INNOVA
APPLIED TECHNOLOGY

Dear Colleague,

Thank you for your interest in INNOVA Applied Technology's interactive technology. We are pleased to present our Exhibit Designer's Guide to Interactive Electronics. We hope this guide will help you in planning the inclusion of interactive technology in all of your exhibits.

Whether you plan a simple system with pushbuttons and lamps or a controller-based system, INNOVA can help you assess the design tradeoffs, design and assemble the complete system, and provide a ready-to-go assembly including installation instructions and technical documentation.

Since each project has its own unique requirements, we like to work closely with our clients to determine the best approach to their particular project. Once you have had a chance to review the Designer's Guide, please call us and take advantage of our free feasibility consultation service. We will analyze your project and make suggestions on various design considerations, appropriate technologies and costing matters.

I look forward to hearing from you soon and to the possibility of working with you to provide interactive technology solutions. In the meantime, our website (www.innova-at.com) will be continually updated, so have a look from time to time.

Sincerely,

Mark Fowle
General Manager

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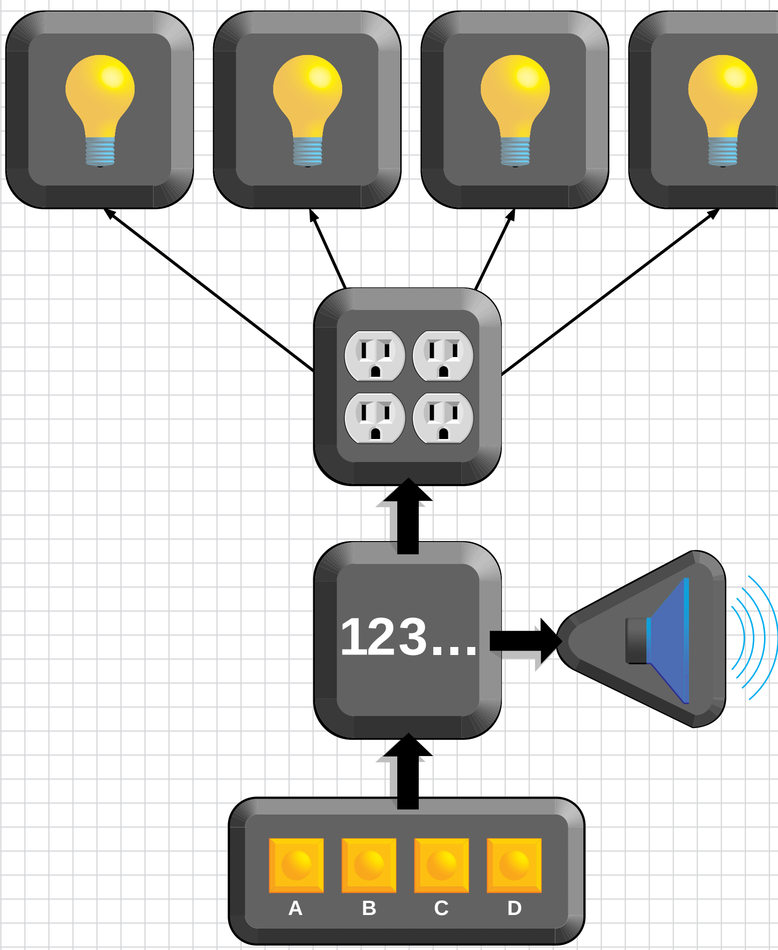
EXHIBIT DESIGNER'S GUIDE TO INTERACTIVE ELECTRONICS



INNOVA
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INNOVA's Exhibit Designer's Guide to Interactive Electronics explores the various technologies available and presents some examples of their use. Although Personal Computers and Computer Kiosks are increasingly being used as interactive devices, the scope of this guide is limited to circuits and devices used within displays and exhibits and in connecting the real world to PCs.

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We've all been there ... staring at that wall of text. It's a subject of great interest to you, but you just can't bring yourself to read it.

Then, out of the corner of your eye, you notice a lighted pushbutton that reads:

Of course you push it!

Suddenly the wall comes to life and explains how a molecule is formed by the natural attraction of atoms.

You have just experienced the natural attraction of interactive technology.

WHY INTERACTIVE TECHNOLOGY?

Display and exhibit designers are constantly challenged to attract and hold the attention of their audiences. In today's multimedia world, we can no longer expect the public to be satisfied by static, one dimensional presentations.

As the interactive entertainment industry has discovered and the flight simulation industry has long known, the human mind can be led to believe that the body is experiencing a simulated event if the sights, sounds and motion of the event are realistically reproduced. When the mind believes that the events are occurring, the natural emotions — excitement, pleasure, fear — are triggered. The experience is complete.

Interactive presentations stimulate the senses as sights, sound and motion continuously respond to the changing actions of people and the environment. As each additional sense is aroused, audiences become excited and engaged; they are transformed from passive viewers into active participants.

Modern electronic technology can be used to add interactive features to displays and exhibits. The most compelling reasons to use interactive technology are:

- Attract attention
- Provide real-time responses to continuously changing situations and conditions
- Engage the audience through participation
- Customize information for each individual

INPUT > PROCESS > OUTPUT

Interactive technology encompasses a wide range of electronic and mechanical devices which—when connected together into a **system** and programmed with specific instructions—will respond to an action or input by performing certain specified tasks.

An interactive system is comprised of three basic sections:

- **Input** — Receives information from the outside world.

