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Development of Arduino-based Logic Gate Training Kit

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Abstract: In this work, we develop a robust, and portable Arduino-based logic gate training kit. It was designed to use with an electronic engineering undergraduate university course instead of using fixed laboratory experimental apparatus. The training kit provides students with the necessary laboratory tool in order to learn a fundamental concept of logic gates operation regarding six logic gates; AND, NAND, OR, NOR, XOR, and XNOR. An ATmega 2560 Arduino board was used, including with a two 3.7V battery for power supply, 2-input or 3-input selectors, and jumpers to connect the supply with desired logic input, to develop the training kit. Therefore, the training kit can be used to explore the output of the 2-input and 3-input basic logic functions. The output of each logic function can be detected by the LED light (Green = high output, Orange = low output). Students can see directly the output logic through LED when they select the desired input logic 1 or 0. The logic gate training kit is capable to use simultaneously while students are in the lecture time. Theoretical calculations are compared with direct observations from the logic gate training kit via the learning activities in the classroom. This provides the active learning environment to the students with a more flexible (Compact Set-up), experimental based learning experience than traditional classroom-based teaching.
Keywords: Educational Aid, Arduino-based, Logic Gate Training Kit, Undergraduate Level, Logic Gate Operation

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