Development of Pneumatic Robot for Outreach

Eshamogbo E. Ojuba, Purdue University and John Lumkes, Purdue University

To encourage the current generation of high school and middle school students to pursue careers in engineering, it is important to have challenging hands-on engineering activities for them. Such activities should be interesting, compelling, and, most importantly, educative. A mini-excavator was built for fluid power outreach, but this tool only demonstrates fluid power, without showing other important aspects of engineering. The tool being developed is able to demonstrate fluid power, as well as other important aspects of engineering, such as controls, electronics, and programming. This tool is an electronically-controlled device that allows the user control a pneumatic circuit, coupled with a stepper motor and an electromagnet, to pick up shapes cut out of easily-magnetized material and sort them out or arrange them to form any desired pattern. A switch can be used to change the mode of operation to a mode in which the robot detects the shape through a camera and carries out specific actions based on the identified shape. It is anticipated that this tool, when completed, can be used in workshops for middle school and high school students for outreach purposes. The tool could also be used to demonstrate the flexibility and benefits of using fluid power over other motion actuation systems, such as electric motors. The developed device is a powerful, flexible system that demonstrates different aspects of engineering – electronic controls, software, and mechanical systems – and can be used successfully for outreach activities.