

person or needs once assistance, when using the medical device, by another person, e.g. a family member or a doctor.

[0015] This advantage is achieved by the present invention in that two types of display, one for each user category, that is a visual display for users not visually impaired and a tactile display module for visually impaired users, can be used together with only one medical device and preferably even can be used simultaneously.

[0016] By means of this invention the disadvantage of the acoustic function as well as the need of another expensive device in communication with the medical device is also avoided.

[0017] The present invention refers to a system comprising a medical device and a tactile display module, wherein the medical device comprises an analytical test section or a drug administration section or both; a visual display for users not visually impaired displaying data generated by the medical device and/or instructions for operating the medical device; wherein the tactile display module is connected to and preferably is plugged into the medical device; and wherein the tactile display module can transmit data generated by the medical device and/or instructions for operating the medical device to visually impaired users.

[0018] A medical device according to the present invention is preferably a handheld device for self testing and monitoring the concentration of analytes in a body fluid such as blood or urine, or a blood parameter such as blood pressure or blood coagulation factors. Examples are glucose meters, coagulation factor meters, blood pressure meters. A medical device may however concern also the controlled administration of therapeutic agents. Examples are insulin pumps. A medical device may not only report current and/or memorized data generated during its use, e.g. the concentration value of a measured analyte, but display other information, too, such as the time of the measurement, a batch number of the test strips used, the dose and time of a therapeutic agent delivered, etc. as well as give operational instructions during its use.

[0019] A medical device may comprise either an analytical test section or a drug administration section or both. An analytical test section is a part of the medical device by means of which the blood parameter, in particular the concentration of one or more analytes in a body fluids can be measured and the information obtained used for diagnostic purposes. An analytical test section may comprise for example a port to accommodate an analytical test strip and an optical or electrochemical detector. Disposable lancets operated by the medical device may be also part of the analytical test section. Measurement steps may involve also calibration steps and/or reading of batch numbers. A suitable medical device is e.g. described in U.S. Pat. No. 6,379,317 B1. The medical device additionally or alternatively may comprise a drug administration section. This section—may comprise for example a pump, e.g. a syringe pump, a syringe, a capsule or vial, filled with the drug to be administered, an infusion catheter. A suitable medical device comprising a drug administration section is e.g. described in US 2004/0006310 A1. An example of drug is insulin and its administration over time is controlled by the medical device either as planned infusion doses or dynamically in response to the measured concentration of glucose in a body fluid. Such concentration of glucose may be measured by means of the analytical test section of the same or a different medical device.

[0020] According to the present invention a visual display is a display integrated into the medical device, displaying

numbers and/or letters and/or symbols recognizable by the sense of sight by a person with normal or sufficient visual capability. A suitable visual display is for example a standard LCD (Liquid Crystal Display) or an OLED display. Another suitable example is an electronic paper (e-paper) display based on e-ink technology. Other types of displays are available and are well known to those skilled in the art and are principally also suitable for the present invention.

[0021] According to the present invention the tactile display module is a display, that is connectable to and in particular pluggable into the medical device, displaying signs, i.e. numbers and/or letters and/or symbols recognizable by the sense of tact. These signs could be conventional signs taken from a conventional written language or graphic signs displayed as contours or relief (hereinafter referred to as “Braille-like displays”). Alternatively, a special code developed for visually impaired persons could be employed. An example of such a code or language is the Braille code. The tactile display module according to the present invention is preferably a Braille module or a Braille-like module comprising a thin sheet display based on the Braille code or on conventional language signs, wherein the sheet display comprises preferably organic field-effect transistors and plastic actuators.

[0022] Altogether, the thin sheet display consists preferably of at least three main layers: an organic field-effect transistor thin film deposited on a plastic sheet, for short a transistor layer, a thin plastic or polymeric actuator layer on top of the transistor layer, and a thin polymeric cover layer on top of all, with the feature of being elastically deformable.

[0023] An organic field-effect transistor is a class of thin film transistors based on organic semiconductors. A thin film transistor is made by depositing thin films of metallic contacts, a semiconductor active layer, in this case an organic semiconductor, and a dielectric layer onto a substrate, in this case a plastic film. An organic semiconductor is any organic material that has semiconductor properties. A semiconductor is any compound whose electrical conductivity is between that of typical metals and that of insulating compounds. Both short chain (oligomers) and long chain (polymers) organic semiconductors are known. Examples of semiconducting oligomers are: pentacene, anthracene and rubrene. Examples of polymers are: poly(3-hexylthiophene), poly(p-phenylene vinylene), F8BT, as well as polyacetylene and its derivatives.

[0024] The plastic actuators making the thin actuator layer consist preferably of an ionic polymer metal composite or any other of the several available soft dielectric elastomers or conjugated polymers. An introduction to these materials is given by Shahinpoor, M. et al, *Smart Mater. Struct.*, 1998, 7, R15-R17.

[0025] According to the present invention the medical device further comprises a display interface and the tactile display module is connected to the medical device via said interface or bus.

[0026] In computer architecture, an interface or bus is a subsystem that transfers data and/or power via wire, i.e. via conductors, between computer components inside a computer or between a computer and a peripheral device.

[0027] Some interfaces may be preferred to attach low-speed peripherals to a motherboard, an embedded system such as a medical device, or a cellphone. In this case the peripheral is the tactile display module and the display interface allows data and preferably also power transfer between the medical device and the tactile display module. This trans-