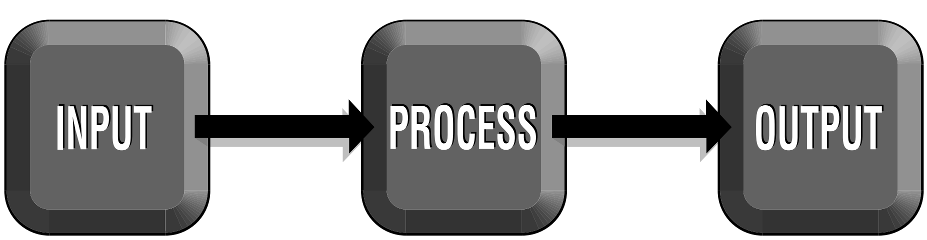
  Input may be a visitor simply walking into the exhibit area, a child pushing a button or a teenager maneuvering a joystick. Input may also be provided by sophisticated sensors tracking the speed and direction of an approaching visitor or weather front.

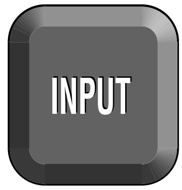
- **Process** — Interprets the information and directs the output section to perform a particular action.

  Control may be provided by dedicated controller boards or PCs equipped with special interface modules.

- **Output** — Performs the specified action.

  Output may be as simple as lighting a lamp on a map or sounding an alarm. Output may also be as complex as simulations of a volcanic eruption through a combination of lights, sounds and motion.



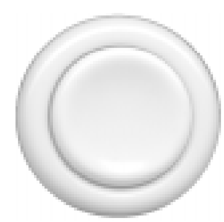


The interactive process begins with input usually from the physical world. Devices which provide input into an interactive system include:

- Push buttons and Keypads
- Pointing Devices
- Motion Detectors
- Optoelectronic Sensors
- Environmental Sensors
- Wireless Input Transmitters / Receivers
- Special Purpose Devices

PUSH BUTTONS AND KEYPADS

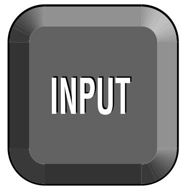
The simplest and most common input comes from some type of switch or pushbutton: *Push to Start; Push to Identify Endangered Species; Push to Hear the Twister's Roar.*



This type of input is simple enough for a single function system to handle directly.

Keypads and keyboards allow for alpha-numeric input:
What is your name?
How old are you?
What planet are you from?

With the increased complexity of input from devices such as keypads and keyboards, a decoder module must be included in the interactive system.



POINTING DEVICES

Pointing devices such as a mouse, trackballs and joysticks are directional input devices.

The **mouse** used on personal computers is the most common pointing device used today.

A **trackball** is basically a mouse turned upside down. The user rolls the ball in the direction of movement rather than moving the entire mouse. Trackballs have two advantages over a mouse: they require less operating space, and they can be fixed in place with no external cord to snag or break.

Along with trackballs, **joysticks** are familiar input devices for younger audiences as they are widely used in arcade/electronic games. Joysticks may be either directional (corresponding to compass directions) or analog (e.g., combining direction and speed).

Touch Screen input is a pointing device which may be used comfortably by audiences of all ages — from toddler to senior. The user inputs his or her choice by simply touching the screen. A sensitive transparent sheet placed over the display records the selection.

MOTION DETECTORS

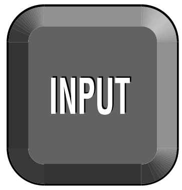
Motion detector modules can begin the interactive process by detecting the presence of a visitor when the person moves into a specified area or field. The field can be defined using invisible Radio Frequency (RF) signals or invisible Infrared (IR) light, or a combination of the two.

Sonar is another technology which can be used to detect the presence of a visitor. Using sound waves, INNOVA's Sonar Module determines the distance to a solid object and can calculate speed, acceleration and direction of motion up to a range of 30 feet.

The joy of Joysticks!

Directional joysticks allow the user to move the stick in 2, 4 or 8 directions, depending on the model. The directions correspond to the compass directions of north, south, east, west and northeast, northwest, southeast and southwest.

Analog joysticks are not limited to the 8 directions and can be pointed in practically any direction. Analog joysticks provide a quantitative input into the system based on the distance away from the center that the stick is moved. This type of joystick can be used to input direction and speed of a desired output action.



OPTOELECTRONIC SENSORS

When it is necessary to detect the presence or absence of a physical object within a relatively close range (inches), optoelectronic sensors can be used to ensure that the object is in position before the action is taken.

For example, in an exhibit which features a ball released down a ramp, the sensor can detect whether the ball is in the correct position before the controller triggers the release device.

Optoelectronic sensors detect light and can be placed relative to a light source in such a way as to detect an object which interrupts the light beam or reflects light back to the sensor. Two sensors placed at a fixed distance apart could be used to calculate the speed of the object's movement.

Other sensors can detect the presence or absence of magnetic or metallic objects.

ENVIRONMENTAL SENSORS

Various sensors can be employed to sense light level, temperature, humidity, absolute and atmospheric pressure, mechanical force and/or acceleration and other conditions. These sensors can be also used to record or control conditions in closed environments.

Since environmental sensors primarily detect conditions which have analog characteristics, an Analog-to-Digital Converter is needed to convert the analog information into digital format. Some sensors are, however, equipped with built-in converters.

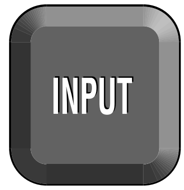
TECHNICALITIES

Analog people in a digital world

The real world as we know it is basically analog. Few matters, if any, are black or white. We like to see the subtle shades of gray. We may not want the lights just on or off; we want them just in between, so we use dimmers to enjoy the different levels between on and off.

On the other hand, the digital world of electronics demands black or white, on or off, and nothing in between.

