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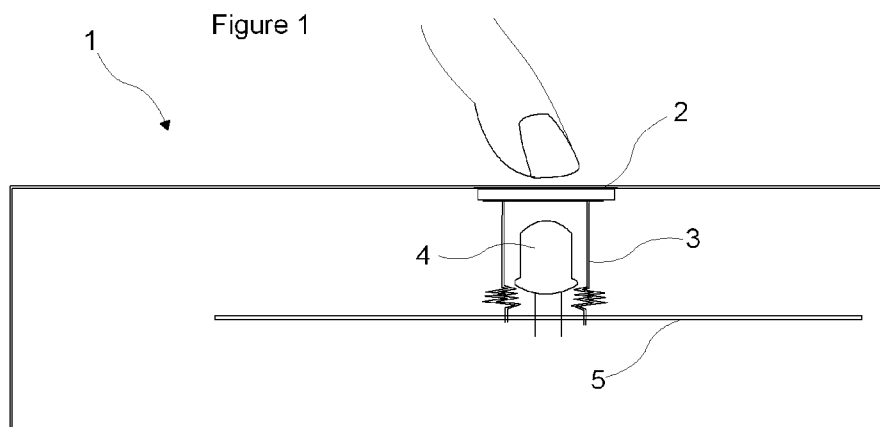
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- (54) **Title:** AN ELECTRONIC DEVICE



- (57) **Abstract:** The present invention relates to an electronic device (1) comprising a panel (8), an electronic board (5) and at least one touch button (2) which operates in accordance with the principle of capacitive proximity and has at least one sensor element (3) enabling the electronic board (5) to detect when the user touches the marked part of the panel (8) and a light source (4) positioned in the center of the sensor element.

Description**AN ELECTRONIC DEVICE**

- [0001] The present invention relates to an electronic device comprising a touch button having a capacitive sensor.
- [0002] In the state of the art, when a button which will function as a capacitive sensor is desired to be formed in electronic devices, the panel and the sensor and thus the electronic board of the device should be near to each other in order for the approaching object to be better detected. In the said electronic devices, various sensor elements are developed for the panel to be located closer to the sensor. A light source can be arranged in the center of some of the developed sensor elements. In order for the said light sources to adequately illuminate the panel surface, they should be mounted perpendicular to the electronic board and their positions should not be deformed.
- [0003] A capacitive sensor element in the state of the art is disclosed in the German patent document DE202005002157U. In one embodiment of the said document, the disclosed sensor element is a wire bent in spiral form. In order to expand the frame of the sensor element, the spiral wire is flattened whereby transforming to a planar form. In another embodiment disclosed in the said document, the sensor element is a cylindrical conductor. One end of the conductor cylinder is bent in the form of a sheet to provide the feature of stretching to it. A light source is arranged in the center of the sensor element.
- [0004] Another capacitive sensor in the state of the art is disclosed in the European patent document EP1732224A1. The sensor elements in the said document are produced from a strip conductor (metallic folio) by giving a form to it.
- [0005] In the state of the art applications of sensors produced in the form of a strip, during mounting of the light source and the sensor into the electronic board, the sensor elements touch and deform the light sources and change their positions. Therefore, the light source cannot be placed perpendicular to the electronic board and the button cannot be sufficiently illuminated. Furthermore, the sensor applications produced by bending

thick conductive strips cause increase in cost.

- [0006] In sensor applications where the wire is formed by being bent in spiral form, errors may occur in the operation of the button and the electronic board as a result of the spirals contacting an undesirable point or each other.
- [0007] The objective of the present invention is to realize an electronic device comprising a touch button that has a sensor element, which enables the light source to be easily mounted to the electronic board without getting deformed and helps protecting the light source when being mounted into the board.
- [0008] The electronic device realized to fulfill the objective of the present invention and defined in Claim 1 and its dependent claims, comprises a panel, at least one touch button disposed below the panel and an electronic board where the button is mounted.
- [0009] The button comprises a sensor element and a light source. The sensor element is formed by bending a wire. The wire is bent to form a frame in the shape of a circle or a tetragon, leaving the center thereof hollow, such that a light source can be disposed in the center thereof and that there will remain enough space for adequate illumination. The sensor element additionally comprises at least two legs extending downwards from the frame. These legs are fixed perpendicular to the electronic board.
- [0010] In the device, the frame and the inner part of the panel are in contact. The sensor element forms a bridge between the panel and the electronic board enabling them to contact each other. This way, when the user touches the area surrounded by the frame on the panel, capacity increase is provided in the sensor element and the button is triggered.
- [0011] The end parts of the legs inserted into the electronic board are folded so as to facilitate mounting of the sensor element to the board. The folded part is in the shape of a spiral spring or a zigzag in the preferred embodiment of the invention. The folded part of the leg stretches during mounting of the electronic board to the device whereby enabling the panel surface that will be touched and the frame to contact each other and when contact is established, allowing the sensor element to stop and be fixed. In

addition to the stretching coefficient of the metal, the amount of stretching basically depends on the folded structure at the end parts and the length of this structure. Stretching margin is limited to the height of the light source. The said limitation prevents the light source from getting crushed during mounting and the sensor element from contacting undesirable areas on the electronic board.

[0012] The electronic device realized to fulfill the objective of the present invention is illustrated in the accompanying figures wherein,

[0013] Figure 1 is the side schematic view of the inventive electronic device.

[0014] Figure 2 is the perspective view of the sensor element used in the inventive electronic device.

