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Portable Pneumatic Demonstrator for STEM Education

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ABSTRACT

This project involves the development of a compact and portable pneumatic demonstrator. Using two pneumatic actuators and four solenoid valves, we are able to move an arm on both the X and Y-axes; one actuator for each range of motion. The setup also employs an air pump and a tank to maintain pressure for the actuators. On the actuators there is an arm that holds a camera, a stepper motor and an electromagnet. The stepper motor raises and lowers the electromagnet which is used to pick up objects. The camera is used to automatically identify objects for when the demonstrator is operating in automatic mode. A manual mode is also available where one is able to control the actuators and the electromagnet using a joystick shield. The setup uses an Arduino microcontroller unit to control all the sensors, the camera, inputs and outputs. It provides more opportunities for students to learn about the fundamentals of fluid power and its applications in the real world; opportunities that are usually not there due to limited exposure time and funding. With open source code, it also allows students to learn about more than just fluid power; the code can be tweaked to enable the students learn more about mechatronics.

KEYWORDS

Fluid Power, Pneumatic, Demonstrator

REFERENCES

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