Title: DEVICE FOR ENTERING INFORMATION IN ELECTRONIC DEVICES

Abstract: This invention concerns devices for entering information in electronic devices, specifically, keyboards. This invention's objective is creation of such device for entering information, which provides for quick and convenient method of entering information in electronic devices by hardware and virtual keyboards with small number of keys. Objective is achieved by use of hardware and virtual keyboard for entering information, in which information entry is performed by pressing individual keys and/or simultaneously pressing several adjacent keys. Besides, types of input symbols in keyboard layout can be additionally structured by method of entering information.
DEVICE FOR ENTERING INFORMATION IN ELECTRONIC DEVICES

The present innovation refers to the electronic data input devices, particularly to keyboards.

The most widespread data input devices are keypads. The known data input devices refer to the button keypads, where one or several symbols are assigned to every button. A keypad can have physical buttons, i.e., hardware keypads either with virtual buttons, i.e., virtual push buttons. There are two most widespread types of keypads. The most widespread keypad for computer devices and smartphones (and practically the only one used) is a QWERTY keypad with an English layout pattern and its analogues for other languages (ЩУКЕН for Russian, AZERTY for French etc.). It is used as a hardware keypad and as a virtual keypad as well. For mobile phones the most used (as well as practically a monopolist) keypad is a twelve - button keypad (four horizontal rows of buttons per three buttons in each row).

There are known the keypads of mobile phones with twelve buttons. The buttons are arranged in four rows per three buttons in each row. There are ten buttons for the input of digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 and two buttons for the input of additional symbols and commands. Eight from ten buttons of a keypad are used for the input - the buttons with digits 2, 3, 4, 5, 6, 7, 8 and 9. Three to four letters are bound to each of said buttons. The letters on the buttons are arranged in the alphabetic order. Buttons 2 ABC, 3 DEF, 4 GHI, 5 JKL, 6 MNO, 7 PQRS, 8 TUY and 9 WXYZ. The load button 0 is used to enter a space (Space Bar). One button controls the input of additional symbols ( . , ? ! @ & $ № etc.), and one button controls the symbol mode. Every pressing on the data input control button entails the sequential switching of the data input modes - the input of digits, the input of uppercase letters, the input of capitals, intelligent editing mode with a dictionary. In order to enter a required symbol it is necessary to press a corresponding button until the required symbol is entered. For example, the uppercase mode was chosen and the user needs to enter a letter A. For that it is necessary to push the button 2ABC. If you need to enter a letter C, then the same button should be pushed thrice. If you need to enter a digit 2, then the same button should be pushed four times or chosen the digit input mode and the button 2ABC should be pushed once. The same is true for other data input buttons as well. In other words, in the letter input mode we can enter only nine letters ADGJMPTW by pushing corresponding buttons. In order to enter letters BEHKNOUX it is necessary to push twice in succession the corresponding buttons. To enter letters CFILORVY it is necessary to push three times in succession the corresponding buttons. To enter letters SZ it is necessary to push four times in succession the corresponding buttons. To enter an additional symbol you need to push the additional symbol button. At that the table of additional symbols will appear on the screen. With the help of the cursor we can choose the required additional symbol and confirm the choice. In the intelligent editing mode with a dictionary (T9) after entry of every consecutive letter the dictionary suggests possible variants of ending of this word. This expedites the data input, but the user must be trained and used to this input mode.

The 12 - button keypads for mobile electronic devices have the following disadvantages:

a) there is no possibility of direct input by one pressing for each symbol of the keypad layout or at least for the majority of symbols. There is a direct input by one pressing only for eight letters of the alphabet;

b) there is no uniform data input algorithm, input of one - type symbols requires the different number of button pressing;

c) the text input inconvenience, because only ADGJMPTW letters can be entered directly by one pressing a corresponding button. The most frequently used in texts English letters are ETAOINSH. In other words, only two letters AT from the most frequently used English letters can be entered directly by one pressing a corresponding button;

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r) when entering in succession two symbols assigned to one button, once the first symbol is entered it is necessary to pause before the input of another symbol bound to the same button. Otherwise the second symbol replaces the first one as the device does not distinguish that this is the input of a new symbol;

A) data input in the intelligent editing mode with a dictionary in languages with plenty of short words (for instance, English) suggests too many alternatives. And in other languages one and the same key combination can display several different words, and, if not look at the screen, you can enter a text with an error. When entering texts in languages with agglutinating elements (for instance, German), you have to enter a word in parts, for example, the implementation of the intelligent input with a dictionary in some phones suggests the following solution: after punching in the first part of a word the user presses the button "OK" and the second part of the word is entered. In languages with a developed ending system (for instance, Russian) there is no guarantee that you will get a word in the required case. Also the input of words unavailable in the dictionary is not convenient. In the intelligent editing mode with a dictionary T9 you have to erase a word in full (or almost in full) and to re-type it by one letter. Because of these disadvantages many users do not apply the data intelligent editing mode.

As a result of the above - listed shortcomings the input of a text through the 12-button keypad is not convenient.

There are known keypads with a QWERTY layout pattern (and its analogues for other languages). In a QWERTY keypad each letter of the alphabet corresponds to its own individual button, in other words, all letters are entered directly by one pressing a corresponding button. Therefore, it is much more convenient to enter information with a QWERTY keypad than with a 12-button keypad. The keypads with a QWERTY layout pattern (and its analogues for other languages) have the following disadvantages:

a) they are too spacious - the area of each button must be sufficient for quick and handy pushing. All letters of the layout pattern language, digits from 0 to 9 and taskbar buttons (Enter, Shift etc.) are present on the layout. A standard QWERTY hardware keypad with a numeric block (Numpad) consists of 104 buttons, which is acceptable only for sufficiently big devices and is unacceptable for mobile devices. The laptop QWERTY hardware keypad consists of 60 buttons. The smartphone QWERTY hardware keypad does not have individual numeric buttons and consists of minimum 40 buttons plus the cursor control buttons. At that the size of a button is not big, since the size of the keypad is limited by the size of a smartphone itself. The smartphone virtual keypad consists of 31 buttons (For English version), therefore it takes a larger space of the screen, but the buttons are not big, since the size of the smartphone screens is not big due to the size of smartphones.

