KNIT GLOVES WITH CONDUCTIVE FINGER PADS

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ABSTRACT

The seamless knit glove has electrically conductive finger regions, either defined by pads or thread. The glove is worn by a user to enable operation of a capacitive touch screen on an electronic device. The seamless knit glove finger sleeves, anterior palm side and posterior “back side” are knit as a unitary structure which has a high degree of stretch. The glove needs no finger-linking operation to attach the sleeves to the anterior and posterior glove regions. In one, electrically conductive yarn is deployed over at least an anterior tip region of the thumb and the index finger sleeve to enable the user to activate a capacitive touch screen of an electronic device. The user’s electrical skin condition is transferred via the conductive threads to the capacitive touch screen. In another, a multiplicity of printed-on conductive ink pads is disposed over the anterior surfaces of the thumb and index sleeves.
KNIT GLOVES WITH CONDUCTIVE FINGER PADS

[0001] The present invention relates to a seamless knit glove with electrically conductive finger regions enabling a user to operate an electronic device having a capacitive touch screen.

BACKGROUND OF THE INVENTION

[0002] In northern climates, individuals typically wear gloves during winter. When those individuals wish to operate capacitive touch screen cellular telephones or computer tablets, collectively identified herein as “electronic devices,” the conductive touch screen does not operate properly because the screen is designed to change electrical state when the user’s finger touches the screen. Since the user’s finger has an electrical charge associated with it, when the user touches a capacitive touch screen, the screen changes its electrical state at that particular location thereby resulting in a user input to the cell phone or tablet. However, when the user wears gloves in cold weather, the capacitive touch screen does not operate because the yarn separates and electrically isolates the user’s finger pads from the capacitive touch screen. Generally, electrical current does not flow through common knit gloves.

[0003] Therefore, there is a need for knit gloves which permit the passage of electrical current from the user’s finger pads to the outer surface of the knit gloves.


Objects of the Invention

[0005] It is an object of the present invention to provide a seamless knit glove with electrically conductive finger regions.

[0006] It is another object of the present invention to provide electrically conductive yarn deployed over at least an anterior tip end region of the thumb sleeve of the glove and deployed over an end tip of an anterior index finger sleeve to enable the user to activate a capacitive touch screen of the electronic device.

[0007] It is another object of the invention to use a multiplicity of conductive ink pads on the anterior portions of the seamless knit gloves whereby, when the gloves are worn by the user, the seamless knit stretches to establish an electrical connection between the hand and finger of the user, the ink pads and the capacitive touch screen of the electronic device.

[0008] It is a further object of the present invention to provide a seamless knit glove wherein a single size fits all enabling small children as well as adults to wear a single size glove.

SUMMARY OF THE INVENTION

[0009] The seamless knit glove has electrically conductive finger regions. The glove is adapted to be worn by a user to enable the user to operate an electronic device having a capacitive touch screen. The seamless knit glove includes finger sleeves, an anterior palm side glove region and a posterior or “back side” glove region. These glove regions and finger sleeves are knit as a unitary structure on a single knitting machine, a single seamless glove making machine. In this manner, the glove needs no finger-linking operation to attach the finger sleeves to the anterior and posterior glove regions. One of the finger sleeves is adapted to retain the thumb of a user and another finger sleeve is adapted to retain an index finger of the user. Electrically conductive yarn is deployed over at least an anterior tip region of the thumb sleeve and an anterior tip region of the index finger sleeve to enable the user to activate a capacitive touch screen of an electronic device. The user’s electrical skin condition is transferred via the conductive threads to the capacitive touch screen.

[0010] In another embodiment, the seamless knit glove has printed thereon a multiplicity of conductive ink pads on the anterior portions of the seamless knit gloves whereby, when the gloves are worn by the user, the seamless knit stretches to establish an electrical connection between the hand and finger of the user, the ink pads and the capacitive touch screen of the electronic device. The seamless knit glove, knitted on a 7 gauge automatic machine, has stretch nylon automatically disbursed throughout the glove by the knitting process to allow an equal distribution of stretch throughout the glove. With the use of acrylic or other 7 gauge yarn along with stretch nylon, the glove becomes a form fitting unit tapered along the contours of the hand, fingers and wrist. It is this tapering and related stress on the yarn/stretch nylon blend that allows conductivity from the finger tips to interact with the conductive ink to activate a capacitive touch screen. The knit glove which is seamless knit glove allows significant stress between the hand and finger joints which a circular knit finger-linked glove would not permit or withstand without delinking.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further objects and advantages of the present invention can be found in the detailed description of the preferred embodiment when taking in conjunction with the accompanying drawings in which:

