Self-Reconfigurable Transformer Robot
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ICRA ABSTRACT

INTRODUCTION

Figure 1. (a): Search and rescue operations being carried after the earthquake occurred in Mexico, 2017.

• Unpredictable scenarios in search and rescue operations demand need of various robots capable of accomplishing specific task at hand.

Figure 1. (b): (a) Snake Monster Robot, H. Choset et al [1] (b) Little-Dog, D. Pongas et al (c) ReBiS Robot, Rohan T. et al

Figure 2. (a): Exploded view of module (left) and fabricated snake robot(right)

• Basic building block of our modular system is a 4 degree of freedom snake robot as shown in the Fig 2 (a).

• The chassis is fabricated using 3D printing technology.

• The snakes can attach or detach through magnetic sites at each end.

Figure 2 (b). : Cyberphysical Architecture

MECHANICAL DESIGN

Figure 1. (b): (a) Snake Monster Robot, H. Choset et al [1] (b) Little-Dog, D. Pongas et al (c) ReBiS Robot, Rohan T. et al

• Legged robots excel in locomotion where precise foot placement is required and stability is prioritized.

• Snake robots are extremely versatile on rough terrains.

• Hence, a reconfigurable robotic system is required capable of changing its morphology on its own.

Figure 2. (a): Exploded view of module (left) and fabricated snake robot(right)

• The Raspberry Pi Zero W microprocessor empowers the system with gait generation and vision on-board processing.

• Software for each snake is implemented using ROS Indigo framework in Raspbian Jessie.

• The snakes can be remotely operated over Wi-Fi.

Figure 2 (b). : Cyberphysical Architecture

Figure 3. : Fabricated biped Configuration (left), Quadruped Robot simulation in Vrep (middle) and Rendered Quad-Monster (right)

• Once uniquely identified and localized, the snake module traverses to the obtained position and attaches to the magnetic connectors.

• Hence, a modular robotic system is formed which could reconfigure itself to attain required legged robot configuration shown in Fig. 3.

REFERENCES


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