6) they have bad ergonomics, i.e., the data input on the QWERTY keypad without using any support, when one hand holds the device, the pad etc., but the second hand is used for data input, is very inconvenient. In small devices, where the device width can be covered by a thumb, for example, in smartphones, for data input you can hold the device with two hands by natural grasp and push the buttons by thumbs, which results in the data input time extension and quite frequent data input mistakes;

r) since the full QWERTY hardware keypads are spacious, the user can hardly keep in focus the entire keypad and during data input the user has to turn gaze to different keypad sectors;

Despite of the above - described disadvantages of the existing keypads for electronic devices, these keypads are in fact the monopolists in electronic devices. This can be explained by the current lack of handy data input devices, which would correspond to the modern level of the development of electronic devices. The actual monopolist of data input devices for mobile phones, the twelve - button keypad initially was designed for fixed push-button entry phones and was intended only for entry of phone numbers. With the appearance of mobile phones this keypad started to be used as well, since the first mobile phones were used only for voice communications, in other words, only the phone number dialling was necessary. The appearance of the short message service (SMS), e-mail and Internet on mobile phones entailed the necessity
of text information input. Currently due to the distribution of various mobile electronic devices - laptops, netbooks, pads, smartphones, mobile phones, navigators, remote control devices, vehicle electronic devices etc., there is the pressing need in the development of compact and ergonomic data input devices.

The objective of the present innovation refers to the development of such electronic data input devices and methods, which:

a) have a minimum space, i.e., engages for data input the minimum number of buttons;
6) ensure direct input (input by one push) for all letters of the applied alphabet;
B) allow to position a finger quickly on the necessary pushing place and hence minimizes errors at data input;
B) enable data input mainly with the thumb of the hand, which holds the device, without moving the hand itself, i.e., the movements have the minimum amplitude;
1) enable to make a keypad both as a hardware keypad and as a virtual keypad;
n) use the users' customary skills to the maximum extend;
3) do not require special training of the person, who inputs information;
3) can be made as an external data input device or built in electronic devices of a standard size or in compact electronic devices;
3) enable to make electronic devices in a form - factor monoblock;
1) in some versions enable not just enter information, but to control GUI (Graphical User Interface) like a Touchpad.

The attained set objective is attributable to the fact that hardware and virtual keypads are used for data input, where data are entered by pushing individual buttons and /or by simultaneous pushing several neighbouring buttons, at that the types of the entered symbols on the keypad layout are structured according to the data input method.

In one embodiment the device is made as a hardware keypad, at that the keypad represents a standard block of a 12 - button keypad - four rows per three buttons in each row and intended for data input. The button borders have a clear relief (either bulged or saddle-like), and when touching the keypad with a finger the user can surely determine what is under the finger: face - button, horizontal or vertical relief - a joint between two neighbouring buttons, X-shaped relief - a joint between four neighbouring buttons. By pushing a button you seal in the button contact and the electronic device senses this as a signal of input of a symbol bound to the given button. At simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) these buttons are sealed in at the same time, and the electronic device senses this as a signal of input of a symbol bound to the simultaneous pressing these two buttons (pressing the joint of four neighbouring buttons) these four buttons are sealed in at the same time and the electronic device senses this as a signal of input of a symbol bound to the simultaneous pressing these buttons (pressing the joint of these buttons), in other words, every joint of four neighbouring buttons represents a virtual button. This embodiment allows to enter on a standard twelve - button block (four rows of buttons per three buttons in each row) by one pushing up to thirty five symbols - twelve buttons, seventeen simultaneous pressing of two neighbouring buttons (joints of two neighbouring buttons) and six simultaneous pressing of four neighbouring buttons (joints of four neighbouring buttons). At such tactile sensations in fact it is impossible to make a mistake what is under the finger - a button, a vertical joint of two neighbouring buttons, a horizontal joint of two neighbouring buttons or a joint of four neighbouring buttons. This enables to position a finger on a necessary pushing point and considerably reduces errors at data input. Mostly the letters are bound to the buttons and to the simultaneous pressing two neighbouring buttons (joints of two buttons). Also these buttons are responsible for digits 0123456789. Mostly the control functions (Enter, ← → ↑ ↓ etc.) are bound to the simultaneous pressing four neighbouring buttons (joints of four neighbouring buttons). In different modes of operation of an electronic device different symbols will be default symbols (entered by single pushing). For instance, in the dialling mode the digits will be default symbols. In the text input mode the letters will be default symbols. Non-default symbols are assigned to a particular
pressing way. For example, in the text input mode: one-time button pressing or one-time simultaneous pressing two neighbouring buttons (joint of two neighbouring buttons) means the entry of a default symbol, i.e., a letter, double pressing of a button means the entry of a non-default symbol, i.e., a digit, one-time simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) means the entry of a corresponding control command. So, when using a keypad consisting of just twelve buttons, in the text input mode by one-time pressing all letters of the English alphabet can be entered, while for digits input you can use a simple and straightforward action - double pressing. If to make this keypad with sixteen buttons (four button rows per four button in each row), the button sizes remain quite big for a convenient pushing, and the number of symbols, entered directly by one-time pressing, increases significantly - up to fifty symbols: sixteen buttons, twenty five joints of two neighbouring buttons (simultaneous pressing two neighbouring buttons) and nine joints of four neighbouring buttons (simultaneous pressing two neighbouring buttons).