When digital circuitry must deal with information from the analog world, it needs a translator to convert the analog signal into digital form. Such devices are called Analog-to-Digital Converters (ADC). ADCs use various methods to convert the analog signal into a binary number which digital circuitry can understand.



WIRELESS INPUT TRANSMITTERS / RECEIVERS

Radio Frequency (RF) modules receive and decode radio signals from companion transmitters. RF wireless modules have a range of 300 yards and more and — depending on the structure — can go through walls.

These receivers can be used in conjunction with hand-held transmitters as remote controls for interactive exhibits. Other RF wireless modules can be used to transfer data to and from remote locations without connecting wires.

Infrared (IR) modules use Infrared light to transfer data from hand-held remote control units (similar to TV/VCR remotes) to the receiver module. IR wireless modules work on a line-of-sight basis: the remote unit must be pointed directly at the receiver sensor for best performance.

Also used as remote controllers, IR modules can activate a particular exhibit in close proximity to another without activating the others due to the line-of-sight feature. This capability gives IR an advantage over RF in certain situations.

Additionally, IR remote units can be used to enter or change data used by the controller. For example, parameters such as delay times or sequence orders can be changed using an IR remote unit.

MISCELLANEOUS INPUT DEVICES

INNOVA offers two types of **compass modules** which provide magnetic compass direction input to an interactive system. These compasses can be used in free-standing interactive systems such as robots.

Accelerometer modules sense various degrees of movement. These very sensitive units can sense vibrations associated with earthquakes.

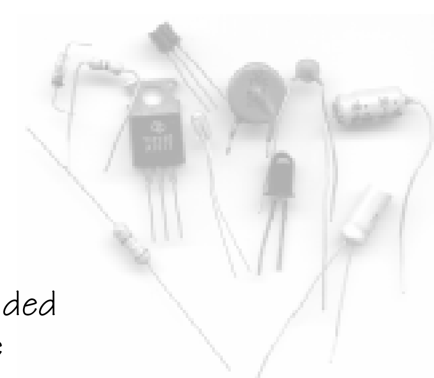
Barcode and **magnetic card readers** allow input into interactive systems using objects with barcodes such as grocery items, credit cards and barcoded mail.

Controllers (processors) are the brains of interactive systems as they control the interaction between the various input and output modules.

An interactive system may be controlled by two basic categories of processors:

- Programmable Controllers
- Personal Computers with Interface Modules

PROGRAMMABLE CONTROLLERS



As each interactive exhibit is unique, control modules must be customized for each application. Using standard electronic parts and components, INNOVA creates control modules which are programmed to the specifications of the designer/client.

The programmability of a controller gives the interactive system its flexibility. Input and output modules can be added or removed from the system, and the functionality can be changed by programming the controller. In systems which require reconfiguration *in situ*, in some cases the controller can be programmed to adjust automatically without reprogramming.

PROCESS

Programmability of a controller is determined by its ability to store a set of control instructions (program) in memory. Depending on the type of memory device used, the program can be changed by replacing or reprogramming the memory.

Electronic memory circuits fall into two basic categories — volatile, in which the contents are lost when the power is turned off; and non-volatile, which is permanent or semi-permanent and not lost when the power is turned off.

- **Non-volatile Memory** — Permanent or semi-permanent memory which is unchanged when the power is turned off.

  Read Only Memory (ROM) can be read from but not written to. ROMs are permanently programmed during manufacturing and cannot be changed.

- ***Volatile Memory*** — Memory content is lost (forgotten) when power is turned off.

  Random Access Memory (RAM) is best described as read/write memory as it allows the processor to read data and programs stored in memory as well as write to memory.

Interactive systems may include both types of memory: the controller's program may be stored in a type of ROM so that it is available as soon as power is applied; RAM may be provided to temporarily store data used during normal operations.

While it is possible to have an interactive system without using a programmable controller, the utility and flexibility are greatly reduced.

TECHNICALITIES

What good is ROM?

ROM (Read Only Memory) is useful in systems which are dedicated to a specific function and do not normally have a need to store new data. Because ROM cannot be changed, this type of memory is ideal in situations requiring permanency and protection from user interference.

Other types of more flexible ROM are available :

PROM — Programmable ROM requires special equipment to program.

EPROM — Erasable Programmable ROM can be erased using ultraviolet light and reprogrammed.

EEPROM — Electrically Erasable Programmable ROM is programmable, erasable and reprogrammable on the system in which it is used.

PROCESS

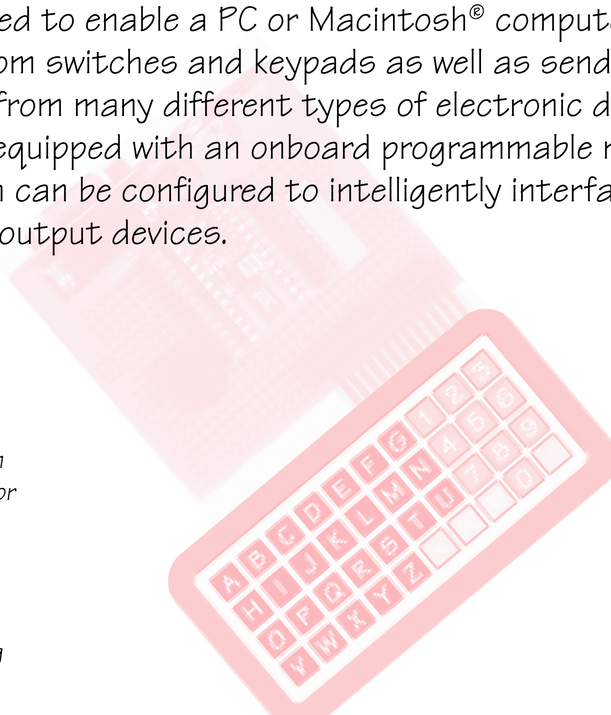
PERSONAL COMPUTERS WITH INTERFACE MODULES

Personal computers (PCs) are, in effect, self-contained interactive systems which include standard input (keyboard, mouse, etc.); a processor (CPU); and output (monitor, printer, etc.). Within an exhibit, a personal computer with standard equipment is somewhat limited in dealing with the outside world. Fortunately, personal computers are equipped with standard ports which can be used to connect specialized devices for use in displays and exhibits.