[0015] The components shown in the figures are numbered individually, where the numbers refer to the following:

1. Electronic device
2. Touch button
3. Sensor element
4. Light source
5. Electronic board
6. Frame
7. Leg
8. Panel

[0016] The electronic device (1) comprises a panel (8), at least one touch button (2) operating according to the principle of capacitive proximity and an electronic board (5) to which the button (2) is mounted.

[0017] The button (2) comprises at least one sensor element (3) and at least one light source (4) positioned in the center of the sensor element (3).

[0018] The sensor element (3) comprises a hollow frame (6) formed by folding a conductive wire, and at least two legs (7) which extend downwards from the edges of the frame (6) perpendicular to the electronic board (5) and enable fixing the sensor element (3) to the electronic board (5). The end parts of the legs (7) which are inserted into the electronic board (5) are bent in the form of a spring (biasing means) in order to ensure controlled stretching of the sensor element (3).

- [0019] The button (2) is mounted to the electronic board (1), below the panel (8); such that the frame (6) abuts to the panel (8). The area where the frame (6) abuts to the panel (8) determines the area where the sensor element (3) can perform detection. The said area is marked on the panel (8). When the user touches the marked area, the electronic board (5) detects as if the button (2) is depressed.
- [0020] The light source (4) is fixed to the electronic board (5) such that it remains in the projection of the area that the frame (6) surrounds on the panel (8). After mounting, the frame (6) is positioned above the light source (4) such that there remains a distance between it and the top of the light source (4).
- [0021] The frame (6) is in the form of a hollow circle or a tetragon or polygon. After the button (2) is mounted to the electronic board (5), the electronic board (5) is mounted to the electronic device (1). When the electronic board (5) is being positioned on the electronic device (1), the legs (7) stretch and the frame (6) is fixed upon touching the panel (8) of the electronic device (1).
- [0022] The stretching amount of the sensor element (3) during mounting depends on the structure of the spring formed parts of the legs (7) and the stretching coefficient of the wire. The structure of the spring formed parts of the legs (7) and the stretching coefficient of the wire are selected so as to prevent contact of the sensor element (3) with the light source (4) during stretching. This way, the sensor element (3) protects the structure and position of the light source.
- [0023] When the user touches the area marked in advance and surrounded by the frame (6) on the panel (8), the frame (6) causes capacity increase in the sensor element (3) and stimulates the electronic board (5). As a result of this effect, the electronic board (5) turns on the light source (4). The light passes through the frame (6) illuminating the area that the button (2) surrounds on the panel (8), and informs the user that she/he has touched the button (2).
- [0024] In one embodiment of the invention, the parts of the legs (7) that will enable stretching are formed by bending the wire in zigzag form at the concerned points of the wire. The zigzag formed structure provides

mounting ease to the sensor element (3).

[0025] In one embodiment of the invention, number of the legs (7) of the sensor element (3) is configured to be three or more. This way, balance and robustness of the sensor element (3) when being positioned on the electronic board (5) is enhanced.

[0026] In the inventive electronic device (1), detection sensitivity of the sensor element (3) is increased and the sensor element (3) is rendered more sensitive due to the fact that the frame (6) is in contact with the lower surface of the panel (8).

[0027] The fact that the sensor element (3) in the inventive electronic device (1) is made of wire, has decreased the amount of materials used whereby reducing the cost.

Claims

1. An electronic device (1), comprising a panel (8); at least one touch button (2) which operates according to the principle of capacitive proximity and has at least one sensor element (3) and at least one light source (4) positioned in the center of the sensor element (3); and an electronic board (5) to which the button (2) is mounted; characterized by a hollow frame (6) formed by folding a conductive wire, and at least two legs (7), which extend from the edges of the frame (6) toward the electronic board (5) that they are inserted and which descend perpendicular to the electronic board (5) enabling the sensor element (3) to be fixed to the electronic board (5), and parts of which are bent in the form of a spring in order to provide stretching.
2. An electronic device (1) according to Claim 1 characterized by a circular frame (6).
3. An electronic device (1) according to Claim 1 characterized by a hollow polygonal frame (6).
4. An electronic device (1) according to any of the preceding claims characterized by legs (7) formed by bending a part of the wire in zigzag form.
5. An electronic device (1) according to any of the preceding claims characterized three or more legs (7).

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Figure 1

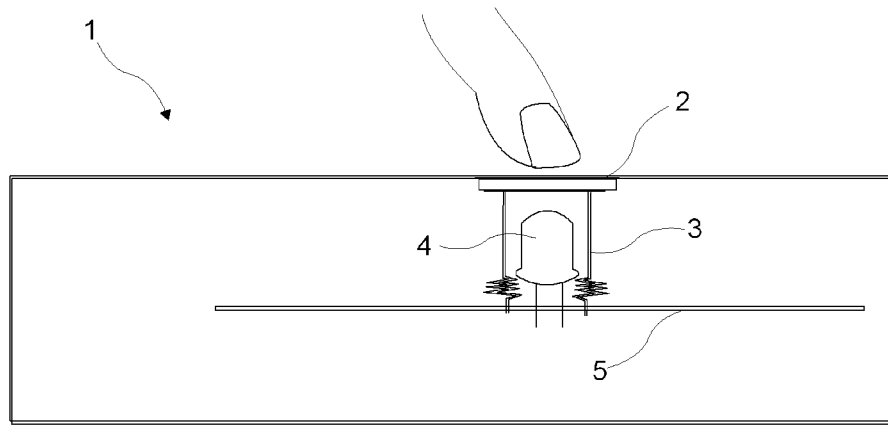


Figure 2

