

Amaranthine: A Humanoid Robot

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Abstract:

This poster presents the mechanism, configuration, mathematical modeling and workspace of a 3D printed humanoid robot - Amaranthine. Humanoid robots are employed in a wide range of fields to replicate actions and help humans. This poster discusses the potential scope of a humanoid robot in the present day and future. Amaranthine is a fully 3D printed robot where all the parts including head, hands, torso, back and shoulder were assembled with different types of servo motors with respect to the load for each joint. Amaranthine is controlled through voice commands and using Arduino UNO and Arduino Mega microcontrollers. It can be programmed for automation as per the demand of the task or operations to be performed. The robot comprises a five Degree of Freedom in each arm, 16 Degree of Freedom in each hand, 6 Degree of Freedom head, and 2 Degree of Freedom Torso. This robot has various functions like the tactile stimulation from metal fingertip sensor to sense the heat sensation, point cloud data collection from Kinect placed in the torso area and audio-visual documentation via cameras in the eyes. The arm is mathematically modeled, and the workspace is calculated using the "Denavit -Hartenberg" notation. The forward kinematics is obtained theoretically and verified using MATLAB simulations. Humanoid robots, while being one of the smallest groups of service robots in the current market, have the greatest potential to become the industrial tool of the future. Introducing a Humanoid Robot-like Amaranthine holds huge scope majorly in the fields of Medical assistance, Teaching aid, big industries where heavy duty operations require application specific software.