

The New York Times

March 17, 2011

MUSEUMS SPECIAL SECTION; An Interactive Exhibit for About \$30

By NICK BILTON

JUST five years ago, an artist or designer who wanted to add the slightest bit of interactivity to a work for a museum or gallery had two options: buy a computer that cost about \$2,000 and have it reprogrammed to fit the task at hand, or hire a computer engineer to design and fabricate a computer chip specifically for the artwork.

These, of course, were not viable options for your average starving artist.

This all changed a few years ago when a group of five engineers and artists got together to develop a tiny programmable computer called an Arduino, (pronounced arr-DWEE-no).

Most museumgoers probably have not seen an Arduino, as it is intended to be a behind-the-scenes part of an exhibit. For those who wonder what it looks like, the Arduino is about the size of a deck of cards, does not have a screen or keyboard and looks like something you would find in a mad scientist's lair or in a secret lab at Apple or Microsoft.

But this nondescript gadget has become the driving force behind most of the interactive exhibits seen in museums and galleries today. Push a button and watch a painting light up, or see a sculpture move autonomously in a gallery, and there is a pretty good chance an Arduino is orchestrating the entire experience.

"The Arduino has changed the way we can create and build exhibits," said H el ene Alonso, director of interactive exhibits at the American Museum of Natural History in New York. "In the past, we would have used 50 percent of our budget on computers that have now been replaced with the simplicity of the Arduino."

A current exhibit at the museum called "Brain: The Inside Story," uses an Arduino to calculate a person's accuracy and brain power while tracing the shape of a star. Another exhibit at the museum lets people see the relationship of the weights of some dinosaurs in relation to those of humans.

For artists and designers, one of the biggest draws of the Arduino is the cost. A single Arduino,

which can be used to control a number of aspects of a museum installation, costs just \$30. Once an artist has a chip, inexpensive sensors can be added to make the device sentient.

Limor Fried, chief executive of a company called Adafruit, which sells Arduinos and other interactive components, said a number of artists buy motors and buzzers from her online store to try and make their artwork come alive.

"Artists want to create pieces that interact with the viewer, and the Arduino makes it so simple to do that," Ms. Fried explained.

The do-it-yourself movement has been the driving force behind this new world of interactive art, she noted. "Hackers and geeks have been doing this for years, building all sorts of cool robots and interactive experiences, but now it's become so simple and inexpensive that artists and designers have adopted it, too."

Ms. Fried said artists often bought motors or sensors that detect light or sound. These can be used to create engaging interactive elements of a museum exhibit in which the viewer becomes a part of the art through movement or touch, she said.

A rich online community has developed around the Arduino. There are thousands of free tutorials, examples of programming code and forums to help people learn how to control and manipulate the device. This online community has helped to put the Arduino into designers' hands and has made it a major part of museums around the world.

"The two most important introductions for art in the past 20 years have been the Arduino and Processing," explained Paola Antonelli, senior curator in the Department of Architecture and Design at the Museum of Modern Art. Processing is a free design program that can be used on a traditional computer to interact with an Arduino.

Ms. Antonelli said a number of artworks that would appear in an exhibit called "Talk to Me" had been created using the Arduino and Processing.

Tom Igoe, one of the co-creators of the Arduino and the head of the physical computing group at the Interactive Telecommunications Program of New York University, said curators in museums could see additional uses for the Arduino, like one in which the "painting starts looking back at you."

"Imagine when every piece in a museum has an Arduino built in that can see how people interact and look at the artwork," he said. "You could see a scenario when the curator rearranges an exhibit because a specific painting is being passed over by museumgoers."

Mr. Igoe said his students at N.Y.U. were trying to learn how people interacted with artwork with the hopes of optimizing the experience. For example, using the Arduino, artists can make

images on a screen change based on how close someone is standing to the piece. Artists can then find the optimal distance before making the screen's image change.

Artists at N.Y.U. have used the Arduino to create works that blur the line between art and robotics. Last year a student created a robot with a paintbrush affixed to it that autonomously painted canvases. Another artist used the device to create a computer that used a tub of mud in place of a keyboard and mouse.

Massimo Banzi, an Italian engineer and one of the driving forces behind creation of the Arduino, said the original goal was to make a low-cost and simple-to-use product that artists and designers could employ to create responsive artwork without having to understand complex programming or electrical engineering. Mr. Banzi sees the uses for the device as just the beginning of interactive museums.

"I imagine a museum that is completely programmable, where people can actually interact with the entire physical space using touch, movement or their mobile phone," he said.

Mr. Banzi regularly hosts workshops around the world to help teach artists and designers how to use the Arduino and Processing. He said artists with no programming background are amazed that the technology is so simple to use and are often astonished when they are able to make a light glow or a motor move in just a matter of minutes.

More advanced interactive artists are pairing these technologies with other new ones to push the boundaries of interactive art.

A group of Canadian artists used the Arduino and a similar inexpensive computer called a Bug to create an interactive installation for the 2010 Winter Olympic Games in Vancouver. In the project, called "That Space in Between," umbrellas were equipped with cameras, then sent around the Olympic Village to take pictures of attendees. The images were sent back to a large sculpture and displayed on small screens for others to view.

Peter Semmelhack, the founder of Bug Labs, which makes the Bug computer, likened the rise of new digital technologies in art to the variation of paint styles by painters hundreds of years ago.

"When you can use technology like a paintbrush, we'll see artists invent new ways to use these tools," he said. "It's really exciting that artists no longer need a Ph.D. in programming to create amazing interactive works."

PHOTO: MUSEUM BOARD: The Arduino, a relatively new device, is being used to orchestrate many shows. (PHOTOGRAPH BY WILLIAM P. O'DONNELL/THE NEW YORK TIMES)