In another embodiment the device is made as a hardware keypad, at that the keypad represents a touch-sensitive surface, activated by pressing as a button (a so-called Click Pad), and designed for data input. On the touch-sensitive screen there are the raised buttons, or on the borders of the button zones there are bulged delimiters, or the touch-sensitive screen has a corresponding relief. The button borders have a clear relief, and when touching the keypad with a finger the user can surely determine what is under the finger: face - a button zone, horizontal or vertical relief - a joint between two neighbouring button zones, X-shaped relief - a joint between four neighbouring button zones. In order to enter a symbol it is necessary to press a corresponding place on the touch-sensitive surface. The touch-sensitive surface determines the pace of pressing and enters a symbol bound to such place in the electronic device. Such embodiment allows to enter on a standard twelve-button block (four rows of buttons per three buttons in each row) by one-time pushing up to thirty five symbols - twelve button zones, seventeen simultaneous pressing of two neighbouring button zones (joints of two neighbouring button zones) and six simultaneous pressing of four neighbouring button zones (joints of four neighbouring button zones). This is enough for the overwhelming majority of languages. The joints of four neighbouring button zones are assigned with predominantly control functions (Enter, ← → ↑ ↓ etc.). In different modes of operation of an electronic device different symbols will be default symbols (entered by single pushing the keypad). For instance, in the dialling mode the digits will be default symbols. In the text input mode the letters will be default symbols. Non-default symbols are bound to a particular pressing way. For example, in the text input mode: one-time button zone pressing or one-time simultaneous pressing two neighbouring button zones (joint of two neighbouring button zones) means the entry of a default symbol, i.e., a letter, double pressing of a button zone means the entry of a non-default symbol, i.e., a digit, one-time simultaneous pressing four neighbouring button zones (pressing the joint of four neighbouring button zones) means the entry of a corresponding control command. So, when using a keypad consisting of just twelve buttons (button zones), in the text input mode by one-time pressing all letters of English alphabet can be entered, while for digit input you can use a simple and straightforward action - double pressing. At the same time the touch-sensitive surface of the keypad can be used as a touchpad for moving cursor, navigation in menu of an electronic device, navigation in applications etc. If to make this keypad with sixteen button zones (four button rows per four button in each row), the button zone sizes remain quite big for a convenient pushing, and the number of symbols, entered directly by one-time pressing, increases significantly - up to fifty symbols: sixteen button zones, twenty five joints of two neighbouring button zones and nine joints of four neighbouring button zones. For safer determination of simultaneous pushing the neighbouring button zones (pressing the joint of the neighbouring button zones), every individual relief of the border of the neighbouring button zones can be made as an additional individual sensing elements or the entire relief of the button zone borders of the keypad can be made as one additional sensing element.
In the alternative embodiment the device is made as a hardware keypad, at that the keypad represents a multi-touch sensitive surface, activated by pushing as a button (a so-called Click Pad), which controls the virtual keypad displayed on the screen of the electronic device and designed for data input. On the touch-sensitive screen there are the raised buttons, or on the borders of the button zones there are bulged delimiters, or the touch-sensitive screen has a corresponding relief. The button borders have a clear relief, and when touching the keypad with a finger the user can surely determine what is under the finger: face - a button zone, horizontal or vertical relief - a joint between two neighbouring button zones, X-shaped relief - a joint between four neighbouring button zones. Such embodiment allows to enter on a standard twelve-button block (four rows of buttons per three buttons in each row) by one-time pushing up to thirty-five symbols - twelve button zones, seventeen simultaneous pressing of two neighbouring button zones (joints of two neighbouring button zones) and six simultaneous pressing of four neighbouring button zones (joints of four neighbouring button zones). This is enough for the overwhelming majority of languages. At the same time the touch-sensitive surface of the keypad can be used as a touchpad for moving cursor, navigation in menu of an electronic device, navigation in applications etc. Preferably the keypad should be positioned on the other from the screen side of the electronic device. The user holds the electronic device with the hand by a natural grasp. In such a manner four fingers of the hand - the forefinger, the long finger, the ring finger and the little finger are on the keypad. The screen displays a virtual keypad with a layout similar to a hardware keypad layout. The touch-sensitive surface determines the place where a finger touches the hardware keypad and marks corresponding symbols on the virtual keypad. The user moves the fingers over the hardware keypad in order to mark off the required symbols and presses by a corresponding finger for input of the required symbol. The touch-sensitive screen determines the place where a finger touches the hardware keypad (which finger pressed) and enters the corresponding symbol. In such a manner:
a) always at least four symbols available to input without additional moving of fingers are marked off;
6) the finger movement amplitude is minimum;
B) the fingers positioning on the hardware keypad is very distinct, because the keypad has a relief and on the virtual keypad one can see which symbols are currently marked, which in practice excludes the data input errors;
r) the virtual keypad can be positioned on the screen next to the entered information, therefore the entered information and the keypad can be within one focus of attention of the user;
J) the virtual keypad can be embodied in the minimum size as it is designed only for the reflection of the symbols to be entered.

The embodiment of the data input device, made as a keypad, i.e., a touch-sensitive surface, can be embodied as one common touch-sensitive surface for the whole keypad, but also as individual touch-sensitive surfaces for each keypad button.

In another embodiment the device is made as a virtual keypad of an electronic device equipped with a touch-sensitive screen, at that the keypad is designed for data input. The keypad is made as a button block. The keypad can switch over the button implications, for input of digits, additional symbols etc. For the maximum dense location of symbols and to ensure at that the certain choice of a symbol, the symbols are bound not just to the buttons, but to the button joints (to the simultaneous pressing the neighbouring buttons). Therefore, the buttons serve as a kind of a reference grid, to which the symbols are bound. Because of the peculiarities of human visual perception, if to position the symbols on a simple background at the same distance from each other as if the symbols were positioned on the buttons, then due to the lack of biding to the background (simple background) the user will need an additional time to choose the necessary symbol. Exactly thereby on the virtual keypads the symbols are bound to the buttons like on the hardware keypads instead of positioning against a monotonous background. This gives clear visual binding of a symbol and enables the user to choose and enter the required symbol. The joints of the neighbouring buttons give the same clear visual binding as the buttons themselves.
Usage of the joints of the neighbouring buttons for the symbol binding purposes enables to position much more symbols on the same space.

So:

a) the clear visual binding secures the quick detecting and certain input of the necessary symbol;

6) the buttons have the same sizes as the buttons of a standard QWERTY hardware keypad. This secures the certain clicking on the symbols correspondent to the buttons.

B) for input of a symbol correspondent to a joint of the neighbouring buttons the finger should touch at the same time these buttons - simulations pressing of neighbouring buttons.

