Specific Chaotic System and its Implementation in Robotic Field

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ABSTRACT
This paper presented a three-dimensional continuous autonomous chaotic system, modified from the Arnold system which has a single product term in each equation of the system; therefore it's different from Arnold system and other existing system. This system has nine parameter (i.e. A,B,C,D,E, and F) which gives a more flexibility in generation chaotic behavior throughout these parameters. Basic properties of the presented system were analyzed by means of Lyapunov exponent spectrum, Poincar'e mapping, fractal dimension, power spectrum and chaotic behaviors. Theoretical and numerical analysis prove that the system shows chaotic behavior. Furthermore the cited chaotic system was implemented in robotics field for coverage area purposes, where it's used to generate chaotic motion for mobile robot that's guarantee of scanning the whole connected workspace as an example of advantage of this system.

Keywords: Arnold equation, chaos, mobile robot.