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Electronic stylus and electronic device

Abstract

Disclosed are an electronic stylus and an electronic device. The electronic stylus includes: a pen body provided with a control mainboard; a pen core detachably connected to the pen body and configured to make a touch screen produce an electrical signal in response to being in contact with the touch screen; and a plurality of electrodes integrated in the pen core and provided at intervals, and the plurality of electrodes are electrically connected to the control mainboard.

Inventors: Huang; Yanxin (Shenzhen, CN), Chen; Liangwu (Shenzhen, CN), Zhan; Ziyu (Shenzhen, CN)

Applicant: SHENZHEN QIANFENYI INTELLIGENT TECHNOLOGY CO., LTD
(Shenzhen, CN)

Family ID: 1000008752350

Assignee: SHENZHEN QIANFENYI INTELLIGENT TECHNOLOGY CO., LTD
(Shenzhen, CN)

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Primary Examiner: Ghebretinsae; Temesghen

Assistant Examiner: Quiles; Ivelisse Martinez

Attorney, Agent or Firm: Westbridge IP LLC

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) The present application is a continuation application of International Application No. PCT/CN2023/103293, filed on Jun. 28, 2023, which claims priority to Chinese Patent Application No. 202223095588.2, filed on Nov. 17, 2022. The disclosures of the above-mentioned applications are incorporated herein by reference in their entirety.

TECHNICAL FIELD

(1) The present application relates to the technical field of touch, and in particular to an electronic

stylus and an electronic device.

BACKGROUND

(2) The electronic stylus is a small pen-shaped tool that is used to input commands into the computer screen, the mobile device, the drawing tablet, or other devices with a touch screen, and the user can tap the touch screen with the stylus to select a file or a drawing. In order to achieve good writing performance of the electronic stylus, the distance between electrode structures of the electronic stylus, the signal shielding between electrodes, and the size of electrodes are all strictly required.

(3) In related art, the pen core part at the front-end of the existing electronic stylus is usually provided with only one electrode, and the rest of the electrodes are provided inside the pen body. Limited by the shape structure and the internal space of the pen body, the side of the rest of the electrodes cannot be large, so that the performance of the electronic stylus is also limited and cannot be adjusted to the optimal state, which affects the writing performance of the electronic stylus.

SUMMARY

(4) The main purpose of the present application is to provide an electronic stylus and an electronic device, aiming to realize the rational use of the internal space of the pen core at the front end of the electronic stylus, increase the size of the electrode, and improve the writing performance of the electronic stylus.

(5) To achieve the above purposes, the electronic stylus provided in the present application includes: a pen body provided with a control mainboard; a pen core detachably connected to the pen body and configured to make a touch screen produce an electrical signal in response to being in contact with the touch screen; and a plurality of electrodes integrated in the pen core and provided at intervals, and the plurality of electrodes are electrically connected to the control mainboard.

(6) In an embodiment, the plurality of electrodes at least include a first electrode and a second electrode; the first electrode is a first emitting electrode and is configured to send an electrical signal reflecting a position information of the electronic stylus on the touch screen to the touch screen; and the second electrode is a second emitting electrode and is configured to send an electrical signal reflecting a tilt angle of the electronic stylus relative to the touch screen to the touch screen.

(7) In an embodiment, the plurality of electrodes at least include a first electrode and a second electrode; the first electrode is a first emitting electrode and is configured to send an electrical signal reflecting a position information of the electronic stylus on the touch screen to the touch screen; and the second electrode is a receiving electrode and is configured to receive an electrical signal of the touch screen.

(8) In an embodiment, the electronic stylus further includes: a third electrode provided on the pen body, and the third electrode is configured to send an electrical signal reflecting a tilt angle of the electronic stylus relative to the touch screen to the touch screen.

(9) In an embodiment, the pen body is provided with an inner thread, an outer periphery of the pen core is provided with an outer thread, and the outer thread is adapted to and screwed with the inner thread.

(10) In an embodiment, the pen core is provided with a first installation groove and a second installation groove provided at intervals with the first installation groove, and the second installation groove is provided at an outer periphery of the first installation groove; and the first electrode is inserted into the first installation groove, and the second electrode is inserted into the second installation groove.

