Concrete microprocessor control device

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Abstract
Concrete products, and products similar to concrete to create manmade stone-like structures, are formed with embedded paths, i.e. embedded signal pipes, for light and/or electrical current, to create microprocessor control surfaces for remotely located microprocessors. The light and/or electrical current travels through the signal pipes to activate, run or otherwise control or communicate through the microprocessor for the operation of one or more appliances.
Top view of a concrete control interface

Figure 2
Isometric view of concrete object with embedded interface elements and signal port

Figure 3
Figure 8
CONCRETE MICROPROCESSOR CONTROL DEVICE

REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority based on U.S. Provisional Patent Application Ser. No. 60/669671, filed on Apr. 8, 2006 by the same inventor herein and entitled "CONCRETE MICROPROCESSOR CONTROL SURFACES (Control Stone)".

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to concrete products, and products similar to concrete to create manmade stone-like structures, that are formed with embedded paths, i.e., embedded signal pipes, for light and/or electrical current to move through the structure to create durable, interactive control surfaces for remotely located electronic devices to provide for the operation of one or more appliances.

[0004] The term "pipe" as used herein means one or more light conducting and/or electrical conducting elongated structures that may have any cross-sectional shape, and may be alone, coupled, bundled, formed in whole or portions as a sheet, fixed or otherwise packaged, connected or interconnected, sheathed or unsheathed, twisted, braided or coxial, having or not having properties of total internal reflection (in reference to optical pipe). Pipe may be rigidly formed to a predetermined shape for embedding, or may be formed as semi-flexible or flexible and shaped in situ prior to embedding.

[0005] The term "appliance" as used herein shall mean any functional device that conventionally has controls for operation or content delivery. Hence, herein, "appliance" includes household appliances, such as stoves, clocks, timers, microwaves, ovens, toasters, dishwashers, washing machines, dryers, refrigerators, faucets, faucet temperatures, heating devices, air conditioning devices, humidifiers and vents, as well as other devices, such as communications devices, entertainment devices, business equipment and security devices, as well as systems relating to any one or more of the foregoing. Included, for example, are telephone systems, intercoms, transmitters and/or receivers and/or transponders, internet access systems, radios and televisions, stereo systems, home entertainment systems, wireless systems, computers, fax, copiers, printers, modems, integrated business devices, such as combinations of the foregoing, as well as home and business locks, security cameras, employee security systems, user entry and/or access systems, identification systems, such as voice, fingerprint, palm, face topography, retina or other identification system, etc. Other types of appliances include vehicles, scientific instruments, medical devices, medical devices, weapons, power equipment, pumps, pool systems, lighting systems, environmental devices and systems, toll devices, entrances, windows, screens and blind systems, plumbing controls, outdoor controls, such as sprinkler controls, traffic control systems, etc.

[0006] 2. Information Disclosure Statement

[0007] The following patents are representative of prior art of interest to the present invention technology:


[0009] Notwithstanding the prior art, the present invention is neither taught nor rendered obvious thereby.

SUMMARY OF THE INVENTION

[0010] The present invention is a concrete based, electronics control interface device, or microprocessor control device. It involves concrete products, and products similar to concrete to create manmade stone-like structures, that are formed with embedded signal pipes, for light and/or electrical current, to move through the structure, and form human control surfaces and or content presentation surfaces, for the operation and monitoring of one or more appliances by proxy, via remote electronic devices, termed controllers, connected to a (usually hidden) second surface(s) of the concrete structure. The controllers are a signal source for the embedded signal pipes and include logic means and input/output means and power means.

[0011] The present invention concrete microprocessor control device includes

[0012] a) a preshaped item of concrete having a plurality of surfaces in different planes;

[0013] b) at least one embedded signal pipe being embedded in the preshaped item of concrete and having a first terminus located proximate a first surface of the plurality of surfaces and having a second terminus located away from the first terminus and adjacent a second surface of the plurality of surfaces, the at least one embedded signal pipe being selected from the group consisting of touch sensitive functional optical pipe, touch sensitive functional electrical pipe and combinations thereof; and

[0014] c) at least one coupling port connected to the second terminus of at least one of the at least one embedded signal pipe, the coupling port adapted to connect to a microprocessor controller having touch sensitive detection and processing means and having signal interfacing means for operating at least one appliance.

[0015] In some preferred embodiments of the present invention, the signal pipe first terminus is in the same plane as and flush with the first surface. In some other preferred embodiments of the present invention, the first terminus is located proximate to and below the first surface. In some of these cases, it is in a recess, while in others, it may be recessed with a bevel or a surface contour, as desired. In some other preferred embodiments of the present invention,
the first terminus is located proximate to and above the first surface. In some of these cases, it may protrude without encasement or embellishment, while in others, it may be ensheathed, or flanged or the concrete structure may include a surface contour. The term "proximate", as used herein means within six centimeters of the concrete surface, and preferably within two or less centimeters of the concrete surface. In some cases, the pipe terminus may protrude or recess just enough to appear as a button, e.g. about one centimeter or so from the surface. There may optionally be concrete molded, cast, etched or machined features, or add on frames, outlines, instructions or other features at the surface where the first terminus is located.

[0016] In some preferred embodiments of the present invention, at least one embedded signal pipe is an optical pipe selected from the group consisting of an optical fiber, a glass, a transparent cement, a transparent ceramic, a plastic, a transparent metal, a fiber optic image guide, a fiber optic faceplate, a hollow light guide, a natural gemstone and a manmade gemstone. Plural pipes may be included and they may be in multiples in parallel or in series or both, and may include any combination of the foregoing.

[0017] In some preferred embodiments of the present invention, at least one embedded signal pipe is an electrical pipe selected from the group consisting of a wire, a coated wire, a shielded wire, the shielded wire having either active or passive shielding, a jacketed group of wires, and plates or sheets of conductive or semiconductive material, or of non-conductive material coated with a conductive or semiconductive layer or layers. Plural pipes may be included and they may be in multiples in parallel or in series or both, and may include any combination of the foregoing.

[0018] In some preferred embodiments of the present invention, there are a plurality of embedded signal pipes wherein the first termini of the plurality of embedded signal pipes are arranged in an intelligent pattern. In some preferred embodiments of the present invention, the first termini are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level. In some preferred embodiments of the present invention, the first termini are arranged in a matrix to provide for display character representations of alpha or numeric characters.

