

## **TITLE: DIGITAL KEYPAD**

### **DESCRIPTION**

#### 1. Background

05 The invention generally relates to a keypad, specifically a keypad which functions as a code input interface as part of a mechanical digital lock control panel. This keypad additionally has a variable key symbol display. Similar to conventional keypads installed in mechanical digital lock control panels, the invention can be operated through a series of mechanical operations actuated by the physical depression of digital keys on said  
10 keypad.

#### 2. Conceptualization

Conventionally, mechanical digital lock control panels comprising keypads with key  
15 symbols from 0 to 9 have a code input interface that includes designated permanent positions where the said digits are located on the keypad buttons. Assuming the pre-set digitals for the code are not changed regularly, the buttons on the conventional keypad would experience wear and tear stemming from the frequent physical depression of the digital keys by users. As such, the most oft-used buttons would appear more distinctly  
20 than other buttons after prolonged periods of use, thereby hinting strongly towards the pre-set sequence of digits in tandem with the process of wear and tear on the buttons. This compromises the security offered by the conventional lock.

Additionally, repeated surveillance of the physical input motion of the code onto the code  
25 input interface can lead to easy reproduction of the code by unauthorized parties due to the fixed nature of the code input interface. Thus, there is a prospect and need for this problem to be resolved via the present invention.

#### 3. Summary

30 According to the invention, a keypad which has a means of varying the display of the digits on the keys is presented. Buttons comprising small, individual display means and transparent casings are installed in lieu of conventional keys.

Features of the present invention as well as its overall advantages are clearly perceptible from the following descriptions when taken in connection with the appended diagram and details.

05        4. Diagram(s)

Figure 1 depicts the isometric view of the invention.

10        Figure 2 depicts the invention installed in a preferred embodiment of a mechanical digital lock control panel.

Figure 3 depicts the ideal functionality of the invention installed in a preferred embodiment of a mechanical digital lock control panel.

15        5. Preferred Embodiment(s)

In one preferred embodiment, the invention offers a convenient and more secure replacement of the conventional keypad by replacing conventional keys with rectangular buttons where the numerical displays 0-9 are presented via individual Light Emitting Diode (LED) arrays 01. The invention then forms the code input interface of a mechanical digital lock control panel 03 wired to a separate locking mechanism attached to an entrance barrier like a door (not shown), as can be seen in Figure 2. The individual Light Emitting Diode (LED) arrays 01 are encapsulated in a transparent polycarbonate casing 02 which is transparent, hence allowing the user to be able to peruse the numerical displays shown on the individual Light Emitting Diode (LED) arrays 01 and simultaneously  
25        actuate an access code by sequentially depressing the relevant buttons.

The mechanical digital lock control panel 03 that the invention is installed in, as reflected in Figure 2, houses a means of continuously and automatically varying the key symbol displays on the screens. The key symbol displays are hence variable and are randomly  
30        rearranged once a user inputs an access code, ensuring that the physical process of actuating an access code via depression of the buttons is dynamic in nature, and the access code is thus not easily reproduced by unauthorized personnel surveying the user's actions.

Referring to Figure 2 as a preferred embodiment, the invention presents itself with a power-saving measure. The mechanical digital lock control panel 03 that the invention is installed in houses a means of controlling the key symbol display appearing on the invention's individual Light Emitting Diode (LED) arrays 01. When the invention is left idle and unused for a short period of time, the individual Light Emitting Diode (LED) arrays would be unlit (stand-by mode 08a) until a request for a code input on the invention is forwarded by a user.

As an overview of the preferred embodiment, Figure 3 depicts an ideal functional diagram of the digital variable keypad. The variable keypad 07a is part of the entire user interface mounted on a mechanical digital lock control panel 03. The control panel will be directly connected to a power supply 04 wherein power is supplied to the components inside the control panel as well as the digital variable keypad, and houses the processing means 05 and programmable means 06. Processing means 05 comprises a processor and a PCB Board to control the overall function of the control panel. Programmable means 06 comprises a memory means 06a that stores software instructions for the digital variable keypad 07a, and software instructions may be configured or input into the memory 06a during the manufacturing process or customized via the variable keypad. Software instructions input in the programmable means would directly affect the processing means 05.

The user interface 07 may comprise devices or mechanical implements which users can utilize to input instructions or information into the control panel. In the preferred embodiment, the user interface 07 comprises the variable keypad 07a wherein users can input access codes and information into the control panel's programmable means 06.