With special interface* modules, PCs can turn on lights, motors and other output devices as well as receive signals from input devices such as push buttons, special keypads and sensors.

An example of a special interface module is INNOVA's **Power/Con,** which is capable of controlling power to four electrical devices with standard wall plugs. With our proprietary software, this unit enables a PC to control power to lamps, motors, blowers and other electrical equipment.

INNOVA's **Intelligent Interface Module** is a versatile unit which can be configured to enable a PC or Macintosh® computer to receive input from switches and keypads as well as send control signals to and from many different types of electronic devices. This module is equipped with an onboard programmable micro-controller which can be configured to intelligently interface with different input/output devices.



* *Interface is a term used for a circuit or device which connects two or more components or circuits with different operating conditions.*

TECHNICALITIES

Serial & Parallel

When electronic devices talk to each other, they use two methods of data transfer: serial and parallel. The basic differences between the two methods are the amount of data sent at once, the speed and the number of hardwire connections between two devices.

Serial:
The sending unit sends one bit of data at a time, which the receiving unit reassembles to form the complete data. Serial transfers require fewer connecting wires but take longer to send the information and need more circuitry to assemble, send, receive and reassemble the data.

Parallel:
Several bits of data are sent at the same time as more wires are used in parallel cables. Parallel transfers are generally faster than serial transfers.

This is where the action is! The output of an interactive system may include one or more of the following types of output devices. At the direction of the controller, they act immediately, after a delay, simultaneously, in sequence or in a random or prescribed mix depending on conditions.

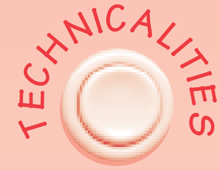
- Lights; Lamps & Lamp Interfaces
- Sound: Audio Repeaters
- Motion: Electro-Mechanical Devices
- Informational Displays

LIGHTS: LAMPS & LAMP INTERFACES

Lamps are among the most common output devices used in displays and exhibits. Using lamps in an exhibit can be a simple matter of flipping a switch. Interactive systems are typically more complicated due to the number of lamps and the different types of lamps needed for different situations.

Factors to be considered when specifying lamps for interactive display and exhibit use include:

- **Physical/Design considerations** — color, size, shape and luminosity of lamps
- **Functional needs** — speed of response, voltage and current needs
- **Safety issues** — heat generation and risk of electrical shock
- **Lamp life and durability** — lamp environment, protection and service time
- **Cost and availability** — replacement availability and down time



Standard Voltage

INCANDESCENT BULBS:
These bulbs turn on and off quickly and are readily available any time anywhere in many sizes, shapes, colors and wattages. The disadvantage is that they produce more heat during operation than fluorescents.

FLUORESCENT BULBS:
Relatively cool running, fluorescents can produce large area lighting at lower operating cost. Tubes vary in length from 18 inches to 8 feet, but shapes are limited. Normal fluorescents take longer to illuminate fully, making them inappropriate for situations requiring blinks or rapid sequencing of lights. This problem is somewhat overcome by using special “rapid start” fluorescent fixtures.

Standard voltage lamps which run on 110 volts AC (Alternating Current, as in a U.S. household) provide greater illumination possibilities but greater hazards. As contact with household current can be fatal, displays and exhibits using these lamps must be designed to isolate the user from direct contact with such devices to reduce the danger of burns and electrical shock.

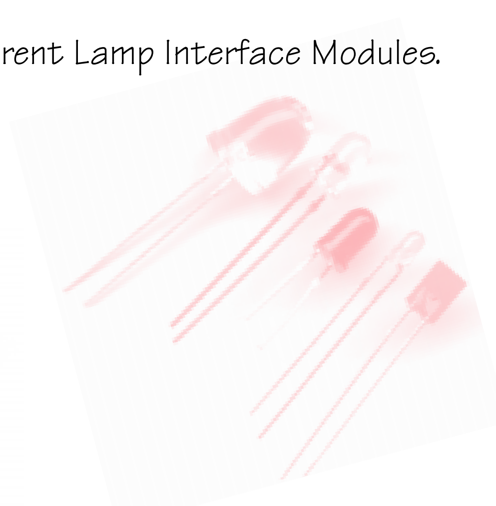
Standard voltage lamps include incandescent, fluorescent and other specialty lamps.

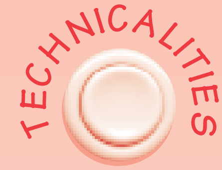
Low voltage lamps operating on relatively low voltage—usually 12 volts or less — reduce the electrical shock hazard to near zero.

The most common low voltage lamps include incandescent, halogen and LEDs (light emitting diodes).

Lamp Interface Modules may be needed to control the lamps, depending on the type of lamp used and the requirements of the exhibit. These devices are used to interface the lamp with the controlling circuit by adjusting for differences between the voltage level and amount of current available from the controlling unit and the voltage level and amount of current needed by the lamps.

INNOVA provides several different Lamp Interface Modules.