[0019] In some preferred embodiments of the present invention, the device includes an embedded template and the second termini are positioned within the template to fix their positions. In some preferred embodiments of the present invention, the aforesaid template includes a plurality of template collars adapted to receive and hold the second termini. In some preferred embodiments of the present invention, the template collars are prefilled with plug components to create the at least one coupling port. The embedded template includes physical connection means for removably or permanently connecting and attaching a microprocessor thereto.

[0020] In some preferred embodiments of the present invention, the device further provides at least one video display image conduit created from a single or plurality of the signal pipes embedded in a surface of the concrete.

[0021] In some preferred embodiments of the present invention, at least one embedded signal pipe second terminus is functionally connected to an LED. In some preferred embodiments of the present invention, there is a plurality of embedded signal pipes with their second termini functionally connected to LEDs.

[0022] In some preferred embodiments of the present invention, the first termini of the plurality of embedded signal pipes is arranged in an intelligent pattern.

[0023] In some preferred embodiments of the present invention, at least one embedded signal pipe is adapted to at least present a signal from the microprocessor or adapted to send a signal to the microprocessor.

[0024] In some preferred embodiments of the present invention, at least one embedded signal pipe is connected to at least one embedded functional component located between a first terminus and a second terminus, the functional component being at least partially embedded in the concrete and being selected from the group consisting of an electrical component, an electronic component, an optical component, a junction and a light.

[0025] In some preferred embodiments of the present invention, the device further includes at least one functional component that is connected to at least one embedded signal pipe, the functional component being selected from the group consisting of an electrical component, an electronic component, an optical component, a junction and a light.

[0026] In some preferred embodiments of the present invention, the device further includes at least one microprocessor firmly embedded in the concrete and connected to at least one embedded signal pipe.

[0027] In some preferred embodiments of the present invention, the device further includes at least one microprocessor partially embedded in the concrete and connected to at least one embedded signal pipe. In some of these preferred embodiments of the present invention, the device further includes at least one microprocessor partially embedded in the concrete and connected to at least one coupling port.

[0028] In some preferred embodiments of the present invention, the device further includes at least one microprocessor connected to at least one coupling port.

[0029] In some preferred embodiments of the present invention, at least one of the at least one embedded signal pipe is directly or indirectly connected to an appliance. Thus, it might be directly connected to an appliance that includes the microprocessor or it might be connected to one or more appliances through a separate microprocessor controller. In some preferred embodiments of the present invention, the appliance is selected from the group consisting of a timer, a clock, a stove, an oven and a microwave appliance. In some preferred embodiments of the present invention, the appliance is selected from the group consisting of a radio, a television, a computer and a telecommunications device.

[0030] In some preferred embodiments of the present invention, a first terminus is adapted to illuminate and presents light from a remote electric or electronic light source connected directly or indirectly thereto.

[0031] In some preferred embodiments of the present invention, at least one embedded signal pipe is connected to a speaker.

[0032] In some preferred embodiments of the present invention, there are at least two embedded signal pipes and
at least of one the at least two embedded signal pipes is connected for and adapted to send a signal to a controller and at least one other of the at least two embedded and at least one other of the at least two embedded signal pipes is connected for and adapted to receive and present a signal initiated by a microprocessor.

[0033] In some preferred embodiments of the present invention, the signal initiated by a microprocessor is selected from the group consisting of light, sound, heat, and electrical.

[0034] In some preferred embodiments of the present invention, at least one signal pipe is adapted to carry a power source.

[0035] In some preferred embodiments of the present invention, the device further includes a touch controller, a system controller, an optical controller and at least one external appliance; and at least one embedded signal pipe sending a signal to a controller is connected to the touch controller and at least one embedded signal pipe receiving a signal from a controller is connected to the optical controller, and the touch controller and the optical controller are connected to the system controller, and the system controller is connected to the at least one external appliance.

[0036] In some preferred embodiments of the present invention, the external appliance is selected from the group consisting of a household appliance, an entertainment appliance, a communications appliance and a computer.

[0037] In some preferred embodiments of the present invention, the concrete is selected from the group consisting of standard concrete, polymer-enhanced concrete, engineered stone and composite stone. In some preferred embodiments of the present invention, the concrete is pre-shaped into a shape having at least one flat surface and at least one the first terminus is located on the at least one flat surface. In some preferred embodiments of the present invention, the concrete shape is selected from the group consisting of at least a portion of an appliance body, a countertop, a wall panel, a wall-hanging unit and a portable device.

[0038] In some preferred embodiments of the present invention, at least one embedded signal pipe is a touch sensitive electrical pipe that is adapted to transmit electrical signals selected from the group consisting of touch circuit portions, data streams, power sources and power grounds.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] The present invention should be more fully understood when the specification herein is taken in conjunction with the drawings appended hereto wherein:

[0040] FIG. 1 illustrates a side cut diagrammatic view of one embodiment of the present invention.

[0041] FIG. 2 illustrates a top view of one embodiment of the present invention simple matrix arrangement for a control interface (top concrete surface with a plurality of first termini of signal pipes).

[0042] FIG. 3 illustrates an isometric view of one embodiment of the present invention concrete object with embedded interface elements and signal port.

[0043] FIGS. 4a, 4b and 4c illustrate cut oblique, side cut and oblique finished views of one embodiment of the present invention cast interface device.

[0044] FIGS. 5a, 5b and 5c illustrate various views of one embodiment of the present invention depicting the components and assembly relations of a signal port in a present invention device.

[0045] FIGS. 6a, 6b, 6c and 6d illustrate components and their connective relationships of an alternative embodiment of a present invention signal port, showing a two component circular port plate and collar.

[0046] FIGS. 7a and 7b illustrate example control modules for embedded surfaces of present invention devices.

[0047] FIG. 8 illustrates a side cut view of one embodiment of the present invention device controller, controller garage and signal ports.

[0048] FIGS. 9a, 9b and 9c illustrate components for an embodiment of a present invention guide for an alphanumeric display.

[0049] FIG. 10 shows a dynamic embedded icons and touch input of a present invention device.

[0050] FIG. 11 shows a one embodiment of the present invention as a concrete body with a control surface located signal coupling port for thin films.

[0051] FIG. 12a and 12b illustrate one embodiment of the present invention as a concrete body with a control surface located signal coupling port for thin control and media devices.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0052] The present invention entails a concrete object, formed with embedded signal carrying elements, i.e. signal pipes, which produces a man-machine interface along one of its surfaces, when signal providing control packs (microprocessor controllers) are attached to a second surface.