This embodiment allows to enter on a standard twelve - button block (four rows of buttons per three buttons in each row) by one - time pushing up to thirty five symbols - twelve buttons, seventeen joints of two neighbouring buttons and six joints of four neighbouring buttons. This is enough for the overwhelming majority of languages. The keypad also contains control buttons Alt, Ctrl, Shift, Enter, Space Bar etc. These control buttons are positioned so that to enable to by the simultaneous clicking on two buttons by one finger (Ctrl+Alt, Shift+Alt, Shift+Ctrl), necessary to compose the common 3 - button combinations Ctrl+Shift+ button, Ctrl+Alt+ button, Alt+Shift+ button. This embodiment enables to get a keypad, which occupies the minimum screen area, convenient for the full-fledged data input and cursor management, which has the same function as the QWERTY keypad. At that only a thumb, which holds the device, is used to enter information.

In another embodiment the device is made as a mobile electronic communication device and has a hardware keypad, at that the device is designed for entry of phone numbers and call management (call mode switching on and ending). The button borders have a clear relief, and when touching the keypad with a finger the user can surely determine what is under the finger: face - a button, horizontal or vertical relief - a joint between two neighbouring buttons, X-shaped relief - a joint between four neighbouring buttons. By pushing a button you seal in the button and the electronic device senses this as a signal of input of a symbol bound to the given button. At simultaneous pressing two neighbouring buttons (pressing the joint of these buttons) these buttons are sealed in at the same time, and the electronic device senses this as a signal of input of a symbol bound to the simultaneous pressing these two buttons (pressing the joint of four neighbouring buttons), in other words, the joint of two neighbouring buttons refers to a virtual button. At simultaneous pressing four neighbouring buttons (pressing the joint of the neighbouring four buttons) these four buttons are sealed in at the same time and the electronic device senses this as a signal of input of a symbol bound to the simultaneous pressing these buttons (pressing the joint of these buttons, in other words, every joint of four neighbouring buttons represents a virtual button. This embodiment allows entering on a six - button block (two rows of buttons per three buttons in each row) by one pushing up to fifteen symbols - six buttons, seven joints of two neighbouring buttons and two joints of four neighbouring buttons. Digits are bound to the buttons and vertical joints of the neighbouring buttons (simultaneous clicking on two neighbouring buttons). Control functions - call and call ending - are assigned to the joints of four neighbouring buttons. Additionally three button joints remain free, which might be used for input of any necessary for the number dialling additional symbols or for input of any necessary control commands, for example, for switching on /off the hands - free mode etc. So, at application of a keypad comprised of just six buttons by one -time pressing all digits and necessary call management commands can be entered.

In other embodiment the device is made as a mobile electronic communication device and has a hardware keypad, at that the keypad is designed for entry of phone numbers and call management (call mode switching on and ending). The keypad represents a touch-sensitive surface responding as a button to the pressing (a so - called Click Pad). On the touch-sensitive screen there are the buttons, or there is a relief on the borders of the button zones there are bulged delimiters, or the touch-sensitive screen has a corresponding relief. The button zone borders have a clear relief, and when touching the keypad with a finger the user can surely determine what is under the finger: face - a button zone, horizontal or vertical relief - a joint of
two neighbouring button zones, X-shaped relief - a joint of four neighbouring button zones. In order to enter a symbol it is necessary to press a corresponding place on the touch-sensitive surface. The touch-sensitive surface determines the pace of pressing and enters a symbol bound to such place in the electronic device. Such embodiment allows to enter on a block consisting of six button zones (two rows of button zones per three button zones in each row) by one - time pushing up to fifteen symbols - six button zones, seven joints of two neighbouring button zones (simultaneous pressing of joints of two neighbouring button zones) and two joints of four neighbouring button zones (simultaneous pressing of four neighbouring button zones). Digits are bound to the button zones and vertical joints of the neighbouring buttons. Control functions - call and call ending - are assigned to the joints of four neighbouring buttons. Additionally three horizontal button zone joints remain free, which might be used for input of any necessary for the number dialling additional symbols or for input of any necessary control commands, for example, for switching on /off the hands - free mode etc. So, at the application of a keypad comprised of just six button zones by one - time pressing all digits and necessary call control commands can be entered. At the same time the touch-sensitive surface might be used as a touchpad for moving cursor, navigation in menu of an electronic device, navigation in applications etc. 

In other embodiments the keypad might be made as either hardware or virtual keypad of and electronic device with the QWERTY layout pattern. For the symbol input there used the pressing on the buttons and on the joints of the neighbouring buttons (simultaneous pressing the buttons and the joints of the neighbouring buttons). In this embodiment for the positioning of the QWERTY layout pattern it is enough to use only fifteen or eleven buttons (depending upon the embodiment).

The advantages of the present innovation lie in the safeguarding of a compact handy method of data input at the minimum size. A compact keypad at the time of data input lies completely within the user's focus, thereby additionally reducing the symbol input time and reducing the input error risks. This enables the creation of different compact electronic devices with no less convenience of data input than in the devices of a standard size and the creation of mobile electronic devices in new form-factors. For instance, this allows making a mobile phone akin to watches and at that it would have a keypad handy for the text information input. Also the present innovation enables making a keypad with the QWERTY layout with application of much less number of buttons and much more compact accordingly.

This innovation can be used for data input actually into any electronic devices. For example, into mobile phones, smartphones, navigators, external keypads, notebooks, tablet computers, e-books, vehicle electronic devices, remote control devices etc. But this innovation is particularly topical for mobile electronic devices.

The key solution, which enables reducing the keypad dimensions drastically and at that safeguarding the quick and certain choice and input of necessary symbols, refers to the application for the symbol input not only the buttons, but also the simultaneous clicking on several buttons - clicking on the joints of the neighbouring buttons. The keypad serves as a reference grid, where all possible places for the symbol input are used: the grid cells, i.e., the buttons, the grid lines - the joints of two neighbouring buttons, the grid references - the joints of four neighbouring buttons. If the button rows are displaced from one another, then for the symbol input the joint of three neighbouring buttons can be used. The pressing places (the buttons and the button joints) on the keypad are clearly differentiated, on the hardware keypads - visually and tactually, on the virtual keypads - visually. At that the tighter placing of the symbols not just reduces the pressing area for every individual symbol, but on the contrary the area of pressing the symbols corresponding to the button joints (simultaneous pressing the neighbouring buttons) is larger. This reduces the erroneous symbol input to the minimum. Application of several pressing types enables structuring the layout of the keypad symbols akin to the pressing, for example, pressing a button - input of a vowel, the simultaneous pressing two neighbouring
buttons (pressing the joint of two neighbouring buttons) - input of a consonant, the simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) - input of a control command. In a hardware keypad the user by tactual sensations clearly knows what symbol type he is entering. If under the finger there is a button, then a vowel is being entered, if under the finger there is a joint (a relief barrier) of two buttons, then a consonant is being entered, if under the finger there is a joint (a relief barrier) of four buttons, then a control command is being entered. In a virtual keypad there is a different binding of different symbol types - for example, the binding of vowels to the buttons, the binding of consonants to the joints of two buttons (simultaneous pressing two neighbouring buttons), the binding of control commands to the joints of four buttons (simultaneous pressing four neighbouring buttons) also additionally expedites the symbol input. The buttons have different shapes - quadratic, rectangle, triangle, pentagonal, hexagonal etc., and even round. The buttons can be spaced apart from each other, i.e., do not touch each other. The main point is to leave a possibility of their simultaneous pressing by a finger.

