jay Gowdy, Charles E. Thorpe, "Combining Artificial Neural Networks and Symbolic Processing for Autonomous Robot Guidance", Engineering Applications of Artificial Intelligence I. Vol. 4, No. 4, pp. 279-285, 1991.

[4] Tstvan Harmati, Krzysztof Skrzypczyk, "Robot team coordination for target tracking using fuzzy logic controller in game theoretic framework", Robotics and Autonomous Systems, 57, pp.75-86, 2009.

[5] K.D. Do, "Output-feedback formation tracking control of unicycle-type mobile robots with limited sensing ranges", Robotics and Autonomous Systems, 57, pp. 34-47, 2009.

[6] L1U Shi-Cai, TAN Da-Long, Liu Guang-Jun, "Formation Control of Mobile Robots with Active Obstacle Avoidance", Acta Automatica Sinica, Vol. 33, No. 5, 2007.

[7] Yang Tian-Tian, Liu Zhi-Yuan, CHEN Hong, Pei Run, "Formation Control and Obstacle Avoidance for Multiple Mobile Robots", Acta Automatica Sinica, Vol. 34, No. 5, 2008.

[8] Fuyi Xu, Hendrik Van Brussel, Marnix Nuttin, Ronny Moreas, "Concepts for dynamic obstacle avoidance and their extended application in underground navigation", Robotics and Autonomous Systems, 42, pp. 1-15, 2003.

[9] Guilherme Augusto Silva Pereira, Vijay Kumar, Mario Fernando Montenegro Campos, "Closed loop motion planning of cooperating mobile robots using graph connectivity", Robotics and Autonomous Systems, 56, pp. 373-384, 2008.

[10] Jose Manuel Gascuena, Antonio Fernandez-Caballero, "Agent-oriented modeling and development of a person-following mobile robot", Expert Systems with Applications, 38, pp. 4280-4290, 2011.

[11] Sandhana, Lakshmi, "A Theory of Evolution for Robots", Wired Magazine , 2007.

[12] J. Kramer and M. Scheutz, "Development environments for autonomous mobile robots: A survey", Autonomous Robots, vol. 22. 2007.

[I3] Floreano, D., Mondada, F., "Evolutionary neuro-controllers for autonomous mobile robots", Neural Networks 11, pp. 1461-1478, 1998.

[14] Hagras, H., Pounds-cornish, A., Colley, M., Callaghan, V., Clarke, G., "Evolving Spiking Neural Network Controllers for Autonomous Robots", Proceedings of the 2004 IEEE International Conference on Robotics and Automation, pp. 4620-4626., 2004.

[IS] Bajd, Tadej and Mihelj, Matja and Lenarcic, Jadran and Stanovnik, Ale and Munih, Marko, "Robotics. Intelligent Systems, Control and Automation: Science and Engineering", Springer, 2010.

[16] Charles A. Schuler, Willam L. Mcnamee, "Industrial Electronics and Robotics", Mc Graw-Hill International Edition, Industrial Electronics Series, 2003.

[17] Nor Maniha Abdul Ghani, Faradila Naim, Tan Piow Yon, "Two Wheels Balancing Robot with Line Following Capability", pp-634-638, 2011.

[18] M. Pakdaman, M. Sanaatiyan, M. Rezaei Ghahroudi, "A Line Follower Robot from Design to Implementation: Technical Issues and Problems", 2nd International Conference on Computer and Automation Engineering (ICCAE), Vol. 1, pp. 5-9, 2010.

[19] Taiki Fujiwara, Yasushi Iwatani, "Interactions with a line-follower: An interactive tabletop system with a markerless gesture interface for robot control", Proceedings of the IEEE International Conference on Robotics and Biomimetics, 2011.