System Overview

[0053] A concrete body ("concrete" is defined above) is cast with embedded electrical and/or optical signal carriers, also referred to herein as signal pipes, such as fiber optics and wires, forming paths. The embedded signal paths created by the embedded signal pipes lie in a precise arrangement and routing, being terminated at first ends (first termini) upon reaching the first surface, or nearly upon reaching it or extending slightly beyond it. Second ends (second termini) terminate upon a second surface or nearly upon reaching it or extending slightly beyond it. The first ends are positioned and terminated so as to provide a flat, or substantially flat, hard, man-machine interface upon the first surface. The second ends are positioned and terminated at the second surface, so as to permit an external signal source device to form a signal connection to the embedded signal paths. The cast object represents the passive portion of an interface system that is activated by external devices, i.e. control devices referred to herein as microprocessor controllers, when attached to the second surface(s). These external devices can then in turn be connected to one or more appliances, or be within an appliance, and the first termini of the signal pipes respond to touch when activated
to ultimately control the appliances. The term “appliances” is defined above. The term “microprocessor” includes any computing device having at least input and output means.

[0054] Because the external device can be connected or easily disconnected and replaced, the life of the interface is limited only by the durability of the cast portions. The interface surface can be ground and polished and exposed to water.

[0055] The invention provides a means of constructing a wide variety of extremely durable interfaces, which can be applied to the control of many devices such as domestic and commercial devices, public terminals, outdoor and wet location devices, security systems, and industrial control systems.

[0056] FIG. 1 illustrates a side cut diagrammatic view of one embodiment of the present invention. FIG. 1, thus, depicts a high level view of the essential elements of the invention. A concrete object (50) is viewed from the side and cut to reveal embedded elements (60,70). Light pipes (60) and electrical pathways (70) are embedded within the solid concrete form (50b). First end points, also called first termini (60a,70a), terminate upon reaching exterior surface (50a), being generally coplanar or flush to it. Second end points, i.e., second termini (60b, 70b), are seen to terminate upon reaching signal port (80), which can also be seen to occur at the boundary of the concrete. Assembly connector (95) depicts an external connector assembly matched to signal port (80), wherein the input/output signals of the controller(s) are linked to the embedded signal paths when connection is made.

[0057] The logical elements of the external control system are also shown. The box “OPTICAL CONTROLLER” (92) maintains an optical signal path (64) to connector assembly connector (95). The box “TOUCH CONTROLLER” (91) also maintains an electrical signal path(s) to assembly connector (95). A data stream is maintained between the “TOUCH CONTROLLER” (91) and the “SYSTEM CONTROLLER” (93); between the “SYSTEM CONTROLLER” (93) and the “OPTICAL CONTROLLER” (92); and between the “SYSTEM CONTROLLER” (93) and an “EXTERNAL DEVICE” (4). The function of the optical controller is to provide a computer-controlled source of light(s), for embedded optics. The touch controller provides touch detection and processing circuitry. The system controller acts to manage system operations. The external device is an interface to an end device that is typically the ultimate control object of the embedded man-machine interface. The designations are abstractions of functional parts; in practice, the elements may comprise a single device or be distributed across devices. The signal devices or controllers are self-contained enclosures that are fashioned to “hook up” to a signal port. In the process, the light outputs of the device are optically aligned with embedded optical paths and the I/O circuit points of the device establish electrical connection to the embedded electrical paths.

[0058] In FIG. 1, connector (95) is a signal coupling interface, such as an optoelectrical connector, and an element of an external control device. The signal port is a region of the concrete surface (usually hidden in the back, side, underside or as an underside well) configured to be the mate of such a connector. Therefore, the non-permanent coupling of connector (95) and signal port (80) forms an interface between the concrete object and the external system (the controllers and the external device (appliance)).

[0059] The embedded light pipe first end points, terminating upon the interface surface, are arranged in various patterns and according to the precise layout of the design. Each optical end point on the surface is the end of a continuous directed path of light, originating at the attached external controller. The light sources are under microprocessor control. The correlation of light sources to second end points at the signal port, and further to first end point locations on the interface surface, is known, noted during the design process.

[0060] Therefore, familiar output controls can be fashioned by controlling the layout of the exposed, concrete flush, optical ends. The simplest of these is a single point, used to communicate a device state parameter, by virtue of being on or off or patterns thereof, or of a particular color or color sequence. End points can also be arranged to function as bar graph/level displays and alphanumeric character displays. For example, horizontal or vertical rows of points can be used to indicate such things as power levels, or any level, by selectively illuminating certain points. Or short rows of points can be used to fashion the character segments as seen on calculators. The controller, using data driven logic, choos=es which segment sets to illuminate, in order to depict a character or number.

[0061] In addition to fiber optics, other rigid, light transmissive materials may be embedded so as to expose one face as flush or substantially flush to the concrete surface. At an interior location, these may be coupled to embedded light pipes, following a path originating at a signal port, or they may span the thickness, in order to form a coupling region to aligned light sources on an underside mounted controller. Fiber optic image guides and faceplates may also be embedded and couple to video sources.

[0062] FIG. 2 illustrates a top view of one embodiment of the present invention simple matrix arrangement for a control interface (top concrete surface with a plurality of first termini of signal pipes). Thus, FIG. 2 depicts a simplified concrete interface as seen from the surface (the user’s point of view). The concrete surface (50a) is a section of a larger surrounding surface area.

[0063] First end points (60a.1) are seen as flush to surface (50a) and are arranged in four rows, in order to provide an equalizer type display, in operation. A single point (60a.2) in the upper right hand corner is a state light. Three circles (61) are solid light transmissive forms, embedded in the concrete, exposing a single face, flush along surface (50a). Electrical first end points (70a) terminate likewise upon concrete surface (50a), being also encased by surrounding solid (61). End points (70a) are the termination of the embedded electrical paths. The encased portion may any conductive material such as metal or preferably a clear conductive material. Two electrical end points are located within each circle, and, in operation, a human finger touching the circle, will close the circuit gap between the points and thus send a signal.

[0064] FIG. 2 depicts a first method of detecting touch: A pair of electrical end points is exposed at the surface. The corresponding embedded wire pair is terminated near the signal port, by physical connection to an embedded connec-
tion assembly half, such as a female connector, or the like. The connector half is embedded within the concrete, exposing a single face, along an embedded faceplate, so that the controller can make connection by providing the other half of the assembly (e.g. the male connector), inserting at that point. Internally, the controller is designed according to well-known principles to detect and act when an object, such as a human finger, spans the gap, closing the open circuit.

The signal port provides a signal coupling region that bridges input/output signals provided by the signal device with individual signal carriers embedded in the concrete.

