

# Rough Terrain Beetle Robot

**Rohit Sumbad, Aditya Dhanashetty, Shardul Kulkarni, Atharva Hallikhede, Prof. Abhinay Dube**

Department of Mechanical Engineering  
JSPM'S Rajarshi Shahu College of Engineering, Tathawade, Pune, India

**Abstract:** *This paper presents the design and development of a rough terrain beetle robot able of covering grueling surroundings. The robot is inspired by the deconstruction and locomotion of beetles, which have the capability to acclimatize to complex terrains. The paper describes the mechanical design, control system, and locomotion strategy of the robot. The performance of the robot is estimated in a variety of terrains, including uneven shells, jewels, and stairs. The experimental results demonstrate the effectiveness of the proposed design and control system in achieving stable and effective locomotion on rough terrain.*

**Keywords:** rough terrain; beetle robot; locomotion; control system; mechanical design.

## REFERENCES

- [1] U. Saranlı, M. Buehler, D.E. Koditschek. "RHex: A Simple and Highly Mobile Hexapod Robot", The International Journal of Robotics Research 20, July 2001.
- [2] J. D. Weingarten, G. A. D. Lopes, M. Buehler, R. E. Groff, D. E. Koditschek, "Automated Gait Adaptation for Legged Robots." IEEE Int. Conf. On Robotics and Automation (ICRA) Vol. 3, New Orleans, LA, April 2004, pp.2153-2158
- [3] U. Saranlı, A. Rizzi, and D. Koditschek, "Model-based dynamic self-righting maneuvers for a hexapedal robot," The International Journal of Robotics Research, vol. 23, no. 9, p. 903, 2004.
- [4] C. Prahacs, A. Saunders, M. K. Smith, D. McMordie, and M. Buehler, "Towards legged amphibious mobile robotics,"
- [5] N. Neville, M. Buehler, "Towards Bipedal Running of a Six Legged Robot." 12th Yale Workshop on Adaptive and Learning Systems, May 2003.
- [6] E. Z. Moore, D. Campbell, F. Grimmering, and M. Buehler, "Reliable stair climbing in the simple hexapod 'RHex'," in Proceedings of the IEEE International Conference on Robotics and Automation, vol. 3, 2002, pp. 2222–2227.
- [7] J. D. Weingarten, D. E. Koditschek, H. Komsuoglu, and C. Massey, "Robotics as the delivery vehicle: A contextualized, social, self paced, engineering education for life-long learners," in Robotics Science and Systems Workshop on "Research in Robots for Education, 2007.
- [8] Boston Dynamics, "RHex Datasheet," 2007
- [9] V.Vanitha, V.P.Sumathi, J.Cynthia and B.Illakia, "Next Generation Vehicle Diagnostic Systems", International Journal of Pure and Applied Mathematics (IJPAM), ISSN: 1311-8080, vol. 116, no. 11, 2017, pp. 251-259.
- [10] N.Suganthi, R.Arun, D.Saranya and N.Vignesh, "Smart Security Surveillance Rover", International Journal of Pure and Applied Mathematics (IJPAM), ISSN: 1311-8080, vol. 116, no. 12, 2017, pp. 67
- [11]. Er.M.Premkumar " Unmanned Multi-functional Robot using Zigbee Adopter Network for Defense Application" in International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 2, Issue 1, January 2013.
- [12] Ramesh Nayak, Mithuna Shetty, Rakesh Ganapathi, Sushwitha Naik, Varsha Aithal "Performance analysis and terrain classification for a legged robot over rough terrain" in Institute of Integrative Omics and Applied Biotechnology(IIOAB) Volume 7, Issue in 2016.
- [13] Pooventhan K, Achuthaperumal R, Kowshik S, Manoj Balajee C R "Surveillance Robot Using Multi Sensor Network" in International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering Vol. 3, Issue at 2, February 2015.

- [14] Kunal Borker, Rohan Gaikwad<sup>2</sup>, Ajaysingh Rajput “Wireless Controlled Surveillance Robot” in International Journal of Advance Research in Computer Science and Management Studies, Volume 2, Issue2, February 2014.
- [15] Tarek Mohammad “Using Ultrasonic and Infrared Sensors for Distance Measurement” in World Academy of Science, Engineering and Technology International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering Volume 3, Issued at November, 3, 2009.
- [16] Lisa Goldman ,Dr. Arye Nehorai, L. M. Goldman thanks Ed Richter, William Feero, Phani Chavali, Raphael Schwartz, and Zachary Knudson.“Automated gait adaptation for legged robots,” in IEEE International..
- [17] SY Juang, JG Juang. [2012] Real-time indoor surveillance based on smartphone and mobile robot,” 10th IEEE International Conference on Industrial Informatics (INDIN), Beijing, 475–480.
- [18] A.M. Sabatini, V. Genovese, E. Guglielmelli, “A low-cost, composite sensor array combining ultrasonic andinfrared proximity sensors, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Pittsburgh, PA, vol. 3, 1995, pp. 120–126.
- [19] RF Controlled Terrorist Fighting Robot By Abhinav Kumar Singh., Nilaya Mitash Shanker., Anand Prakash Yadav, International Journal of Computer Science & Communication, vol. 1, No. 1, January-June 2010, Pp. 109-112.
- [20] A Sharma and Balamurgan MS. “Mobile robotic system for search mission, International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, 2015, 1–4.
- [21] SY Juang, JG Juang. [2012] Real-time indoor surveillance based on smartphone and mobile robot,” 10th IEEE International Conference on Industrial Informatics (INDIN), Beijing, 475–480.
- [22] Sivasoundari.A, Kalaimani.S, Balamurugan.M (2013) „Wireless Surveillance Robot with Motion Detection and Live Video Transmission”, International Journal of Emerging Science and Engineering (IJESE) Volume 1, Issue-6, pp. 266-278.