(11) In an embodiment, the electronic stylus further includes: a seat provided in the pen body; a first elastic piece is provided on the seat corresponding to the first electrode, a second elastic piece is provided on the seat corresponding to the second electrode, and the first elastic piece and the second elastic piece are electrically connected to the control mainboard respectively; and in

response to that the pen core is assembled with the pen body, the first elastic piece is electrically connected to the first electrode, and the second elastic piece is electrically connected to the second electrode.

(12) In an embodiment, the second electrode is hollowed and is provided at an outer periphery of the first electrode.

(13) In an embodiment, the first electrode includes a conical head and a solid column connected to the conical head; the second electrode includes a conical ring, a first hollow column, and a second hollow column connected sequentially; and the conical ring, the first hollow column, and the second hollow column are provided at intervals on an outer periphery of the solid column.

(14) The present application also provides an electronic device, including: a touch screen and the electronic stylus, and the touch screen is configured for touching of the electronic stylus.

(15) In the present application, the electronic stylus includes a pen body, a pen core and a plurality of electrodes. A control mainboard is provided in the pen body; the pen core is detachably connected to the pen body, and the pen core is configured for touching the touch screen to generate an electrical signal; the electrodes are integrated in the pen core. The electrodes are spaced apart and are electrically connected to the control mainboard. In this way, a plurality of main electrodes required by the electronic stylus are fronted into the pen core, which increases the layout space of the electrodes without affecting the appearance, and can significantly improve the writing performance of the pen.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) In order to illustrate the technical solutions in the embodiments of the present application or in the related art more clearly, the following briefly introduces the accompanying drawings required for the description of the embodiments or the related art. Obviously, the drawings in the following description are only part of embodiments of the present application. For those skilled in the art, other drawings can also be obtained according to the structures shown in these drawings without any creative effort.

(2) FIG. 1 is a schematic structural view of a pen core of an electronic stylus according to an embodiment of the present application.

(3) FIG. 2 is an exploded view of the pen core of the electronic stylus according to an embodiment of the present application.

(4) FIG. 3 is a partial cross-sectional view of the electronic stylus according to an embodiment of the present application.

(5) FIG. 4 is an exploded view of the electronic stylus according to an embodiment of the present application.

(6) The realization of the objective, functional characteristics, and advantages of the present application are further described with reference to the accompanying drawings.

DETAILED DESCRIPTION OF THE EMBODIMENTS

(7) The technical solutions of the embodiments of the present application will be described in more detail below with reference to the accompanying drawings. It is obvious that the embodiments to be described are only some rather than all of the embodiments of the present application. All other embodiments obtained by those skilled in the art based on the embodiments of the present application without creative efforts shall fall within the scope of the present application.

(8) It should be noted that all directional indications (such as up, down, left, right, front, back, etc.) in the embodiments of the present application are only used to explain the relative positional relationship, the movement situation, etc. among various assemblies under a certain posture as shown in the drawings. If the specific posture changes, the directional indication also changes

accordingly.

(9) In addition, the descriptions of “first”, “second”, etc. are only for the purpose of description, and should not be construed as indicating or implying relative importance or implicitly indicating the number of technical features indicated. Thus, a feature delimited with “first”, “second” may expressly or implicitly include at least one of that feature. Besides, the meaning of “and/or” appearing in the application includes three parallel scenarios. For example, “A and/or B” includes only A, or only B, or both A and B. In addition, the technical solutions between the various embodiments can be combined with each other, but must be based on the realization by those skilled in the art. When the combination of technical solutions is contradictory or cannot be realized, it should be considered that the combination of such technical solutions does not exist or fall within the scope of protection claimed in the present application.

(10) The electronic stylus is a small pen-shaped tool that is used to input commands into the computer screen, the mobile device, the drawing tablet, or other devices with a touch screen, and the user can tap the touch screen with the stylus to select a file or a drawing. In order to achieve good writing performance of the electronic stylus, the distance between electrode structures of the electronic stylus, the signal shielding between electrodes, and the size of electrodes are all strictly required.

