Construction of Locomotion Models of a Snake Robot

M.D.P. Prabhashana and R.M.T.C.B. Ekanayake

Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka

Biological snakes use different modes of locomotion on terrain and underwater to fulfill their needs. These locomotion models help them to adapt to different environments where they live. Snake robots which has the locomotion models same as biological snakes will possess similar capabilities enabling them to be used in applications involving complicated environments fulfilling modern human needs such as urban search and rescue, maintenance in narrow places or dangerous surroundings to human and military needs such as spying. Snake robots can traverse inaccessible environments more efficiently than the motor driven conventional wheeled vehicles. Construction of this robot is fulfilled by using ten linkages, ten servo motors, microcontroller and 7.5V battery. The rectilinear and serpentine motions of the robot are controlled by the Arduino microcontroller. In this work, considering the kinematic and dynamics of biological snakes, the design of a segment of robot was designed by using the computer aided designing software and those segments were 3D printed using ABS fiber material. Kinematics and dynamics of locomotion methods of snakes simplified and coded by using C+ language to the microcontroller of snake robot. Constructing a low-cost, passive caster wheeled snake robot which has locomotion models of biological snakes was developed.

Keywords: Snake robot, Locomotion models, Caster wheeled, Low-cost