Low Voltage

INCANDESCENT bulbs (flashlight type) are versatile and have a wide viewing angle. When placed in a protected position, these fragile bulbs can operate for a long time. The bulbs range in size from 1/8" to 1" in diameter, with voltages from 1.5 volts to 24 volts.

HALOGEN lamps are high intensity lamps, often with built-in reflectors to form a spotlight. The disadvantage is the heat they produce must be vented or used in appropriate fixtures in open air.

LEDs are durable semiconductor devices which emit light when supplied with the appropriate voltage, polarity and current. LEDs will last for more than 10 years unless exposed to excess electrical current. LEDs are available in many sizes and shapes but limited in colors (red, yellow, green and recently blue).

OUTPUT

SOUND: AUDIO REPEATERS

For reliable, controllable sound reproduction, electronic devices called audio repeaters are utilized to output prerecorded speech and sound. There are three categories of audio repeaters:

- **Playback only** — Plays prerecorded sounds stored on a memory chip.

  Some modules are capable of storing several sound segments which can be played individually or in sequence on command from the controller. These modules can store up to 30 minutes or more of recorded sounds.

  Sound quality varies from good to high based on audio quality needs, length of recording and budget. Given the same memory resources, better sound quality can be achieved at the expense of length of recording.

- **Record and Playback** — Equipped with a microphone which is used to record up to 90 seconds of voice and/or sound. Once the sound is recorded, the module can be set for playback and will reproduce the recorded sounds.

  The advantage of direct and immediate recording is achieved at the expense of quality and length, which are relatively low.

- **Phoneme-based speech** — Pronounces words using phonemes ("fo-nims", which are individual speech sounds) based on text sent to it from the controller. Speech is produced based on rules of pronunciation. The length of speech is limited primarily by the amount of text sent to the module by the controller. The advantage of phoneme-based speech is its somewhat unlimited length and ability to produce speech on-the-fly, without prerecording. However, the speech is typically robotic in sound, and occasional mispronunciation of unusual words occurs.

Common audio components such as compact disk players can also be used within interactive systems; however, controllability is limited without special interface modules.

TECHNICALITIES

Solid State Reliability

Electronic circuits are based on solid state technology which uses semiconductor devices made of silicon. With minor exceptions, solid state devices are not subject to wear, making them very reliable over time.

Solid state audio repeaters greatly increase the overall reliability of reproducing audio compared to mechanical tape recorders. Since there are no mechanical parts to wear out and no tapes to jam, solid state audio repeaters generally need no maintenance.

While very reliable, solid state circuitry is not infallible. Heat is an enemy, and venting or cooling arrangements must be made if solid state electronics will be used within an enclosed area or an environment with above normal temperatures.

OUTPUT

MOTION: ELECTRO-MECHANICAL DEVICES

What is an earthquake without a shake, rattle and roll?

Adding motion and other physical effects to an interactive exhibit completes the sensory stimulation achieved through the use of visual and auditory effects.

Various types of electro-mechanical devices are used to translate electrical signals from the controller into mechanical energy:

- **Motor** — Commonly used to output rotary motion, which can also be converted to complex motions using gears, levers and other mechanisms.
- **Solenoid** — Composed of a coil of wire and metal core piston which, when energized, translate electrical energy into push-pull motion
- **Linear Actuator** — Motor or other device which is mechanically coupled to produce reciprocal motion.
- **Specialized Mechanisms** — For special complex motion applications.

Electro-mechanical devices require interface modules to translate the signals from the controller into voltage, current and control signals to activate the particular device.

Motion control programming with feedback from sensors is usually needed in situations requiring accurate control over the speed or position of elements in an exhibit.

TECHNICALITIES

Motors

Two basic types of motors are typically used within interactive displays:

AC MOTOR
Typically used to provide fixed speed power to mechanisms such as fans and pumps. Motor runs on alternating current from 110 to 440 volts.

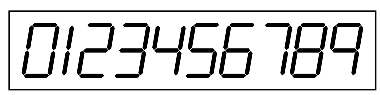
DC MOTOR
Highly controllable in both speed and direction of rotation, this type of motor is available in a wide variety of sizes and power ratings. Uses direct current from batteries or special power supplies at voltages ranging from 1.5 to 90 volts. Speed of rotation ranges from 1 RPM to more than 10,000.

Servo motors are a type of DC motor used when precise control is required and may include internal feedback. Stepper motors are used when rotation control is needed.

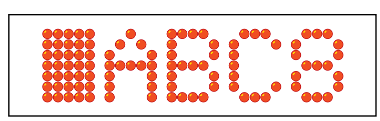
INFORMATION DISPLAYS

Most displays and exhibits are designed to convey information to the viewer. With interactive technology, that information can be controlled and changed depending on the circumstances. Devices used to display information which changes continuously include the following:

- **Indicators** are usually single element displays which are generally on or off to indicate state or location. A state indicator is a lamp which glows when a particular element or condition is active. Location indicators show the position of an object relative to others, as in "You are Here" maps.
- **Numeric displays** are used to display numbers as with digital clocks or timers. A standard 7-segment digit format can display Arabic numerals 0 through 9 by turning on different combinations of the seven segments.



- **Alpha-numeric displays** can generate letters of the alphabet as well as numbers. The ability to display letters increases the utility of this type of display module. The most common type of alpha-numeric display is a matrix of elements five across and seven down.



- **Graphic displays** are virtually unlimited by expanding the matrix to hundreds of elements or lamps which can be turned on and off to display numbers, letters and graphic elements.

TECHNICALITIES

Display Options

LED — Light Emitting Diodes have a relatively wide angle of view so they can be read from many angles. LEDs emit light so they are good for use in areas with moderate to low light levels but not good in direct sunlight or brightly lit areas.

