ECMG
Empire Consumer Marketing Group

Educational Design Series

Educational Electronic Kit Using Microcontrollers

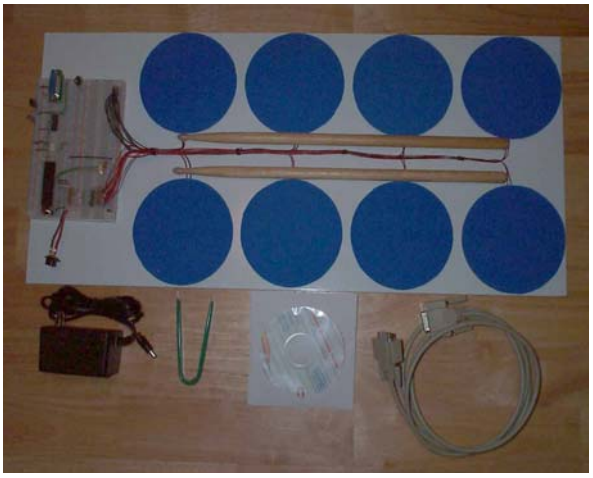
The Educational Electronic MIDI DrumKit

"It is truly amazing how real the drum sounds are coming from the speakers of the soundcard..."

"I was impressed at how easy this kit was to assemble and also how much I actually learned about the overall design process itself..."

"I really liked the ability to personalize the drumset to include only the sounds that I wanted to include in my kit. It kept my interest throughout the building of the kit and I learned a great deal..."

BENEFITS:



This educational electronic hobby kit institutes the most current national and state high school learning standards in the Science and Technology/Engineering Curriculum Frameworks. This educational electronic drum kit is based on actual project based courses taken on the university level in microcontrollers. It allows parents of electronic enthusiasts and electronic hobbyists themselves, a way of seeing the future potential in a career designing electronic devices using microcontrollers, and to spur their interest in further education in the various fields of electrical engineering.

Microcontrollers are found in a multitude of applications in the automotive, consumer communications, office automation and industrial control markets. For example, a modern car may have 50 or more microcontrollers controlling anti-lock brakes, keyless entry, air bags, burglar alarm systems and various vital engine functions. On the other hand a home is likely to have at least 30 and perhaps as many as 200 microcontrollers embedded in such popular household items as the washing machine and clothes dryer, security system, refrigerator, microwave oven, various electronic games, smoke detectors, and not to mention personalcomputers and their peripherals.

The instructional documentation contained in this electronics kit steps through the design process, and explains how algebra and physics, with the aid of software, are used in the design process to create an eight piece MIDI drum set that easily attaches to the gameport of a standard soundcard on almost any desktop PC. Assembly of the kit requires no soldering and the drum sounds created by the microcontroller can be customized to include eight drum and cymbal sounds from the current total of 48 drum and cymbal sounds created and recognized by the soundcard on a desktop PC.

TOPICS COVERED:

Electrical Engineering

- The MIDI protocol that communicates with the soundcard on a PC. Also included will be a general explanation of how serial communication works between peripherals and the PC and between PC's.
- The microcontroller that converts the data received from the 8 drum sensors into the MIDI protocol. Also included will be a discussion about other applications that these microcontrollers are used in and an explanation of how these microcontrollers fit into the world of electrical engineering and computer chips in general.
- A flow chart explanation of the software that is programmed into the microcontroller. Also included will be an explanation of what computer languages are used to program microcontrollers and how the overall process works.
- How to properly condition the inputs from the sensors to give the microcontroller a signal that it can process correctly.
- An explanation on how crystal oscillators work and why they are needed in electronic devices.
- An explanation of how the drum sensors (i.e. peizo sensors) work and why they produce a signal capable of being processed by a microcontroller when they are struck.

Math and Physics

- Number systems in general and a more in-depth discussion of the numbers systems used in computer hardware and programming.
- An explanation of the Math needed to calculate the values of the various components used in this electronics kit as an input to, an output of, and power source to the micro controller.
- An explanation of the Physics behind the various components used in this electronics kit and why they work the way they do.

KIT INCLUDES:

1. CD-ROM containing the software needed to play the drum sounds on your computer and the instructional documentation.
2. One - gameport cable used to connect the electronics kit to the soundcard of a PC.
3. One - 5V DC power supply used to power the electronics kit.
4. Directions on how to assemble the electronics kit.
5. All the parts necessary to assemble the electronics kit.
   - Breadboard (1)
   - Resistors (20)
   - Capacitors (5)
   - Diodes (9)
   - Opto-Isolator (1)
   - DB15 Gameport Connector (1)
   - 4Mhz Crystal Oscillator (1)
   - Piezo Sensors (i.e. Drum Pads) (8)
   - Jumper wire to connect the components together.
   - Drum sticks (2)
   - Pre-programmed PIC 16F877 Microcontroller (1)

The only component not supplied by this kit is a desktop PC with a soundcard.

Ordering and Pricing Information:

Our Educational Design Series electronic drum kit can be purchased by visiting our website at www.ecmg.net or by calling us directly at 419-831-0943.

Pricing is as follows:

1 - 10 Kits: ~~$199.99~~ $149 SALE PRICE
10+ Kits: ~~$189.99~~ $139 SALE PRICE

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