[0012] FIG. 1 diagrammatically illustrates the anterior view of a seamless knit glove; and

[0013] FIG. 2 diagrammatically illustrates the posterior side of the knit glove; and

[0014] FIG. 3 diagrammatically illustrates the anterior view of a seamless knit glove with a multiplicity of printed-on conductive ink pads.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] The present invention relates to a seamless knit glove with electrically conductive finger regions. This specially configured glove is adapted to be worn by a user to enable the user to operate an electronic device, such as a cellular telephone, an i-phone®, a computer tablet, an iPod®, all of which have a capacitive touch screen.
[0016] Similar numerals designate similar items throughout the drawings.

[0017] FIG. 1 diagrammatically illustrates an anterior or "palm side" view of seamless knit glove 10. Glove 10 includes five finger sleeves 14, 20, 30, 40 and 50. An anterior palm size glove region 52 is also shown which is seamlessly attached by the seamless knit glove making machine to finger sleeves 14, 20, 30, 40 and 50. Thumb sleeve 12 includes an anterior tip-end region 16. Region 16 covers the anterior finger phalanges. A plurality of electrically conductive threads 18 are deployed in the knit glove at anterior tip end region 16 of thumb sleeve 12. The threads electrically couple the interior of the glove sleeve (and the finger) with an exterior, exposed surface 16 of sleeve 12. In this manner, when the user inserts his or her finger, namely his or her thumb, into thumb sleeve 12, the electrical state of the finger is transferred to the exterior surface, that is anterior surface 14, of thumb sleeve 12 via the conductive threads. Conductive threads 18 are shown diagrammatically in FIG. 1.

[0018] Index finger sleeve 20 includes anterior side surface 22. The anterior tip end region 24 atop the finger phalanges pad also includes a plurality of electrically conductive yarn elements 26 deployed over the tip end region 24. Index finger sleeve 20 is adapted to retain the user's index finger therein. Finger sleeves 30, 40 and 50 are also adapted to retain the user's finger. The electrical condition of the index finger is presented by the conductive thread to the exterior of the glove.

[0019] FIG. 2 diagrammatically illustrates glove 10 and, more particularly, the posterior of glove 10. Thumb sleeve 12 has posterior or backside region 13 and a small edge of anterior tip end region 18 is visible from an edge-wise view in FIG. 2. Index finger 20 has a posterior side 21. Conductive anterior tip end region 26 is shown in dashed lines in FIG. 2.

[0020] The knit seamless glove is adapted to fit a wide range of users, from 4 years old to an adult. Therefore, the seamless knit glove is easy to manufacture and stretches to fit the hands of a wide variety of the population. The seamless knit glove has approximately 5% nylon therein that enables a high degree of stretch. Further, since the seamless knit glove closely matches the hand of the user (whether the user is a child or an adult), the electrical linkage between thumb pad 16 and index pad 24 and the opposing inboard surface of the knit glove next to the finger is enhanced. Electrical connection is enhanced by this seamless glove. Since the seamless glove is made completely on a singular machine, it is not necessary to attach finger sleeves 12, 20, 30, 40 and 50 to the palm region 52 or the posterior side region 60 (shown in FIG. 2). Preferably, the conductive yarn is only at the tip of the thumb and the tip of the index finger.

[0021] FIG. 3 diagrammatically illustrates the anterior view of a seamless knit glove with a multiplicity of printed-on conductive ink pads. In this embodiment (different than the conductive thread embodiment), the seamless knit glove has printed thereon a multiplicity of conductive ink pads, three of which are identified as pads 70a, 70b and 70c. In FIG. 3 (generally referred to collectively as "pads 70" herein), on the anterior portions of the seamless knit gloves. Pads 70 may cover the entire anterior region, such as region 22 of finger sleeve 20, or a portion of the anterior region as noted on thumb sleeve 12. Entire sleeves may be unprinted by the conductive ink pads such as finger sleeves 30, 40 and 50. However, a current embodiment covers all anterior surfaces of sleeves 12, 20, 30, 40 and 50 as well as anterior palm region 52.

[0022] In the illustrated embodiment, an image 74 is formed by the multiplicity of conductive ink pads which includes pad 70d (a peanut with a hat design). Therefore, decorative shapes may be printed on the glove.