(11) In related art, the pen core part at the front-end of the existing electronic stylus is usually provided with only one electrode, and the rest of the electrodes are provided inside the pen body. Limited by the shape structure and the internal space of the pen body, the side of the rest of the electrodes cannot be large, so that the performance of the electronic stylus is also limited and cannot be adjusted to the optimal state, which affects the writing performance of the electronic stylus.

(12) Referring to FIG. 1 to FIG. 4, the present application provides an electronic stylus.

(13) The electronic stylus includes a pen body **200**, a pen core **100** and a plurality of electrodes. A control mainboard is provided in the pen body **200**, the pen core **100** is detachably connected to the pen body **200**, and the pen core **100** is configured to touch the touch screen to generate an electrical signal. A plurality of electrodes are integrated in the pen core **100** and are provided at intervals, and the plurality of electrodes are electrically connected to the control mainboard.

(14) Specifically, the plurality of electrodes include the main emitting electrode for sending the electrical signal to the touch screen reflecting the positional information of the electronic stylus on the touch screen and the auxiliary emitting electrode for sending the electrical signal to the touch screen reflecting the tilt angle of the electronic stylus relative to the touch screen, or the plurality of electrodes include the emitting electrode for sending the electrical signal to the touch screen reflecting the positional information of the electronic stylus on the touch screen and the receiving electrode for receiving the electrical signal of the touch screen. By fronting the plurality of main electrodes required by the electronic stylus into the pen core **100**, the layout space of the electrode is increased without affecting the appearance, and the writing performance of the pen can be significantly improved. The plurality of electrode structural members are merged into a module and are integrated into the pen core **100** structure, and each of the electrodes is separated by insulating materials. Since the electrode is directly made on the pen core **100**, compared with that part of the electrode needs to be made inside the pen body **200**, the effective area can be greatly increased. Since the pen core **100** is detachably connected to the pen body **200**, the pen core **100** can be disassembled and replaced as a whole module, which can improve the assembly and disassembly efficiency, so that the plurality of the main electrodes at the pen core **100** do not need complex assembly operations.

(15) Referring to FIG. 1 to FIG. 3, in an embodiment, the plurality of electrodes at least include a first electrode **110** and a second electrode **120**. The first electrode **110** is the first emitting electrode, and the first electrode **110** is configured to send the electrical signal reflecting the positional information of the electronic stylus on the touch screen to the touch screen. The second electrode

120 is the second emitting electrode, and the second electrode **120** is configured to send the electrical signal reflecting the tilt angle of the electronic stylus relative to the touch screen to the touch screen.

(16) Referring to FIG. 1 to FIG. 3, it is easy to understand that the first electrode **110** and the second electrode **120** are provided in sequence along an axis direction of the pen core **100**.

(17) Referring to FIG. 1 to FIG. 3, in an embodiment, the plurality of electrodes at least include the first electrode **110** and the second electrode **120**. The first electrode **110** is the first emitting electrode, and the first electrode **110** is configured to send the electrical signal reflecting the positional information of the electronic stylus on the touch screen to the touch screen. The second electrode **120** is the receiving electrode, and the second electrode **120** is configured to receive the electrical signal of the touch screen. Based on the above embodiment, the electronic stylus further includes a third electrode **210** provided on the pen body **200**, and the third electrode **210** is configured to send the electrical signal reflecting the tilt angle of the electronic stylus relative to the touch screen to the touch screen. It should be understood that, when the user uses the electronic stylus, the pen core **100** is provided with a nib extending out of the pen body **200**. The electronic stylus sends the position information of the touching point to the touch screen through the first electrode **110** of the nib, and sends the tilt angle of the electronic stylus relative to the touch screen through the third electrode **210**. The touch screen sends the electrical signal reflecting the position information to the electronic stylus and the tilt angle of the electronic stylus when in use. The second electrode **120** of the electronic stylus provided in the pen core **100**, that is, the receiving electrode, receives the electrical signal, and further passes the electrical signal to the control mainboard. The control mainboard processes the electrical signal and transmits it to the pen core **100**. The pen core **100** receives the processed electrical signal transmitted from the control mainboard, and performs the instructions carried by the processed electrical signal, so as to draw the points, lines or surfaces on the designated position of the touch screen with thickness and length required by the user. When the user finishes the use of the electronic stylus, it only needs to disconnect the contact between the pen core **100** and the touch screen.