The embodiment of a keypad akin to the mobile phone keypads like the QWERTY numpad enables to enter information by a thumb and at that to apply the user's set skills to the fullest extend. In the keypad layout the symbols are positioned in accordance with the frequency of use and in accordance with the convenience of movement of the thumbs.

The innovation is explained by the drawings, where:

Fig.1 - the view of an electronic communication device (mobile phone), comprised of a hardware keypad embodied pursuant to the version of this innovation, where data input and device operation control are implemented by pressing the buttons, the simultaneous pressing two neighbouring buttons (pressing the joints of two neighbouring buttons) and the simultaneous pressing four neighbouring buttons (pressing the joints of four neighbouring buttons);

Fig.1A - a view of a data input device, representing the version of this innovation as a twelve-button keypad, where data input is implemented by pressing the buttons, the simultaneous pressing two neighbouring buttons (pressing the joints of two neighbouring buttons) and the simultaneous pressing four neighbouring buttons (pressing the joints of four neighbouring buttons), which shows the number of symbols to be entered by one-time pressing;

Fig.2 - a view of a data input device, representing the version of this innovation as a touchpad (touch-sensitive surface), which has a relief marking off on the touchpad (the touch-sensitive surface) the button zones, where data input is implemented by pressing the button zones, the simultaneous pressing two neighbouring button zones (pressing the joints of two neighbouring button zones) and the simultaneous pressing four neighbouring button zones (pressing the joints of four neighbouring button zones), which shows the possible symbol layout;

Fig.2A - a sectional right-side view of a data input device, which represents the embodiment of a keypad according to the touchpad device design (touch-sensitive surface), having a hollow relief, which marks off the button zone on the touchpad (touch-sensitive surface);

Fig.2B - a sectional right-side view of a data input device, which represents the embodiment of a keypad according to the innovation design as separate touchpads (touch-sensitive surfaces) for every button zone, at that the button zones are separated by a bulged relief;

Fig.3 - a view of a data input device, representing the version of this innovation as a six-button keypad, where data input and device operation control are implemented by pressing the buttons, the simultaneous pressing two neighbouring buttons (pressing the joints of two neighbouring buttons) and the simultaneous pressing four neighbouring buttons (pressing the joints of four neighbouring buttons), which shows the possible symbol layout on the keypad buttons for the dialling of phone numbers and call management;

Fig.3A - a view of a data input device, representing the version of this innovation as a touchpad (touch-sensitive surface), which has a relief marking off on the touchpad (the touch-sensitive surface) the button zones, where data input is implemented by pressing the button zones, the simultaneous pressing two neighbouring button zones (pressing the joints of two neighbouring button zones) and the simultaneous pressing four neighbouring button zones (pressing the joints
of four neighbouring button zones), which shows the possible symbol layout for the dialling of
phone numbers and call management;
Fig.4 - a view of a data input device, representing the version of this innovation as a virtual
keypad, where data input is implemented by pressing the buttons, the simultaneous pressing two
neighbouring buttons (pressing the joints of two neighbouring buttons) and the simultaneous
pressing four neighbouring buttons (pressing the joints of four neighbouring buttons), which
shows the possible symbol layout;
Fig.5 - a view of a data input device, representing the version of this innovation as a keypad with
the QWERTY layout pattern, where data input is implemented by pressing the buttons and by the
simultaneous pressing two neighbouring buttons (pressing the joints of two neighbouring buttons),
which shows the version with application of fifteen buttons;
Fig.5A - a view of a data input device, representing the version of this innovation as a keypad with
the QWERTY layout pattern, where data input is implemented by pressing the buttons, by the
simultaneous pressing two neighbouring buttons (pressing the joints of two neighbouring buttons)
and by the simultaneous pressing three neighbouring buttons (pressing the joints of
three neighbouring buttons), which shows the version with application of eleven buttons;
Fig.5B - a view of a data input device, representing the version of this innovation as a keypad with
the QWERTY layout pattern, where data input is implemented by pressing the buttons, by the
simultaneous pressing two neighbouring buttons (pressing the joints of two neighbouring buttons)
and by the simultaneous pressing four neighbouring buttons (pressing the joints of four
neighbouring buttons), which shows the version with application of eleven buttons;
Fig.6 - a view of a data input device, representing the version of this innovation as a twelve-
button keypad, where data input is implemented by pressing the buttons, the simultaneous
pressing two neighbouring buttons and the simultaneous pressing four neighbouring buttons, at
that the buttons are spaced apart from each other;
Fig.7 - a view of an electronic device - a tablet computer, representing the version of this
innovation as a built-in hardware keypad, where data input is implemented by pressing the
buttons, by the simultaneous pressing two neighbouring buttons (pressing the joints of two
neighbouring buttons) and by the simultaneous pressing four neighbouring buttons (pressing the
joints of four neighbouring buttons);
Fig.7A - a view of an electronic device - a tablet computer, representing the version of this
innovation as a built-in hardware keypad as per Fig.7, where data input and device operation
control are implemented by pressing the buttons, the simultaneous pressing two neighbouring
buttons (pressing the joints of two neighbouring buttons) and the simultaneous pressing four
neighbouring buttons (pressing the joints of four neighbouring buttons);

Data input device and data input into electronic devices:

The data input device embodiments pursuant to the present innovation are represented at Fig. 1 - Fig.7A.