LCD — Liquid Crystal Displays have a very limited angle of view and are normally adjusted to be viewed at a slight angle. Backlit LCDs are suitable for use in areas with moderate to low ambient light. Reflective LCDs work best in well lit areas.

Electromechanical displays are typically made of flaps or balls which rotate to display a bright color when activated, thus forming characters. Characters can range in size from 2" to more than 24", making them suitable for outdoor distance viewing. When used in low light levels, these displays must be illuminated.

DESIGNING AN INTERACTIVE SYSTEM

Now that you understand the basic parts of an interactive system — *INPUT - PROCESS - OUTPUT* — and the op[illegible]s and considerations of each part, let's start thinking about how you can add interactive technology to your current project.

MODULAR

At INNOVA, we take a **modular approach** to interactive systems. Our system of electronic circuits and functional modules can be represented in **block diagrams** to easily define interactive systems. Each block represents a functional component of the system. Arrows represent direction of information flow between the blocks and indicate electrical connections.

By identifying the needed components and describing the interaction between them, a designer can plan a system without concern for the technical aspects and specifications of components.

EXAMPLE 1: SIMPLE SYSTEM

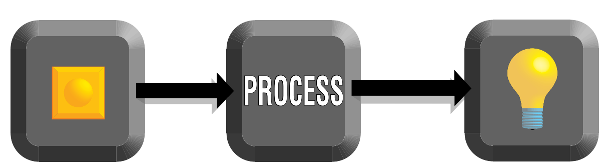
On a map of the state, push button to locate the recycling center. Lamp remains on for a brief time after release of button.

Input: Pushbutton switch

Process: Simple dedicated circuit serves as a delayed shut-off timer

Output: Single lamp which lights up and remains on for set period of time

Parameters: On-time period must be defined.



EXAMPLE 2: BACKLIT GRAPHIC PANELS

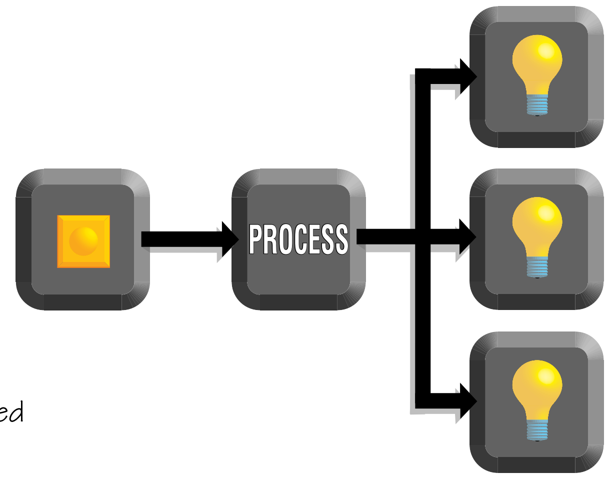
Text and graphics on three backlit panels depict how recycled paper is made.

Input: Pushbutton switch

Process: Programmable controller turns on lamps in sequence and for specified periods of time for each panel.

Output: Lamps light up in sequence behind each of three graphic panels. Panels are not visible until lamps are turned on by the processor, allowing for a controlled presentation of information.

Parameters: Panel sequence, on-time for each panel and off-time between panels must be defined.



EXAMPLE 3: BACKLIT GRAPHIC PANELS WITH NARRATION

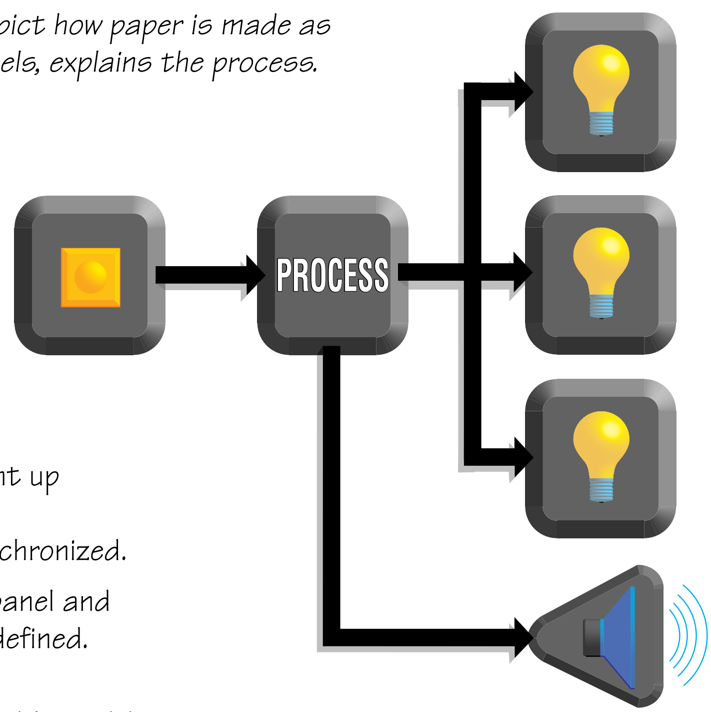
Graphics and photos on three backlit panels depict how paper is made as a recorded narration, synchronized with the panels, explains the process.

Input: Pushbutton switch

Process: Programmable controller turns on lamps in sequence and for the period of the narration for each segment. Controller synchronizes narration to panel illumination.

Output: An audio repeater plays the recorded narration and sound effects as each of three lamps light up in sequence behind graphic panels. Narration and illumination are synchronized.

Parameters: Panel sequence, on-time for each panel and off-time between panels must be defined.



More complex systems can be represented by adding more input and output blocks and defining their interaction. For example, a pause button could be added as a new input to allow the user to pause the presentation for a brief period of time.