FIG. 3, depicts the interface panel of FIG. 2, in the context of a larger concrete object, which includes a signal port, seen as a matrix like organization of second optical ends (60b) and female jack assemblies (81a) (which are in electrical connection with the second electrical ends of first electrical ends (70a), hidden in the interior). And secured in place by embedded guide plate (81). Guide plate (81) comprises metal or plastic threaded wells that are a securing means for the external controller. The entire signal port assembly comprises the faces of a protruding area (50d). The controller designed to connect to the port may be a self contained attachable item, appropriately sized and dimensioned to fit, or an optoelectrical connector and cable, connected to a source at the opposing end. The signal port area may protrude as shown, be located in a recess, or may be entirely flat to the surrounding surface.

Prior to pouring concrete into a mold or form, the elements to be embedded are placed within the form, directed and secured by means of guiding assemblies.

FIGS. 4a and 4b depict a side cut view of a mold or form, prior to pouring concrete, and an oblique view of the finished product. An assembly of plates (100) with holes is connected and supported by posts, creating a structure similar to floors in a building. The assemblies of plates (100) are seen resting on the form bottom (110c). Embedded light pipes (60) and electrical pathways (70) are seen to pass through holes in guide assembly, being directed along the particular route. Junction (62) depicts the optical alignment of light transmissive solid form (61) and embedded light pipe (60), where the two end points are aligned in opposition, each component being secured by the assembled structure (100). Embedded electrical pathways (70), are partially encased within optically transmissive solid (61), first ends (70a) terminating at bottom exterior surface of optically transmissive solid (61), the pair generally centered within the circular area.

A partial cutout of form bottom at (110d), allows solid light conductive form (61), to slightly extend below the surrounding plane of the form bottom. This will cause the form to protrude slightly above the interface surface of the finished piece. Grinding or polishing will equalize the surfaces. Guide plate 81 fills a hole cut in the form side. The joint is then glued. Electrical paths (70) are terminated at back of guide plate (81), forming electrical connection to female jack assemblies (81a), which are secured within mounting holes on guide plate (81).

Example portable cast interface device (150) generally depicts a possible appearance of the finished object. A small concrete tablet has four illuminatatable touch buttons, powered by a remote device connected to hidden end of the shown cable assembly, which is an optoelectrical cable with an end termination that is mated to and allows connection to the signal port.

Embedded Path Guides

The system of holed plates and support posts, as guides, is a demonstration of the principle that embedded elements can be secured and precisely directed within a concrete form, prior to pouring the concrete, using such means. Means of securing and directing conduits is well known. Therefore, many guides of different design could be envisioned, sharing the same essential principle. For example, a two part plastic form may be molded, so that the halves, snap-fit together, over one or more light pipes, solid shapes, electrical wires, etc., in order to secure them in the desired positions and relationships.

The guides depicted in FIG. 4a, have support posts which rest on the form bottom. There are alternative arrangements to accomplish the same task of placing the elements. The tradeoff is ease of manufacture versus quality of the final product. For example, if the guide posts simply rest on the bottom of the form (when that corresponds to the top of the finished piece), there will be artifacts visible upon the concrete surface. An improved result can be obtained by suspending the guide(s) from overhead. Using available equipment and well-known principles, such a device could be constructed to hold the guide(s) within the form at a precision depth, with reference to the form bottom. In this case, the signal carrying elements, whose endpoints are intended to be exposed upon the surface of the interface, can extend above the topmost portion of the guide, to avoid portions of the guide showing at the surface. If the terminations (first ends (70a, 60a)) rest upon the form bottom, they may be partially covered with concrete during the pouring process. The cured surface can be ground and or polished to expose the buried end points.

If this is not desirable, the form bottom can be drilled, routed/cutout or pre molded to a depth that matches the extent of the protrusions, and in a matching pattern/ layout also. The protrusions, therefore, extend into the cutouts, when the guides are placed within the form. In this embodiment, no part of the guide touches the form bottom. It may be desirable to apply a sealant to the edges, (depending on the tightness of fit, etc) where embedded elements protrude into the openings.

After the mold is removed, the protrusions will be seen sticking up and can be cut or ground to be flush to the surrounding concrete. The intended first surface termini can be oriented to the bottom of the form, in which case they approach or abut to the form floor, or extend into reception areas of the form bottom.

Alternatively, the first ends may be oriented to the top, meaning the concrete will be filled in the form to the same level, or just below it. Grinding and polishing can then treat the surface, to flatten and smooth all the elements to the same plane.

FIGS. 5a, 5b and 5c: illustrate various views of one embodiment of the present invention depicting the components and assembly relations of a signal port in a present invention device. These Figures depict the components and assembly relations of a present invention device signal port.
Some light pipes (60) to be embedded are seen inserted into matching holes in guide plate (81). Jack assemblies (81a) are seen to occupy the holes in plate (81) so that the faceplate of the jack is approximately co-planar to the plate.

[Figs. 6a, 6b, 6c and 6d illustrate components and their connective relationships of an alternative embodiment of a present invention signal port, showing a two component circular port plate and collar. These figures depict an alternative design for a signal port guide assembly. A smaller diameter guide plate inner component (81x) is holding light pipe ends (60b), as shown. A larger ring shaped outer guide plate component (81y) is seen to contain four female connections around the perimeter. Connection (72) depicts the physical/electrical junction of the leads of the jack assembly, with electrical paths to be embedded. The smaller diameter circle inner component inserts into the outer ring component to comprise the total guide plate.

Signal Coupling Ports

[0078] The optical and electrical signal paths embedded within the concrete, require a signal source device. A need exists to precisely connect or couple the input/output of such a device to the embedded paths. For example, an external signal source device may provide an LED matrix display. Each LED in the display (or light pipe extensions of some) must optically couple, which is to say, align and abut to corresponding second end points (60b) at the signal port. Or an electrical termination at the signal port must achieve electrical connection to the I/O access points of the external circuit that processes touch input signals.

[0079] Using the same principle as the internal guides, a plate with holes (81) (or equivalent mechanism, such as a box with through tunnels), provides a method to precisely hold the end points in place. The hole diameters will match the parts intended to be inserted.

[0080] Numerous methods exist to secure the end points in place, after they are inserted into the guide plate. For example, the plate may be a sufficient thickness to provide collar like support, and also provide ample wall surface area within the shaft, so that glue may be applied, just before inserting the elements (such as fiber optics). Alternatively, the holes may be threaded to accept additional parts to form an assembly. An electrical jack assembly can be devised, according to the many types existing, which is attached to the guide plate, occupying the hole cut for it. Embedded electrical wires are terminated at second ends, being attached to leads provided by electrical jack assemblies. This junction (72) (FIG. 6) will reside in the solid concrete.