In one embodiment (Fig.1 - Fig.1A), the data input device refers to a hardware
keypad (3, 10), built in the electronic communication device (1). The electronic device has a
screen (2) to display information. The keypad has three types of pressing -pressing a button (3)
(at Fig.1A denoted by the digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), simultaneous pressing two
neighbouring buttons (6, 7) (at Fig.1A denoted by the digits 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
23, 24, 25, 26, 27, 28, 29) and simultaneous pressing four neighbouring buttons (8, 9) (at Fig.1A
denoted by the digits 30, 31, 32, 33, 34, 35). In different operation modes of the electronic device
different symbols will be default symbols (the symbols entered by single pressing the keypad). In
the dialling mode the digits will be default symbols (5), when you are pressing the buttons the
corresponding digits will be entered (5). In the text input mode the letters will be default symbols
(4, 6, 7), the letters will be entered at pressing the button (4), and at the simultaneous pressing
two neighbouring buttons (6, 7). At the simultaneous pressing four neighbouring buttons the
control commands will be entered (8, 9) - a call, call ending, cursor control. For example, the
simultaneous pressing two buttons (1) and (4) (Fig.1) a letter H is entered, but the simultaneous pressing two buttons (1) and (2) (Fig.1) enters a letter L. The simultaneous pressing four neighbouring buttons enters a command corresponding to the simultaneous pressing these buttons (2, 3, 5 and 6) (Fig.1) "Call Ending" (9).

In other embodiment (Fig.2, Fig.2A) the data input device refers to a keypad made as a touchpad (touch-sensitive surface) responding as a button to pressing. The button zone borders have a relief (17, 19, 23). To enter a symbol it is necessary to press by a finger the corresponding touchpad place (touch-sensitive surface), at that the contacts are sealed in (25, 26). The touchpad (touch-sensitive surface) (15, 23) determines the place of pressing and the symbol corresponding to this place and enters it into the electronic device. The keypad (15, 23) has three places of pressing - pressing the button zone (face) (16, 18), the simultaneous pressing two neighbouring button zones (pressing the relief border of two neighbouring button zones) (17, 19, 20, 21) and the simultaneous pressing four neighbouring button zones (pressing the relief border of four neighbouring button zones) (22). In different operation modes of the electronic device different symbols will be default symbols. In the dialling mode the digits will be default symbols (18), at pressing the button zones the digits corresponding to the button zones will be entered (18 In the text input mode the letters will be default symbols (16, 20, 21). At pressing the button zone, the touchpad (touch-sensitive surface) (15, 23) determines the place of pressing and the letter corresponding to this button zone is entered (16). At the simultaneous pressing two neighbouring button zones (pressing the relief border of two neighbouring button zones) (17, 19, 21) the touchpad (touch-sensitive surface) (15, 23) determines and enters the letter corresponding to the simultaneous pressing two neighbouring button zones (pressing the border of two neighbouring button zones). For example, the simultaneous pressing two neighbouring button zones (pressing the border of two neighbouring button zones) (4) and (7) enters a letter R (20), the simultaneous pressing two neighbouring button zones (pressing the border of two neighbouring button zones) 0 enters a letter W (21). At the simultaneous pressing four neighbouring button zones (pressing the relief border of four neighbouring button zones) (22), the touchpad (touch-sensitive surface) (15) determines and enters the command corresponding to the border of these button zones (22). For instance, the simultaneous pressing four neighbouring button zones (pressing the relief border of four neighbouring button zones) (1, 2, 4 and 5) enters the command Enter. In the embodiment (Fig.2B), the data input device refers to a keypad with individual touchpads (touch-sensitive surfaces) (28, 29, 30) for every button zone, at that the button zones are separated by a bulged relief (27).

In other embodiment (Fig.3) the data input device refers to a hardware keypad (31) of a mobile electronic communication device and it is intended for dialling of phone numbers and call management. The keypad has three pressing types - button pressing (32) (input of digits 1, 3, 5, 6, 8, 9, 0), the simultaneous pressing two neighbouring buttons (33) (input of digits 2, 4, 7, 9) and simultaneous pressing four neighbouring buttons (34, 35) (control command - call (34), control command - call ending (35). When a button is pressed the button contact is sealed in and a digit correspondent to the button is entered - 1, 3, 5, 6, 8 or 0. When two neighbouring buttons are pressed at the same time the contacts of both buttons are sealed in and a digit correspondent to the button is entered - 2, 4, 7 or 9. For instance, the simultaneous pressing two neighbouring buttons (1 and 3) enters a digit 2, but the simultaneous pressing two neighbouring buttons (6 and 8) enters a digit 7. When four neighbouring buttons are pressed at the same time the contacts of these buttons are sealed in and a command correspondent to the simultaneous pressing these buttons (34, 35) is entered. For example, simultaneous pressing four buttons (1, 3, 6 and 8) enters a command "Call" (34).

In other embodiment (Fig.3A), the data input device refers to a hardware keypad of a mobile electronic communication device and it is intended for dialling of phone numbers and call
management. The keypad is made as a touchpad (touch-sensitive surface) responding as a button to pressing. On the touchpad (touch-sensitive surface) there are bulged buttons or there is a relief on the borders of the button zones there are bulged delimiters, or the touch-sensitive screen has a corresponding relief. To enter a symbol it is necessary to push by a finger a corresponding place of the touchpad (touch-sensitive surface). The touchpad (touch-sensitive surface) (36) determines the place of pressing and enters the symbol corresponding to this place into the electronic device. The keypad has three pressing types - button zone pressing (face) (37), the simultaneous pressing two neighbouring button zones (pressing the relief border of two neighbouring button zones) (38) the simultaneous pressing four neighbouring button zones (pressing the relief border of four neighbouring button zones) (39, 40). Mostly the digits are bound to the pressing the button zones and to the pressing the relief border of two neighbouring button zones (37, 38). Call management commands are mostly bound to the pressing the relief border of four neighbouring button zones (39, 40). At pressing a button zone the touchpad (touch-sensitive surface) (36) determines and enters a digit correspondent to the button zone - 1, 3, 5, 6, 8 or 0. At the simultaneous pressing two neighbouring button zones (pressing the relief border of two neighbouring button zones) the touchpad (touch-sensitive surface) (36) determines and enters a digit correspondent to the simultaneous pressing two neighbouring button zones (pressing the relief border of two neighbouring button zones) - 2, 4, 7 or 9. For instance, the simultaneous pressing two neighbouring button zones (pressing the border of two neighbouring button zones) 1 and 3 enters a digit 2, but the simultaneous pressing two neighbouring button zones (pressing the border of two neighbouring button zones) 3 and 5 enters a digit 4. At the simultaneous pressing two neighbouring button zones (pressing the relief border of two neighbouring button zones) (39, 40) the touchpad (touch-sensitive surface) (36) determines and enters a command correspondent to the simultaneous pressing four neighbouring button zones (pressing the relief border of four neighbouring button zones) 3, 5, 8 and 0 and enters a command "Call Ending" (40).