[0023] The pads in one embodiment are about 17 to 20 pads per square inch. Each pad is about 1/4 inch in diameter. The pads may be randomized or be uniformly spaced on the anterior glove surface.

[0024] With the 1/4 inch pads, about 17-20 per square inch, when the gloves are worn by the user, the seamless knit stretches to establish an electrical connection between the hand and finger of the user, the ink pads and the capacitive touch screen of the electronic device. The size of the pads and the number of pads per square inch is an important feature to establish the electrical connection. The seamless knit glove, knitted on a 7 gauge automatic machine, has stretch nylon automatically dispersed throughout the glove by the knitting process to allow an equal distribution of stretch throughout the glove. With the use of acrylic or other 7 gauge yarn along with stretch nylon, the glove becomes a form-fitting unit tapered along the contours of the hand, fingers and wrist. It is this tapering and related stress on the yarn/stretch nylon blend that allows conductivity from the finger tips to interact with the conductive ink to activate a capacitive touch screen. The knit glove which is seamless knit glove allows significant stress between the hand and finger joints which a circular knit finger-linked glove would not permit or withstand without delinking.

[0025] With the use of the multiplicity of conductive ink pads, the pads on the palm side region 52 can spell out an alphabetic symbol A, B, C, D, etc. which uniquely identifies the glove and associates the glove to the user. In this manner, a user named “Betty” could buy a glove printed with a “B” on the palm side and thereby not lose track of her glove as compared with other similar gloves. This printed matter then becomes an advantage over other gloves not so marked.

[0026] The claims appended hereto are meant to cover modifications and changes within the spirit and scope of the present invention.

What is claimed is:

1. A seamless knit glove with electrically conductive finger regions adapted to be worn by a user to enable the user to operate an electronic device having a capacitive touch screen comprising: a seamless knit glove including finger sleeves, an anterior palm side glove region and a posterior glove region wherein the seamless glove is knitted in one piece by a single seamless glove making machine and wherein the glove needs no finger-linking operation to attach said finger sleeves to said anterior and posterior glove regions;

   one of said finger sleeves adapted to retain a thumb of said user and another of said finger sleeves adapted to retain an index finger of said user;

   electrically conductive yarn deployed over at least an anterior tip-end region of said thumb sleeve and said index finger sleeve to enable said user to activate said capacitive touch screen of said electronic device;

   wherein the seamless knit glove is made of about 5% stretch nylon to enable the glove to fit users from 4 years old to an adult and is a single size-fits-all.

2. A seamless knit glove as claimed in claim 1 wherein seamless glove is a 7 gauge fabric glove.

3.-5. (canceled)
6. A seamless knit glove with electrically conductive finger regions adapted to be worn by a user to enable the user to operate an electronic device having a capacitive touch screen comprising:

- a seamless knit glove including finger sleeves, an anterior palm side glove region and a posterior glove region wherein the seamless glove is knitted in one piece by a single seamless glove making machine and wherein the glove needs no finger-linking operation to attach said finger sleeves to said anterior and posterior glove regions;
- one of said finger sleeves adapted to retain a thumb of said user and another of said finger sleeves adapted to retain an index finger of said user;
- a multiplicity of printed-on electrically conductive ink pads deployed over at least an anterior tip-end region of said thumb sleeve and said index finger sleeve to enable said user to activate said capacitive touch screen of said electronic device;
- wherein the seamless knit glove is made of about 5% stretch nylon to enable the glove to fit users from 4 years old to an adult and is a single size-fits-all.

7. A seamless knit glove as claimed in claim 6 wherein said multiplicity of printed-on conductive ink pads includes a first multiplicity of conductive ink pads over substantially all of said anterior surface of said thumb sleeve and a second multiplicity of conductive ink pads over substantially all of said anterior surface of said index finger sleeve.

8. A seamless knit glove as claimed in claim 7 wherein said glove includes:

- a third multiplicity of conductive ink pads over substantially all of said anterior surfaces of the remaining finger sleeves.

9. A seamless knit glove as claimed in claim 8 wherein said glove includes:

- a fourth multiplicity of conductive ink pads over substantially all of the anterior surface of said palm side glove region.

10. A seamless knit glove as claimed in claim 6 wherein said glove includes:

- a further multiplicity of conductive ink pads over substantially all of the anterior surface of said palm side glove region formed as an alphabetic symbol to uniquely identify the glove.

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