[0081] Jack assemblies and other connector assemblies are well known and come in different sizes, shapes and configurations. Therefore, any type of electrical connector assembly may be used in the present invention devices. Connector types used with computer ribbon cable, gold contact plates as used in snap in inkjet printer cartridges, RCA, audio jacks, etc. may be used. Similarly, the electrical connection points on either side of the connection set may be male, female, flat, or bumped. The design only requires that embedded electrical pathways are terminated so as to provide a preferably non-permanent, and in some cases, a permanent, hook-up means to provide a continuation of the electrical path to an external circuit device housing the touch detection circuitry.

[0082] The method described is to mechanically make the attachment of embedded electrical paths and connection assembly halves, such as supply leads on a jack assembly, and embed this portion of the assembly in the concrete. The physical hook up of the electrical components can be sealed against moisture, corrosive effects, etc. Therefore, one half of a connection assembly, i.e. the male of female portion, is permanently embedded in the concrete, or at least permanently secured within its guiding means, so as to present the interactive face or part (the part that something is plugged into) as a secure surface feature of the signal port face.

[0083] The optical second end points (60b) may extend to be co-planar to the guide plate's exposed surface, or alternatively, the plate may include built in optical windows of any thickness, allowing the ends to be inserted into the plate, to a certain depth, until the end points abut to the windows, aligned in opposition, so that the path of light continues through the window.

[0084] The guide plate is positioned to coincide with an exterior surface region of the concrete. The guide plate may abut to a form wall, being sealed around the edges, (causing the signal port to be flush to the concrete) or a cutout area in a form wall, matching the dimensions of the guide plate, may accept it, acting as a plug in the wall cutout (80). Or more complex procedures that may be easily envisioned.

[0085] Many possible methods exist to hold the plate in place within the form wall. It may be glued and sealed to a portion of the form, or a thinner portion of the plate may overlap the surrounding form wall and screws may secure the plate to the form wall. Or it may be held in place by physical connection to other sections of the internal guide system.

[0086] Multiple signal ports may exist for a single interface system. At some, only optical materials may be addressed. Others may be strictly electrical, and others are a combination of the two.

[0087] Some controllers may provide signal sources for embedded paths. Others serve to support another controller device, providing or accepting signals or power. A concrete body may have multiple coupling ports for controllers, so that a network of interconnected controllers may exists. One controller may serve as a hub for the system (as in a client-server model) or control may be distributed across the network. Signals between controllers are typical of electronic devices, including power and ground and information or commands as encoded pulses.

Signal Source Devices

[0088] The embedded signal carriers (signal pipes) of the present invention concrete devices are passive. Therefore an external activating device is needed to supply a source of signal(s), thereby "powering" the embedded controls in the interface. A source of intelligent control is also needed, such as provided by a microprocessor controller or its equivalent.

[0089] In some embodiments, the control device, i.e., the microprocessor controller, is seen as a self contained "black box" of powered circuits, and possibly light sources, that attaches, snaps on, etc., to the concrete, at the region of the signal port. The attachment is generally and usually non-permanent, so that the box may be easily replaced by the end user without the requirement of a professional service call.
In a few instances, such as portable self-contained devices, the connection may be permanent. In some embodiments, the controller is not a self-contained device, but is part of and may partially or fully be contained within the external device (appliance) which is ultimately controlled through touch action at the other (first) ends of the signal pipes.

As already described, the signal coupling port provides an area along the concrete surface that presents embedded signal carriers as an optical and/or electrical hookup connection. As part of the process of attachment, electrical outputs of the controller circuits establish electrical connection to the designated corresponding second end(s) (70a), now terminated by connector(s) (80). Said connectors on each part (the signal port and the controller) being the mate of the other, as in the case of male/female plugs.

The connector parts may be rigid elements in relation to the controller body, such as mounted pins, or a flexible connector cable may be used, to allow plugging in of the elements to be a physical action, independent of the insertion or attachment of the controller to the concrete.

Some controllers provide optical sources. This is typically an array of LED lamps, wherein a microprocessor circuit located within the housing of the controller independently switches each LED. Where a plurality of lamps is required, they are arranged in a matrix. The size and spacing of the matrix elements approximately matches that of its mate portion: the signal port (optical portion). The same applies to the respective surfaces of the controller and signal port, so that they form a complimentary fit when brought together, and align the optical points of the signal port with the output points of the controller, thereby providing a continuous light path from the point of emission, on the controller, to the points of optical emission on the interface (50a).

Having established this arrangement, and having noted or discovered which light sources on the controller, correspond to which emission points on the surface, it is possible to program a microprocessor, such that selected points on the surface (50a) can be illuminated in a controlled and precise way.

A controller may also provide a video display, such as a backlit LCD, Organic LED, etc. A plurality of controllers may be employed to complete a single functional system. Some may provide light sources and touch processing circuits. Another may act as a master controller for the others. Or a controller may be a power supply for another or other controllers. If an end device is to be controlled, a controller in the system will provide a signal interface to that system. Controllers may establish mutual connections via a network of electrical paths embedded in the concrete, terminated as described, as a series of signal ports. Or wireless means may be used. The power supply may be line ac, battery, solar, etc.

All the electronic and computer related elements of the invention, are according to established, well known principles, therefore variations are to be expected. In many cases, a controller can be placed without regard to the distance or reference angle to the embedded interface elements. In other cases, it is desirable to place the controller directly under or behind the interface, that is, along the opposing surface. For example, such would be the case when using fiber optic image guides or faceplates, coupled to video displays, because of the high optical material costs.

In this case, a garage or cutout area may be dimensioned to accept the controller, and signal connection means are provided as already described. This permits a hidden controller that does not protrude beyond the plane of the surface.

FIGS. 7a and 7b depict example control modules for an embedded interface. A first controller (90a) is a plastic box housing circuits, power means, an LED matrix, and male electrical pins in a rigid installation to the box. Upon connection to the matched signal port, the LED's will align and abut to embedded light path terminations. A second controller, (90b) provides an LED row (92a) and also includes a flat color video display (92b) (which, upon controller attachment, will align and flatly abut to an embedded image transfer optic such as a fiber optic faceplate or image conduit).