In the alternative embodiment (Fig.4) the data input device refers to a virtual keypad of an electronic device equipped with a touch screen. The keypad (41) has three pressing types - pressing a button (42), the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) (43, 44) and the simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) (45). At pressing a button a letter bound to the button is entered (42). At the simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) a letter bound to the simultaneous pressing two neighbouring buttons (the joint of these buttons) is entered (43, 44). For example, the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) E and O enters a letter R, but the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) E and A enters a letter H. At the simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) a management command correspondent to the simultaneous pressing four neighbouring button (the joint of four neighbouring buttons) is entered. For example, the simultaneous pressing four neighbouring button (pressing the joint of four neighbouring buttons E, O, A and I enters a command to the cursor to move to the left ←.

In other embodiment (Fig.5) the data input device is a keypad of an electronic device equipped with the QWERTY layout pattern. The keypad (46) has two pressing types - pressing a button (47), the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) (48). Pressing a button entails the input of a letter bound to the button (47). At the simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) a letter bound to the simultaneous pressing two neighbouring buttons (the joint of these buttons) is entered (48). For example, the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) Q and E enters a letter W. In this embodiment of a keypad with the QWERTY layout pattern fifteen buttons are enough to enter all letters.
In other embodiment (Fig.5A) the data input device is a keypad of an electronic device equipped with the QWERTY layout pattern. The keypad button rows are displaced against each other. The keypad (49) has three pressing types - pressing a button (50), the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) (51) and the simultaneous pressing three neighbouring buttons (the joint of three neighbouring buttons) (52). Pressing a button entails the input of a letter bound to the button (50). At the simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) a letter bound to the simultaneous pressing two neighbouring buttons (the joint of these buttons) is entered (51). At the simultaneous pressing three neighbouring buttons (pressing the joint of three neighbouring buttons) a letter bound to the simultaneous pressing three neighbouring buttons (the joint of these buttons) is entered (52). For example, the simultaneous pressing two neighbouring buttons (the joint of two neighbouring buttons) Q and E enters a letter W. The simultaneous pressing three neighbouring buttons (pressing the joint of three neighbouring buttons) Q, E and Z enters a letter A. In this embodiment of a keypad with the QWERTY layout pattern eleven buttons are enough to enter all letters.

In other embodiment (Fig.5B) the data input device is a keypad of an electronic device equipped with the QWERTY layout pattern. The keypad (53) has three pressing types - pressing a button (54), the simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) (55, 56) and the simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) (57). Pressing a button entails the input of a letter bound to the button (54). At the simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) a letter bound to the simultaneous pressing two neighbouring buttons (the joint of these buttons) is entered (55, 56). At the simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) a letter bound to the simultaneous pressing four neighbouring buttons (the joint of these buttons) is entered (57). For example, the simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) Q and E enters a letter W, the simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) Q, E, Z and C enters a letter S. In this embodiment of a keypad with the QWERTY layout pattern eleven buttons are enough to enter all letters.

In other embodiment (Fig.6) the data input device is a hardware keypad of an electronic communication device, where the buttons are spaced apart from each other at such a distance that they do not touch each other, but one can push two or four buttons by one finger at one time. The keypad has three pressing types - pressing a button, the simultaneous pressing two neighbouring buttons and the simultaneous pressing four neighbouring buttons. In different operation modes of the electronic device different symbols will be default symbols (the symbols entered by single pressing the keypad). In the dialling mode the digits will be default symbols (58), when you are pressing the buttons the corresponding digits will be entered (58). In the text input mode the letters will be default symbols (59, 60, 62), the letters will be entered at pressing the button (59), and at the simultaneous pressing two neighbouring buttons (60, 62). The simultaneous pressing two neighbouring buttons 1 and 4 enters a letter H, but the simultaneous pressing two neighbouring buttons 1 and 2 enters a letter L. At the simultaneous pressing four neighbouring buttons a control command corresponding to pressing four neighbouring buttons will be entered (61) - Enter, Clear, cursor control. At the simultaneous pressing four neighbouring buttons a control command corresponding to pressing these buttons will be entered, for example, the simultaneous pressing four buttons 2, 3, 5 and 6 enters a command to the cursor to move one line up (61).

In other embodiment (Fig.7 - Fig.7A) the data input device is a hardware keypad (65), consisting of eighteen buttons and built in a mobile electronic device - a tablet computer
(63). The electronic device has a screen (64) to display information. The keypad has three pressing types - pressing a button, the simultaneous pressing two neighbouring buttons and the simultaneous pressing four neighbouring buttons. Letters and digits are entered by pressing buttons (68), by the simultaneous pressing two neighbouring buttons (69, 72). The control commands are entered by the simultaneous pressing two neighbouring buttons e simultaneous pressing two neighbouring buttons (66, 71), by the simultaneous pressing four neighbouring buttons (70). For instance, the simultaneous pressing two neighbouring buttons 1 and 3 (Fig.7A) enters a digit 2, the simultaneous pressing two neighbouring buttons E and A (Fig.7A) enters a letter H, but the simultaneous pressing two neighbouring buttons 5 and 0 (Fig.7A) enters a command Back Space. The simultaneous pressing four neighbouring buttons enters a command bound to the simultaneous pressing these buttons, for instance, the simultaneous pressing four neighbouring buttons 3, 5, 8 and 0 (Fig.7A) enters a command of moving the cursor one line up (70). Additional symbols (67) are entered by double pressing a corresponding button. This embodiment example shows that by using just eighteen buttons you can enter directly by one pressing all letters of the English alphabet, digits, actually all commands applied in modern computers and enter by double pressing the majority of additional symbols. In other words, this keypad in terms of functionality actually corresponds to the QWERTY keypad, consisting of sixty to one hundred and four buttons.