SAMPLE APPLICATIONS

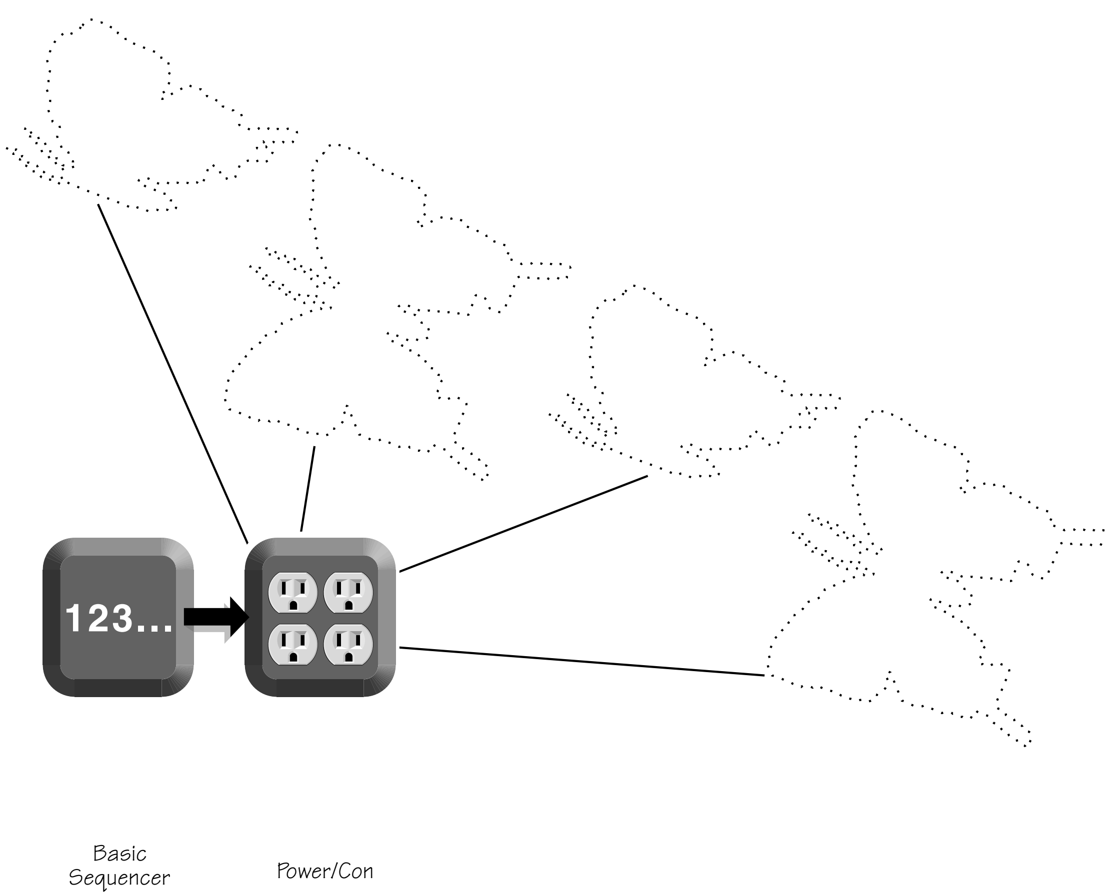
CASE STUDY #1: ANIMATED BUTTERFLY DISPLAY

A small museum needs an inexpensive method of pron .ing its butterfly exhibit. On the museum's outer wall facing heavy evening traffic, an animated display is installed using miniature Christmas lights displaying butterfly outlines. The four outlines are animated in sequence, making it appear that the butterfly is flying.

Input: Light sensor or timer (not shown)

Process: INNOVA's Basic Sequencer is programmed with the "on" times for each light outline and the delay time between outlines. INNOVA's Power/Con module, serving as an interface to the four light outlines, turns the power on and off on command from the Basic Sequencer.

Output: Four outlines of miniature Christmas lights (or light rope) in the shape of butterflies are activated upon command from the controller.

