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Development of the low cost 3D Printed Robotic Hand controlled by 8 bits microcontroller

Mohamad Aizat Abdul Wahit*, Siti Anom Ahmadb, Farah Elya Saidon and Tan Mui Yen

Department of Electrical and Electronic Engineering, Faculty of Engineering,
Universiti Putra Malaysia 43400 Serdang, Selangor, Malaysia

*Corresponding author's e-mail: mohamadaizatmppupm1516@gmail.com,

Abstract. Prosthetics hand robot is the artificial hand that resembles the actual human's hand. This artificial hand is placed onto the amputees hand that will allow them to do the basic hand movement and to make their daily life easier. In order to perform the basic hand movement, degree of freedoms (DOFs) must be considered. DOF also known as joint which is the movement that are produced. DOF is located at each of interphalangeal of the finger and is named as Distal, Proximal and Palmar. There are five fingers that are named as index finger, middle finger, ring finger, baby finger and thumb. Note that, the thumb only have two types of interphalangeal such as distal and proximal while other fingers have one extra interphalangeals that is known as palmar. The difference between finger mechanism of this robot compared to finger mechanism that use the fishing line is fast movement response and high durability. An actuator is used to produce the movement of each fingers that is called as SG90 TowerPro mini servo and it is controlled by Arduino microcontroller. The robot structure is designed by using Autodesk Inventor Professional software and will be downloaded into the 3D printer part by part for the fabrication process. The size of the robot structure is the average size of the actual human hand and the material of the structure is known as Acrylonitrile Butadiene Styrene (ABS) plastic which is lightweight and is safe to be used for the prosthetic hand purpose. The power supply of the system is 3.7V rechargeable batteries (two units connected in series) and its voltage is regulated and is step down into 5V by using buck dc-dc converter before it is supplied to the microcontroller and servo motor. Result that illustrated the movement of the fingers is produced by sending the expected analog signals to the servo motors. As the servo motor shaft is connected to the finger mechanism, the finger will produce the movement. Thus, the results of this study is to propose a structure and the system design of the robotic hand that can be used as prosthetics hand robot for the amputees.

Keywords: hand, robotic, artificial, microcontroller.