

Implementation of biologically-inspired dynamical systems for movement generation: automatic real-time goal adaptation and obstacle avoidance

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Abstract—

I. INTRODUCTION

Our two papers [1], [2]

II. APPROACH

- A. Distance to objects*
- B. Collision monitoring*
- C. Potential field*
- D. Controller*

III. EXPERIMENTS

- A. Testing*
- B. ROS*
- C. Results*

IV. USE CASE

- A. Single arm*
- B. Dual arm*
- C. Self collision*

V. CONCLUSION

APPENDICES

ACKNOWLEDGMENTS

REFERENCES

- [1] H. Hoffmann, P. Pastor, D.-H. Park, and S. Schaal, “Biologically-inspired dynamical systems for movement generation: Automatic real-time goal adaptation and obstacle avoidance,” in 2009 IEEE International Conference on Robotics and Automation, Kobe, May 2009, pp. 2587–2592, doi: 10.1109/ROBOT.2009.5152423.
- [2] M. Velliste, S. Perel, M. C. Spalding, A. S. Whitford, and A. B. Schwartz, “Cortical control of a prosthetic arm for self-feeding,” *Nature*, vol. 453, no. 7198, Art. no. 7198, Jun. 2008, doi: 10.1038/nature06996.
- [3] S. Adey, “Dean Kamen’s ‘Luke Arm’ Prosthesis Readies for Clinical Trials - IEEE Spectrum,” *IEEE Spectrum: Technology, Engineering, and Science News*, Feb. 01, 2008. <https://spectrum.ieee.org/biomedical/bionics/dean-kamens-luke-arm-prosthesis-readies-for-clinical-trials> (accessed Jun. 25, 2020).
- [4] F. Janabi-Sharifi and D. Vinke, “Integration of the artificial potential field approach with simulated annealing for robot path planning,” in *Proceedings of 8th IEEE International Symposium on Intelligent Control*, Aug. 1993, pp. 536–541, doi: 10.1109/ISIC.1993.397640.
- [5] O. Khatib, “Real-Time Obstacle Avoidance for Manipulators and Mobile Robots,” *The International Journal of Robotics Research*, vol. 5, no. 1, pp. 90–98, Mar. 1986, doi: 10.1177/027836498600500106.