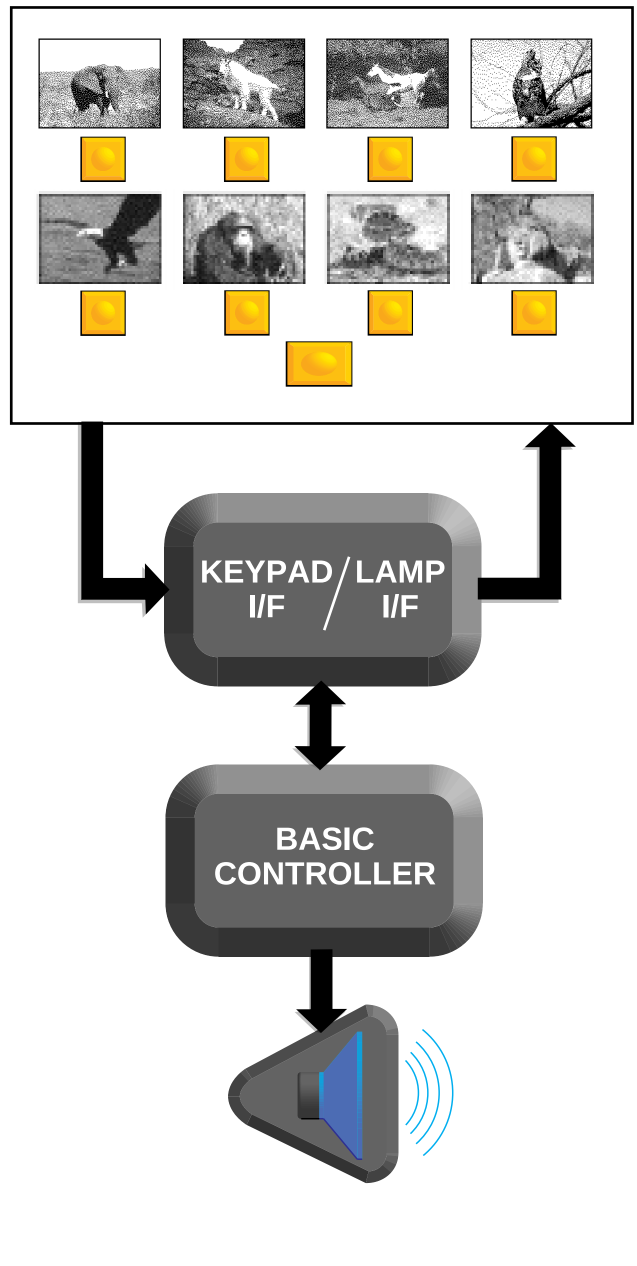


CASE STUDY #2: SIGHTS & SOUNDS GAME

A community outreach program is designed to attract local schools to schedule field trips to the zoo.

A portable unit taken into classrooms features backlit photos of the zoo's most popular animals. In random sequence, each animal introduces itself in its own language. An announcer then describes the animal, its history and its habitat.

Schoolchildren are invited to guess which animal is being described by pressing one of eight illuminated push buttons. A correct guess rewards the child with a celebratory tune; an incorrect guess results in a funny buzzer as the lamp under the correct answer lights.



Audio Repeater

Input: Nine illuminated push buttons — one start/repeat button and eight to make selections. A Keypad Interface decodes the input from the pushbutton switches.

Process: INNOVA's Basic Controller starts the narration when the start button is pressed; randomly selects an animal's message; checks for correct input (button pressed) and responds accordingly. The Lamp Interface conditions the electronic signals to the lamps.

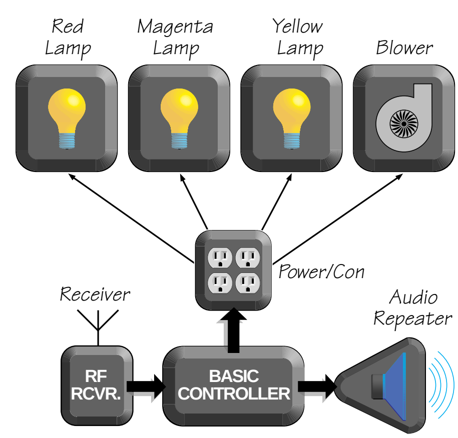
Output: The audio repeater plays the recorded sound effects and narration at the direction of the controller. Pushbutton lamps are illuminated to indicate the correct answer.

CASE STUDY #3: VOLCANIC ERUPTION

To attract travel agents to its trade show exhibit, state tourism executives wanted a flashy, noisy, centerpiece... as explosive as a volcanic eruption.

A volcano shell housed equipment to simulate random and remote controlled eruptions using pulsing red and yellow lights; rumbling sounds of an eruption and red "flames" shooting out the top.

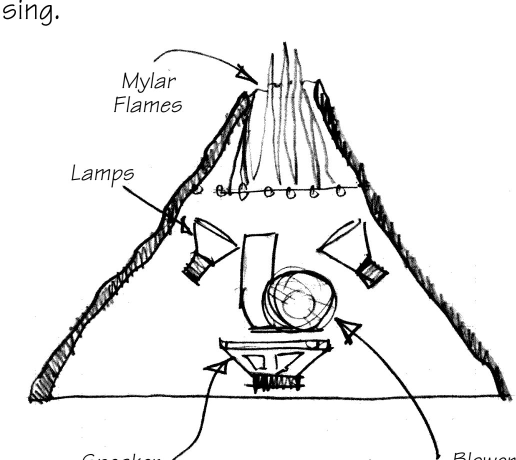
Input: RF remote control unit operated by exhibit personnel is activated to triggers eruptions; an RF receiver forwards the input to the controller. (A timer within the controller also sets off eruptions at random intervals.)



Process: INNOVA's Basic Controller is programmed to operate the volcano's equipment in two different modes — dormant and eruption. Each mode involves a different sequence of outputs. Current to the various equipment is controlled through INNOVA's Power/Con module.

Output: During the dormant period, the controller tells the red lamp inside the volcano to pulse randomly.

When the signal is received to start the eruption, low level sound effects are played by the audio repeater as all three lamps — red, magenta and yellow — begin pulsing. As the eruption progresses, sound effects get increasingly louder. The eruption culminates with red "flames" shooting out the top (silver mylar strips illuminated by the red lamp and forced out by a blower).



PUTTING IT ALL TOGETHER

Putting together an interactive system is simple!

Simply select a lighted push button switch with the appropriate current and voltage contact rating and wire the common and normally open terminals to the input trigger on the timer circuit and ground. Then connect the output terminals to the lamp terminal, but make sure that the output driver is rated for the correct current and voltage for the lamps used. Finally, attach the power supply (don't forget to check the current and voltage rating again) to the timer board with the proper polarity and to the lighted push button switch. Plug in the power supply and hope for the best.

On the other hand, you might consider calling INNOVA Applied Technology.

Since you know the basics of making simple block diagrams, you are now ready to design and communicate your interactive system needs.

INNOVA can take your block diagram and descriptions of the interactions and work with you to further define the system.

Once the design has been finalized, INNOVA will fabricate the system and provide a plug-and-play unit ready for use or installation into your exhibit.

Isn't it time to contact INNOVA?

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