

APPENDIX 2

ABSTRACT OF EXHIBIT TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY: Engineering

TITLE: Design of a Computer Interface for a Robotic Arm Actuated by VHB 4910

NAME: Emmanuel Lorenzo C. de los Santos

COUNTRY: Philippines

Purpose of the Research

Recently, there have been several researches aimed at the feasibility of electroactive polymers (EAPs) replacing motors as robotic actuators – the driving forces behind mechanical devices. However, current EAP actuators are either hard to control or incapable of discrete accurate movements. The research aims to design a computer interface that makes it possible for the electroactive polymer, VHB 4910, to become an effective substitute for bulky motors in effecting precise and accurate control of a robotic arm.

Procedures

A digital-to-analog converter circuit was designed to translate digital instructions from the computer to the corresponding voltage that controls the movement of the VHB. The final dimensions of the VHB actuator was determined by subjecting it to variable input voltages controlled by the computer through the constructed circuit, and measuring expansion of the actuator. This finalized actuator design was placed in a robotic arm, and expansion data was recorded. The expansion data was plotted to a graph and a function was to show the relationship between voltage and expansion. Results & Conclusion: Results of the preliminary testing were found to be promising because they showed that the actuator expansion generally followed the theoretical expansion. The greater voltage applied to the actuator, the greater the expansion. The maximum length of expansion that an actuator has reached was 7 mm. Final Testing showed us that the group was able to make a relatively consistent actuator. The data we got was plotted and then a best fit function was calculated. The t-test for correlated groups was applied between the average of the three tests and the function values. The test showed no significant difference between the two groups. This implies that the creation of a consistent VHB-based muscle that can be controlled with the use of a computer function is possible.