

Two - Segmented Tendon Driven Continuum Manipulator

Alan Antony, Amal Francis, Arshal Agnus George, Lamiya KV

Department of Robotics and Automation

Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur

Abstract: Continuum Inspection Robot can perform complex 3D motions providing an innovative solution for concurrent issues faced in industries for inspecting tight spaces and pipelines. Uses Continuum Mechanism that has no joints which give an advantage over traditional arms in terms of reach and degree of freedom in movement. This mechanism has two segments, since there are zero joints, thus it has infinite degree of freedom. The manipulator is a circular shape robot flexible with backbone. Each backbone is separated with spacer disks. Actuation of the continuum robot is done by pulling the tendons which results in bending motion. The flexible lightweight robot arm, which is composed of each segment can be controlled using three tendons as a result the robot can adopt highly non-linker shapes which allow manipulators in confined spaces. Each tendon is driven by stepper motor controlled by a microcontroller [Arduino mega]. The input signal one given to microcontroller using joystick and its signal is transmitted using the wireless communication devices. The main specialty of this robot is that it's end effector can be interchangeably used according to the circumstances. The power for the mechanism is provided by step down transformer suitable for the internal electronics. The articulation is done wirelessly through the integration of Bluetooth module in microcontroller and special user interface created in smart phone..

Keywords: Continuum, Dof, Zero Joints, Arduino, Bluetooth Module, Tendon Driven, Spacer disks, Segments, Stepper motor

REFERENCES

- [1]. Ian D. Walker, "continuous backbone "continuum" robot manipulators in hindawi publishing corporation ISRN robotics volume 2013.
- [2]. Srinivas neppaali, Bryan A. Jones, "Design, construction, and analysis of continuum robot" in proceedings of the 2007 IEEE/RSJ international conference on intelligent robots and systems sandiego, CA, USA, Oct 29-Nov 2, 2007.
- [3]. William mcMahon, bryan A. jones, and Ian D. walker "design and implementation of a multi-section continuum robot: Air-octave in international conference on intelligent robots and systems 2005 IEEE/RSJ.
- [4]. Bryan A. jones and Ian D. walker "kinematics for multisection continuum robots in IEEE transactions on robotics feb 2006.
- [5]. Robert J. webster and Bryan A. jones "design and kinematic modelling of constant curvature continuum robots in the international journal of robotics research 2010.
- [6]. Bryan A. jones, William mcMahon and Ian D. walker "practical kinematics for real-time implementation of continuum robots" in proceedings of the 2006 IEEE international conference on robotics and automation Orlando, florida-may 2006.