(18) Referring to FIG. 1 to FIG. 4, in order to facilitate the assembly and disassembly of the pen core **100** and the pen body **200**, in an embodiment, the pen body **200** is provided with an inner thread **220**, the outer periphery of the pen core **100** is provided with an outer thread **150** adapted to and screwed with the inner thread **220**. It is easy to understand that the inner thread **220** is connected to the pen core **100**, that is, the inner thread **220** is connected to the pen core **100** by threading with the outer thread **150**. The outer thread **150** is provided on the outer periphery of the pen core **100**, and the volume of the pen core **100** can be further used, which maximizes the available space inside the pen core **100**, and increases the effective area of the electrode. The threaded connection method is easy to assemble, and the pen core **100** is highly efficient to replace or disassemble.

(19) Referring to FIG. 3, it is easy to understand that when the outer thread **150** is screwed with the inner thread **220**, the first electrode **110**, the second electrode **120**, and the third electrode **210** are provided in sequence along the axial direction of the pen core **100**. When the outer thread **150** is not screwed with the inner thread **220**, the third electrode **210** is separated from the first electrode **110** and the second electrode **120**.

(20) Referring to FIG. 2, in an embodiment, the pen core **100** is provided with a first installation groove **130** and a second installation groove **140** provided at intervals with the first installation groove **130**, and the second installation groove **140** is provided at the outer periphery of the first installation groove **130**. The first electrode **110** is inserted into the first installation groove **130**, and the second electrode **120** is inserted into the second installation groove **140**. The shape of the first installation groove **130** is adapted to the shape of the first electrode **110**, and the shape of the second installation groove **140** is adapted to the second electrode **120**. For example, if the first electrode **110** and the second electrode **120** are both arranged as conical rings **123**, then the first

installation groove **130** and second installation groove **140** are also arranged as the conical rings **123**.

(21) Referring to FIG. 3, in an embodiment, the electronic stylus further includes a seat **230** provided in the pen body **200**. A first elastic piece is provided on the seat **230** corresponding to the first electrode **110**, and a second elastic piece is provided on the seat **230** corresponding to the second electrode **120**, and the first elastic piece and the second elastic piece are electrically connected to the control mainboard. When the pen core **100** is assembled with the pen body **200**, the first elastic piece is electrically connected to the first electrode **110**, and the second elastic piece is electrically connected to the control mainboard. The first elastic piece and the second elastic piece are elastic. During the assembly process, the first elastic piece is in an interference fit with the first electrode **110**, and the second elastic piece is in an interference fit with the second electrode **120** to maintain the good electrical contact. In this way, when the pen core **100** is assembled to the pen body **200**, the first electrode **110** and the second electrode **120** on the pen core **100** can be connected to the internal circuit of the pen body **200**.

(22) Referring to FIG. 1 to FIG. 3, the first electrode **110** and the second electrode **120** need to be separated. In an embodiment, the second electrode **120** is hollowed, and the second electrode **120** is provided at intervals on the outer periphery of the first electrode **110**, which makes full use of the internal space of the pen core **100**, and makes sure that the second electrode **120** is not in contact with the first electrode **110**.

(23) Referring to FIG. 2, in an embodiment, the first electrode **110** includes a conical head **112** and a solid column **111** connected to the conical head **112**. The second electrode **120** includes the conical ring **123**, a first hollow column **121**, and a second hollow column **122** that are connected sequentially. The conical ring **123**, the first hollow column **121**, and the second hollow column **122** are provided at intervals on the outer periphery of the solid column **111**. The second hollow column **122** is also extended from the solid column **111** towards a tail of the pen core **100**. When the pen core **100** is assembled to the pen body **200**, the second hollow column **122** and the solid column **111** conduct the internal circuit of the pen body **200**.