Five raised areas, labeled “Q” (91Q), represent a second method of touch input detection. Immediately below the “Q” raised surfaces, are field based touch detection and processing circuits, such as those manufactured by Quantum Research Group, with variations, under the names QTouch, QMatrix and QSlide (Hamble, UK. Web: www.qprox.com). An embedded conductive portion acts as an electrode extension for the circuit. The sensing electrode is embedded at a shallow depth, (in the rough range of 1 mm-20 mm), directly below the concrete surface area that is to detect human touch. Electrical male pins on the controller, insert into female embedded mates, thereby connecting the circuits to the embedded portions.

The male pins on the controllers are rigid; other connection schemes can be employed, such as flexible cables and connectors on the controller, or gold contacts pads may be used, or the like, including all suitable electrical connector pair types.

The principles of capacitive detection and electrode extension using this device are fully documented by the manufacturer and available in publications and the company website.

FIG. 8 depicts an additional example, including a side cut view of a recessed area of a concrete object and a controller. The dotted vertical line indicates that the viewed area is part of a larger item. In this example, the controller fits within the recess in the manner of a hand and glove. Embedded light pipes (60) terminate and expose first ends upon surface (50a), second ends (60b) terminate at top surface of recessed area (81a). (embedded guides not shown for clarity). Embedded electrical paths (70) terminate second ends at embedded signal port (80). Embedded paths (red and blue) connect to conductive plate (70c), which is situated a small distance below surface (50a). The controller housing (90a) is seen to be of a complimentary dimension to recess (81a).

A row of LED's (92a) protrude from the controller housing top surface. Four gold Input/Output contact pads (91b) are situated upon panel (99) of the controller, which is at a size, location and angle, that is complimentary, relative to signal port (80), having four mated pads also (not shown) (mated: one set may be knobbled, the other flat, etc.). A metal
plate (90d) is a fixture of the controller housing and provides holes for screws (90c), which match embedded threaded wells (51).

[0103] Upon controller attachment, the topside LED’s align to the embedded optical path second ends. The gold contact plates are touching mates at the signal port. Two of the embedded electrical paths are dedicated to an embedded electrode connection for a capacitive touch sense circuit; two others are routed to a next signal port.

[0104] Many guide designs may be employed to realize a wide variety of controls for embedding.

[0105] FIGS. 9a, 9b and 9c depict an example guide for an embedded alphanumeric display. A series of plates and mounting posts comprises a guide, as earlier described. Glass or other light transmissive hard material is shaped to comprise the segments of the display. Guide template plate (100a) is cut to fashion a sleeve like pass-through for the optical segments (61). Plate (100b) contains segment support impressions that exactly match the footprints of segments (61). Plate (100b) also includes a round hole centered to each segment support.

[0106] Each segment is optically drilled at the bottom surface to a diameter matching a supplying light pipe. During the assembly process, the light pipe is passed up through plate (100b), inserted into hole in plate (61) and secured (such as glued with optical glue). The segments are then seated in plate (100a) and can be glued. Guide plate (100a) is then placed over the top, so that the segments pass through and extend to a greater height than the plate. Corner holes on each plate allow a post system to be employed to secure the structure at the desired spacing. Such methods are well known; for example, threaded holes may accept threaded post segments, etc. The bottom-most plate serves to support light pipes above the form floor. A clip can be used to secure the assembly. The light pipes enter a jacketed portion and terminate to provide an optical connector. This may represent a signal port, or such junctions may occur along the embedded portion of the light path.

[0107] In operation, illuminating any single light pipe end at the source, will light a single segment on the display. Therefore digits 0-9, and alpha characters can be formed. The same essential principles can be extended to support and position a variety of optical pieces, including fiber optics strands of various diameter, image guides and faceplates for video sources, light transmissive solid forms, electrical materials such as wire and plates and the like.

[0108] Artistic or symbolic shaped, light transmissive solids may also be embedded within the concrete, so that a single face is exposed at the surface, being generally flush to it. These may couple to supply light pipes, or pass through the span to reach a second surface.

[0109] Interactive iconic displays may be devised wherein a symbol or group of symbols is illuminated in such patterns and or colors to communicate information. An example is depicted in FIG. 10. Pictorial optical embeddings, representing weather elements, are organized in a grouping upon interface surface (50a).

[0110] A region (73) senses the position of a human finger, using capacitive detection, and therefore acts as a touch slider. Seen just below the region are embedded metal features (300) to provide a visual scaling aid. In operation, a finger slide will select a date, (shown as “Feb. 15, 2009” in optical endpoints), in a function, wherein sliding to one side moves the date forward by an interval and sliding to the opposing direction moves the date incrementally back in the same fashion. An updated database source, available to the controller, provides weather forecast and historical data. The data for the selected date is presented pictorially by the optical embeddings. For example, on the selected date, the display shows that there will be partial clouds, because optical cloud outline (200) is illuminated, but the other two are not (201). Precipitation can be motion simulated, using segments (203). Many other effects can be depicted pictorially, for example sunspot intensity (205), astronomical data such as comets or meteor showers, lightning forecasts (204), wind, etc.

[0111] Additional Methods of Touch Detection:

[0112] A third method of touch detection employs fiber optics. This method is suitable for wet environments. Single fiber based systems may function to detect a drop in ambient light by finger covering by coupling to a photo-detector on the controller. Or a pair of fibers having close proximity first surface terminations, may be used: A pulsed light is emitted from the first; a covering finger, having some transreflectancy and optical diffusion properties, is able to reflect and transmit the light so that it is passed down the second fiber, to an optical circuit that can detect the pulses.

[0113] A fourth method employs an Active Matrix LCD with Integrated Optical Touch Screen, developed by Planar Systems, Inc., Beaverton, Oreg. In this method the LCD is located on the controller, which aligns and abuts to an embedded fiber optic faceplate. The conduit delivers finger shadows to the photo sensitive LCD via the coupling port. This device also includes a display.

[0114] A fifth method employs an embedded image conduit coupled to a thermal imaging system on the controller. This allows for an optical glide pad that can distinguish hot/cold objects, and recognize hand gestures or fingerprints.

Alternative Embodiment

[0115] In an alternative embodiment of the present invention, an additional coupling port is fashioned from first termini upon the first surface. The additional port, occurring on a user-visible/accessible surface of the object, can provide an attachment and signal-coupling region for thin devices or thin film devices. The termini may be formed in any manner that allows a mated electrical connection, but preferably as flat regions or protrusions, such as small metallic gold bumps, or extensions to end points. That is, non-corrosive end elements with exposed surfaces instead of the original end terminations; or embedded plug components, wherein the connection lugs are connected to first embedded electrical terminations, within the solid region.