In the preferred embodiment, the variable keypad 07a comprises a separate set of functions, namely the request function 08, the display function 09 and the displacement means 10. Request function 08 is a means wherein a user demands for the display function 09 to be initiated, and it may be actuated by the physical depression of any key on the variable keypad. The display function 09 will present key symbol displays on the individual Light Emitting Diode (LED) arrays 01 when the request function 08 is triggered, thus providing an input interface for the user. When the request function 08 and display function 09 are in effect, the top surfaces of polycarbonate casings 02 are backlit, and

hence illuminated, by the key symbol display for easy viewing by the user. Displacement means 10 comprises the means of response to a depression of any key on the variable keypad, and may provide aural, visual or physical indication that the key has been depressed. In an implementation of the invention, the displacement means 10 is manifested in an aural feedback to the user, wherein an exertion of force by the user on a key would result in a beeping sound emanating from a buzzer which forms a part of the displacement means.

10 The physical depression of keys on variable keypad 07a would actuate the input of an access code into the control panel. The access code is processed through the processing means 05, in accordance with programmable means 06, before reflecting a positive or negative feedback to the user. In the preferred embodiment, upon requesting for a display function, the processing means 05 would generate a random array of key display symbols (e.g. 0-9) and transmit the information to the user interface 07 to be displayed on the individual Light Emitting Diode (LED) arrays 01. When an access code is denied (i.e. not recognized by the processing means), the variable keypad 07a reverts to stand-by mode 08a, which must be initiated again via the request function 08 if the user wishes to try again. When this occurs, the randomization of key display symbols takes place once more and is reflected in the display function.

As is discernable from the preceding description, the present invention essentially provides a more secure and reliable code input interface for mechanical digital lock control panels. The present invention surpasses conventional mechanical digital lock control panels in the removal of an unchanging access code input pattern that can be taken advantage of by unwelcome personnel and power-saving capabilities, thus heightening security and longevity of usage.

## CLAIM(S)

What is claimed is:

- 05 1. A keypad functioning as an access code input interface of a mechanical digital lock  
control panel (03) as exemplified in the preceding descriptions and diagrams, wherein  
it has a plurality of buttons installed, each comprising a transparent polycarbonate  
casing (02) encasing small Light Emitting Diode (LED) arrays (01) which can display  
key or numeric symbols, in lieu of conventional keys bearing key symbols in  
10 permanent positions.
2. A keypad as stated in claim 1 which has a variable key symbol display capability, and  
is characterized by having at least one key and a small Light Emitting Diode (LED)  
array (01) designed to effect variable display of a key symbol, wherein the display and  
15 the information transmitted by the key are identical and hence vary together.
3. A keypad as stated in claim 1 wherein correct sequential input of an access code,  
actuated via physical depression of the buttons on the invention, allows a locking  
means to be retracted.  
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4. A keypad as stated in claim 1 wherein the keypad comprises 10 code input buttons,  
each comprising a transparent polycarbonate casing (02) encapsulating a small Light  
Emitting Diode (LED) array (1), which serve to display key symbols comprising the  
numbers 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 which are visible through the transparent  
25 polycarbonate casing (2).
5. A keypad as stated in claim 1 wherein the polycarbonate casing (02) forming the main  
component of each button on the keypad is transparent, allowing the user to view the  
variable key symbol displays distinctly.  
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6. A keypad as stated in claim 1 wherein individual buttons can have numeric displays  
comprising digits 0-9, and numeric displays that are shown on each of the 10  
individual buttons are automatically assigned by the controlling means present during  
embodiment of the invention in a mechanical digital lock control panel (03).

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7. A keypad as stated in claim 1 and claim 6 wherein numeric symbols 0-9 are randomly placed within each designated button, hence ensuring that the arrangement of the symbols are not repeated during each activation of the input interface.
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8. A keypad stated in claim 1 wherein the numeric displays of digits 0-9 appear in variable and random orders on their respective Light Emitting Diode (LED) arrays (01), and hence their respective buttons, when a demand for access code input is issued by the user.
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9. A keypad as stated in claim 1 wherein its individual buttons, each comprising a transparent polycarbonate casing (02) and a small Light Emitting Diode (LED) array (01), are entirely backlit by the encased small Light Emitting Diode (LED) arrays (01) when in use.
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10. A keypad as stated in claim 1 wherein the key symbol displays are not presented on their Light Emitting Diode (LED) arrays (01), and hence the buttons are not illuminated, when the digital lock control panel (03) is not in use or left idle for a short period of time.
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11. A keypad as stated in claim 1 with a function as stated in claim 9 wherein the function is described as a stand-by mode (08a).
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12. A keypad as stated in claim 1 wherein, in its preferred embodiment, it is attached to a processing means (05), programming means (06) and power supply (04) as part of a user interface (07) of a mechanical digital lock control panel (03) .
13. A keypad as stated in claim 1, wherein by virtue of claim 12, can possess a multitude of functions as presented in the preceding descriptions. This is due to the programmable means (06) and memory (06a) where specific software instructions may be installed to control the variable keypad.

14. A keypad as stated in claim 1 comprising keys which provide an aural feedback when depressed by a user as part of its displacement means (10), hence providing a means of acknowledging the user's input into the processing means (05).