(24) In an embodiment, the pen core **100** is made of plastic material. Referring to FIG. 1, in an embodiment, the end of the pen core **100** is arranged as rounded corners. It should be noted that if the end of the pen core **100** configured to contact the touch screen is at a sharp angle, the pen core **100** is stressed and can easily scratch the touch screen. The rounded corners make the contact between the electronic stylus and the touch screen smoother and prevent scratching the touch screen.

(25) Referring to FIG. 1 to FIG. 4, the present application further provides an electronic device, including a touch screen and an electronic stylus. The touch screen is configured for the touching of the electronic stylus. The electronic stylus includes a pen body **200**, a pen core **100** provided with a control mainboard and a plurality of electrodes. The pen core **100** is detachably connected to the pen body **200**, and is configured to make the touch screen produce an electrical signal when it is contact with the touch screen. The plurality of electrodes are integrated in the pen core **100** and are provided at intervals, and the plurality of electrodes are electrically connected to the control mainboard. Since the electronic device adopts all the technical solutions of all the above embodiments, it also has all the beneficial effects brought about by the technical solutions of the above embodiments, which will not be repeated herein.

(26) The above descriptions are only embodiments of the present application, and are not intended to limit the scope of the present application. Under the inventive concept of the present application, any equivalent structural transformations made by using the contents of the description and drawings of the present application, or direct/indirect applications in other related technical fields, are included in the scope of the present application.

Claims

1. An electronic stylus, comprising: a pen body provided with a control mainboard; a pen core detachably connected to the pen body and configured to make a touch screen produce an electrical signal in response to being in contact with the touch screen; a plurality of electrodes integrated in the pen core and provided at intervals, wherein each of the plurality of electrodes is separated by insulating materials, and the plurality of electrodes are electrically connected to the control mainboard; wherein the plurality of electrodes at least comprise a first electrode and a second electrode; and a seat provided in the pen body, wherein a first elastic piece is provided on the seat corresponding to the first electrode, a second elastic piece is provided on the seat corresponding to the second electrode, and the first elastic piece and the second elastic piece are electrically connected to the control mainboard respectively; and in response to the pen core being assembled with the pen body, the first elastic piece is electrically connected to the first electrode, and the second elastic piece is electrically connected to the second electrode.
 2. The electronic stylus of claim 1, wherein the first electrode is a first emitting electrode and is configured to send an electrical signal reflecting a position information of the electronic stylus on the touch screen to the touch screen; and the second electrode is a second emitting electrode and is configured to send an electrical signal reflecting a tilt angle of the electronic stylus relative to the touch screen to the touch screen.
 3. The electronic stylus of claim 2, wherein the pen core is provided with a first installation groove and a second installation groove provided at intervals with the first installation groove, and the second installation groove is provided at an outer periphery of the first installation groove; and the first electrode is inserted into the first installation groove, and the second electrode is inserted into the second installation groove.
 4. The electronic stylus of claim 3, wherein the second electrode is hollowed and is provided at an outer periphery of the first electrode.
 5. The electronic stylus of claim 4, wherein the first electrode comprises a conical head and a solid column connected to the conical head; the second electrode comprises a conical ring, a first hollow column, and a second hollow column connected sequentially; and the conical ring, the first hollow column, and the second hollow column are provided at intervals on an outer periphery of the solid column.
 6. The electronic stylus of claim 1, wherein the first electrode is a first emitting electrode and is configured to send an electrical signal reflecting a position information of the electronic stylus on the touch screen to the touch screen; and the second electrode is a receiving electrode and is configured to receive an electrical signal of the touch screen.
 7. The electronic stylus of claim 6, further comprising: a third electrode provided on the pen body, wherein the third electrode is configured to send an electrical signal reflecting a tilt angle of the electronic stylus relative to the touch screen to the touch screen.
 8. The electronic stylus of claim 1, wherein the pen body is provided with an inner thread, an outer periphery of the pen core is provided with an outer thread, and the outer thread is adapted to and screwed with the inner thread.
 9. An electronic device, comprising: the touch screen and the electronic stylus of claim 1, wherein the touch screen is configured for touching of the electronic stylus.
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