Thin Films as Surface Signal Paths

[0116] Films having electrical or electroluminescent properties can be deposited on the surface by means such as sputtering, modified inkjet printer (as is used for organic LED display manufacture), or other means, to form more or less conductive or semi-conductive or electroluminescent...
paths, forming patterns, comprising at least two signal paths that at least map physical connections to at least two embedded electrical path first terminations, occurring upon a first surface of the concrete, along a coupling region.

[0117] The first termini of surface applied film paths are formed to connection to embedded first electrical termini. The second termini of the film paths occur upon the first surface in order to form touch circuit portions, display regions, other active or passive electronic components, including solar cells, to comprise the user interface in whole or part. The films may be deposited on the surface plane or on raised or lowered regions of it. Additional layers may be added, such as clear or opaque sealant, protective sheets or windows. Ideally, the sun of the layers will equal the depth of the cutout, so that the final assembly is approximately flush to the concrete surface. However, it may occur above, or below it. The films may be of a transparency ranging from opaque to clear.

[0118] The embedded electrical path second termini are fashioned to comprise a signal coupling port on a second (usually hidden) surface, for a controller, as previously stated. Therefore, an attached controller is finally in electrical connection to the applied films. For example, an electrical conductive film can be applied to the surface in a pattern and connection configuration to be an open circuit, when a low voltage potential is applied by the attached controller. Second film path termini are spaced so that a human finger, making contact, will close the circuit in operation. Therefore, a means of comprising a touch zone is provided. Alternatively, the paths may form an extended electrode for a capacitive touch circuit located upon the controller; or the capacitive touch circuit (or any circuit) may be deposited on the surface. The paths may be covered with a clear or opaque non-conductive sealant, where desired.

[0119] It may be desirable to illuminate a touch zone or other area for labeling or indication. An electroluminescent material may be deposited with other layers—following the principles of EL lamp construction—to comprise an electrically lightable defined region. This may form a ring or shape to circumscribe the touch zone and/or include fixed patterns of text, images or alpha characters. At the boundary of the intended lightable area, the layer constitution may change to comprise electrical paths only, which function as supply leads for the lightable area, or the lightable area may continue on, being covered with an opaque layer to mask the desired portions.

[0120] More sophisticated similar methods may be applied to deposit graphical video display regions on the surface. Such displays have already been applied to materials, via inkjet printers, by Cambridge Display Technology (CDT, Cambridge, UK). Current displays usually require a cable for display data and power. The cable generally requires a housing to be practical in a product. The display also generally requires a protective or supporting structure or housing. The current invention provides a method to furnish a more durable housing than present methods. One or more controllers provide the activating power and display instructions for the films, and optionally touch input detection and processing circuits, accessed via the exposed matrix of embedded electrical termini.

[0121] A concrete thin film control interface facilitates permanent appliance installations. For example, an ATM body may be a cast concrete object with embedded electrical paths forming termini upon the first (front) surface to provide signal coupling means for applied films, and providing a coupling port(s) at the back for a controller(s). The touch keypad portions, video display, fixed text and images can be applied as complex film layers. When the life cycle of the film paths has been reached (for example, the limited life of EL materials), it may be removed by scrubbing, grinding, polishing, solvents, etc. A new film system may then be re-applied. In this way, a minimum of materials is wasted and the major body remains a functional, permanent installation. Logic processing, data, and other administrative resources are located away from the interface, on the controller or accessible by the controller, upon a hidden, end-user inaccessible face, which assists to secure content and protect equipment.

[0122] FIG. 11 depicts a concrete body with a matrix of embedded path termini (710a) on the first surface and cutout sections (500) to allow for the addition of installed mechanical components, such as document eating, or dollar feeding devices or card readers. Electrical films may be deposited on the surface and form connection to termini (600a). The terminations are preferably non-corrosive material such as silver or gold. Alternatively, they may be coated. Other cutouts (501) are created for use by a customized component printer as mounting posts, providing a means to establish a known, absolute origin for the device in reference to the surface terrain.

First Surface Coupling Ports for Thin Devices

[0123] As an alternative to first surface end termini for direct film deposition, first surface coupling ports include a connection means and securing means for thin devices to attach, such as entertainment, informational or appliance control devices. The port may include inlet jacks or plugs or any connection or securing method described for the first embodiment.

[0124] Super thin display devices, such as organic LED, have been manufactured on flexible plastic and glass. Printed electronics is also a growing field. Media and control devices may be manufactured as very thin devices, intended to connect to a concrete surface that provides signal connection to at least a second attached device.

[0125] Depending on the embodiment, the device may be very thin or somewhat thicker. The device may include display elements, touch controls, or any elements required for computer function. The device may be manufactured as a rigid or flexible sheet or tabular shaped object.

[0126] Useful materials may include flat displays, such as LCD, organic LED, opaque or transparent; protective rigid or flexible windows, such as fiber optic faceplates or plastic or glass sheets; housing and support material such as plastic, metal or thin cast material; film deposited layers (as previously detailed), circuit layers such as surface mount devices or printed electronic circuits, including input detection circuits, labels, coatings, mounted electrical pins or contacts. Mounting parts may include eyelets for screws or pins or magnetic layers, and electrical jack pins or recesses.

[0127] Physical connection means are provided. The thin device is preferably laid into an inset region of the first surface that includes one or more coupling ports. Ideally, the inset region is a depth to match the device, so that it will be
flush to the surface. Small screws, pins or the like may be used to secure the device in the well, passing through holes or threaded portions of the device body, into embedded female mites or vice versa. Holes for screws can be positioned on the device or on tab extensions, to lie below the plane of the major surface when the device is installed. A locking means may be devised, by employing attachment screws accessed from an end-user-hidden surface, such as the back. Alternatively, an electronic lock method can be employed, wherein pins or extensions of the device, insert into a concrete embedded receiver, wherein a servo motor, electromagnet or mechanical means, secure the device extension in place. Alternatively, a custom screw head may be used. A grout or concrete slurry or other sealer may then fill the wells. The device may be sized to leave a gap around the edges, when attached to the inset coupling region. Therefore, a grout, slurry or sealant can be applied in order to produce a seamless, but serviceable surface. The screw head threads may be covered or sealed with wax or the like, before grouting. A precision depth routing device can remove the material in future, and the screw will be still functional. Alternatively, the assembly may be secured by complementary magnetic sections on each part. Alternatively, the assembly may be secured by physical tension. A precision routing operation can be used to remove joint filler or grout lines, so that the assembly may be serviced.