The above-described examples, illustrated at Fig.1 - Fig.7A, show that application for symbol input not just pressing buttons, but also the simultaneous pressing several neighbouring buttons (pressing the joints of the neighbouring buttons), enables creation of such data input devices and methods, which:
a) use the minimum number of buttons;
b) occupy the minimum area, at that each button has the same size as the buttons of standard keypads;
c) do not require the user's special training;
d) ensure quick and certain input of symbols with the minimum errors;
e) fit to large and small electronic devices;
f) can be embodied as a hardware or virtual keypad;
g) enable structuring the keypad symbol layout by the type of pressing, for example, pressing a button - input of either a vowel or a digit, simultaneous pressing two neighbouring buttons (pressing the joint of two neighbouring buttons) - input of a consonant, simultaneous pressing four neighbouring buttons (pressing the joint of four neighbouring buttons) - input of a control command;

This allows creating the maximum convenient and ergonomic input device and information control arrangement either as external devices or as built-in solutions as well.

The present innovation can be shown by examples of any electronic devices that require data input in the course of application, for instance, such as any computer devices, any communication devices, any navigators, vehicle electronic devices, remote control devices, external data input devices etc. Although this innovation has been described, because currently it is being considered as the most practical and preferable embodiment version, it will be appreciated that the innovation is not limited to the revealed embodiment versions and it covers various alterations and equivalent configurations that correspond to the essence and the volume of the innovation formula. Alterations and versions in the present innovation can be implemented without any deviation from the essence of the innovation as defined in the innovation formula, i.e., this claim is restricted only by volume of the innovation formula.
Cited documents.


4. А. А. Варфоломеев, В. М. Фомичёв. Информационная безопасность. Методические основы криптологии. Москва, МИФИ, 1995г.


CLAIMS

1. A device for inputting information into electronic device, characterized in that a keypad is used for data input, where data input is implemented by pressing individual buttons and/or by simultaneous pressing several neighbouring buttons.

2. The device according to Claim 1, characterized in that a hardware keypad is used for data input, where data input is implemented by pressing individual buttons and/or by simultaneous pressing several neighbouring buttons.

3. The device according to Claim 1, characterized in that a virtual keypad is used for data input, where data input is implemented by pressing individual buttons and/or by simultaneous pressing several neighbouring buttons.

4. The device according to Claim 1, characterized in that a hardware keypad as a touch-sensitive surface (touchpad), divided by a relief into the button zones, is used for data input, where data input is implemented by pressing individual button zones and/or by simultaneous pressing several neighbouring button zones.

5. The device according to Claim 1, characterized in that a virtual keypad is used for data input, which buttons are embodied as individual touch-sensitive surfaces (touchpads), where data input is implemented by pressing individual buttons and/or by simultaneous pressing several neighbouring buttons.

6. The device according to Claim 1, characterized in that a hardware keypad as a touch-sensitive surface (touchpad), divided by a relief into the button zones, is used for data input, where data input is implemented by pressing individual button zones and/or by simultaneous pressing several neighbouring button zones, at that the screen of the electronic device displays a virtual keypad with a layout pattern analogous to the hardware keypad layout pattern and the symbols touched by the fingers at the moment on the hardware keypad are marked off on the virtual keypad additionally.

7. The device according to Claim 1, characterized in that a virtual keypad is used for data input, which buttons are embodied as individual touch-sensitive surfaces (touchpads), where data input is implemented by pressing individual buttons and/or by simultaneous pressing several neighbouring buttons, at that the screen of the electronic device displays a virtual keypad with a layout pattern analogous to the hardware keypad layout pattern and the symbols touched by the fingers at the moment on the hardware keypad are marked off on the virtual keypad additionally.

8. The device according to any one of the preceding claims, characterized in that a keypad is used for data input, where data input is implemented by pressing individual buttons and/or by simultaneous pressing several neighbouring buttons, at that the types of the symbols to be entered on the keypad layout are structured according to the input method, where every input method - either pressing individual buttons or simultaneous pressing two neighbouring buttons, or simultaneous pressing three neighbouring buttons, or simultaneous pressing four neighbouring buttons etc, is bound predominantly to its own symbol type, i.e., vowels, consonants, digits, additional symbols, control commands, etc.
## INTERNATIONAL SEARCH REPORT

**International application No.**

PCT/LV 201 0/0000 13

### A. CLASSIFICATION OF SUBJECT MATTER

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<th>Field</th>
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<td>G06F</td>
<td>03/02</td>
<td>(2006.01)</td>
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### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F 3/00, 3/01, 3/02, 3/023, H01H 9/00, 13/00, 13/70

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI, Esp@cenet, K-PION, PAJ, RUPTO, USPTO, WIPO, BD FIPS

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>RU 2285284 C2 (AFANASIEV ALEKSEI VLADIMIROVICH) 10.10.2006, abstract, p. 5, lines 23-31, 5-1-p. 6, lines 2, 8-15, 36-47, p. 7, lines 6-13, 43-45, claim 1, fig. 1</td>
<td>1 - 2, 8</td>
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<td>Y</td>
<td>RU 22671 §3 C2 (DIGIT WIRELESS, LLC) 27.12.2005, p. 1, line 2, p. 16, line 47-50, p. 17, line 3-4, 48, fig. 1</td>
<td>4</td>
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<td>A</td>
<td>EP 1509937 B1 (DIGIT WIRELESS, LLC) 25.03.2009</td>
<td>1-8</td>
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Further documents are listed in the continuation of Box C

See patent family annex.

### Date of the actual completion of the international search

04 April 2011 (04.04.2011)

### Date of mailing of the international search report

07 April 2011 (07.04.2011)

Address of the international search authority

International Patent Classification (IPC) or to both national classification and IPC

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