[0128] The inset surface area may be a simple enclosure, or contain multiple closed loops. Likewise, the associated thin device may contain close loop cutouts intended to encompass protruding concrete profiles, in a collar fashion, to form a flush final surface. For example, a flat, rigid or flexible electronic component sheet has holes or cutouts, wherein each surrounds concrete protrusions lying on the same plane when the sheet is laid in place. The signal coupling port(s), in this example, lie at the bottom or sides of an embossment of the concrete surface that is the complimentary match to the component sheet. The sheet provides signal connection means at the required locations.

[0129] Means are included to form electrical connections to the concrete embedded paths. The device may include rigid male pins that insert into female embedded mites at the signal coupling area or any known connector type that uses a mate may be used.

[0130] FIG. 12a depicts a concrete object (50), having a shallow recessed cutout or inset area upon the top surface. At the floor of the recess are embedded female plugs (81a). A thin device (400) includes rigid male pins (91a), mounted at 90 degrees to the major surface plane of the device and also matching the female plugs at the bottom of the inset region (52). An organic LED transparent organic LED video display (402) is covered by a transparent fiber optic faceplate (403) of the approximate same surface area. Both are supported at the sides by structural plate (404). A cast portion (405) employs ultra-high performance cements to form a thin, concrete touch button surface with illuminated rings as indicators.

[0131] FIG. 12b depicts a zoomed view of the male and female connectors

[0132] In another variation of the present invention, one or more touch regions are arranged to assist precise placement of human appendages such as hands, fingers and feet, so that they can comfortably remain in steady contact for a testing period. For example, an approximate hand shape may be embossed upon the concrete first surface and present first termini at the approximate positions corresponding to the finger pads. Alternatively, the arrangement may occur upon a flat surface. Alternatively, there may be less than five contact points. Alternatively, termini may occur upon a floor surface for human feet or upon a slab (i.e. as a bed).

[0133] The arrangement is at least useful as an instrument of research for the fields of Biofeedback and Electromedicine. For example, a controller attached to a signal port may include circuits to analyze human responses to changes introduced to the touch circuit electrical stream(s). Minute changes in resistance, capacitance, inductance, and any other parameter may be noted and logged many times per second.

[0134] The contacts may also occur near a drinking fountain or sink. A system may be devised wherein the user places a finger or hand onto the test area during the period of water flow (or a longer period), or in order to cause the flow. The analyzed data may be used by an intelligent system to select just-in-time treatment of the water prior to spigot exit, by exposure to selected optical or electromagnetic frequencies for discrete periods.

[0135] A further modification provides for embedded optical first termini to comprise the test pads. For example, a human finger may be color analyzed or fingerprints may be scanned when touching an embedded image conduit(s). Additionally, properties such as reflectance and transluence may be measured. For translucence and other tests, it may be desirable for an optical first termini pair to occur side by side, wherein one emits a pulse and the other detects the leakage through the finger from the first pulse. Alternatively, optical termini may comprise part of a bio-photon research device that seeks to measure light emissions emanating from the human body. Alternatively, an object, such as a food article may be placed on a designated test region for optical analysis.

[0136] The contacts may also occur on a cast handle, such as a refrigerator door handle grip. Measurements may be taken to note electrical or optical changes, if any, that occur when a human user is holding a particular food item in the other hand.

[0137] The invention may be practiced as a combination of any of the methods or variations disclosed herein.

[0138] Numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

What is claimed is:

1. A concrete microprocessor control device, which comprises:
   d) a preshaped item of concrete having a plurality of surfaces in different planes;
   e) at least one embedded signal pipe being embedded in said preshaped item of concrete and having a first terminus located proximate a first surface of said plurality of surfaces and having a second terminus located away from said first terminus and adjacent a second surface of said plurality of surfaces, said at least one
embedded signal pipe being selected from the group consisting of touch sensitive functional optical pipe, touch sensitive functional electrical pipe and combinations thereof;

1) at least one coupling port connected to said second terminus of at least one of said at least one embedded signal pipe, said coupling port adapted to connect to a microprocessor controller having touch sensitive detection and processing means and having signal interfacing means for operating at least one appliance.

2. The device of claim 1 wherein said first terminus is in the same plane as and flush with said first surface.

3. The device of claim 1 wherein said first terminus is located proximate to and below said first surface.

4. The device of claim 1 wherein said first terminus is located proximate to and above said first surface.

5. The device of claim 1 wherein said first terminus is arranged in an intelligent pattern.

6. The device of claim 1 wherein said first terminus is arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

7. The device of claim 1 wherein said first terminus is arranged in a matrix to provide for display character representations of alpha or numeric characters.

8. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a sensible pattern.

9. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in an intelligent pattern.

10. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

11. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

12. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

13. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

14. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

15. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

16. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

17. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

18. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

19. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in an intelligent pattern.

20. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

21. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

22. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

23. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

24. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

25. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

26. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

27. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

28. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

29. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

30. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

31. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.

32. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a predetermined pattern to provide for display at least one linear pattern illustration of a use level.

33. The device of claim 1 wherein said plurality of embedded signal pipes are arranged in a matrix to provide for display character representations of alpha or numeric characters.
controller and at least one external appliance; and at least one embedded signal pipe sending a signal to a controller is connected to said touch controller and said at least one embedded signal pipe receiving a signal from a controller is connected to said optical controller, and said touch controller and said optical controller are connected to said system controller, and said system controller is connected to said at least one external appliance.

36. The device of claim 35 wherein said external appliance is selected from the group consisting of a household appliance, an entertainment appliance, a communications appliance and a computer.

37. The device of claim 1 wherein said concrete is selected from the group consisting of standard concrete, polymer-enhanced concrete, engineered stone and composite stone.

38. The device of claim 37 wherein said concrete is preshaped into a shape having at least one flat surface and at least one said first terminus is located on said at least one flat surface.

39. The device of claim 38 wherein said shape is selected from the group consisting of at least a portion of an appliance body, a countertop, a wall panel, a wall-hanging unit and a portable device.

40. The device of claim 1 wherein said least one embedded signal pipe is electrical pipe that is adapted to transmit electrical signals selected from the group consisting of touch circuit portions, data streams, command streams, power sources and power grounds.

41. The device of claim 1 wherein at least one coupling port is located upon or approximate to the surface of the interface and adapted to allow connection by a connection means selected from the group consisting of surface deposited, removable, electrically active films, electroluminescent films, and wafer or tabular shaped removable devices having device at least one of operational and content display controls.