



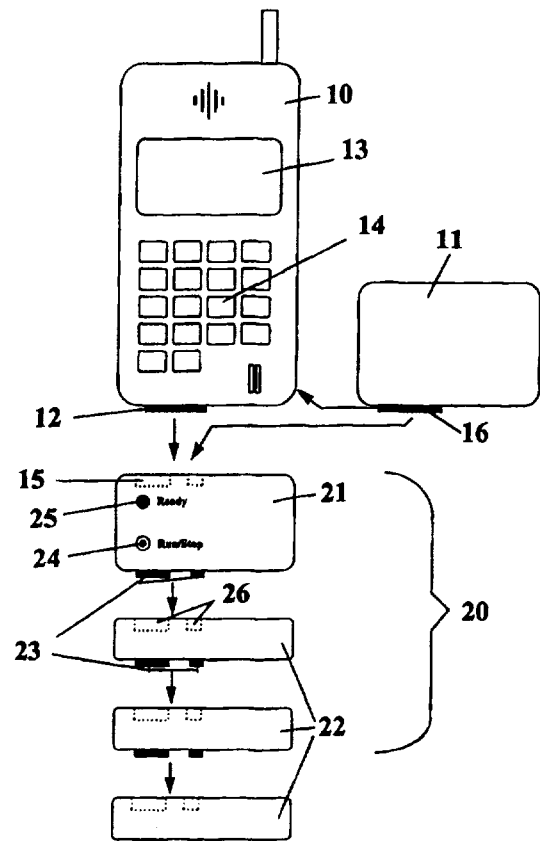
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<p>(21) International Application Number: PCT/FI97/00378 (22) International Filing Date: 16 June 1997 (16.06.97) (30) Priority Data: U960362 17 June 1996 (17.06.96) FI (71) Applicant (for all designated States except US): NOKIA MOBILE PHONES LTD. [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventors; and (75) Inventors/Applicants (for US only): KUUSELA, Tom [FI/FI]; Västäräkinpolku 4 A 9, FIN-20610 Turku (FI). KAILA, Timo [FI/FI]; Sirkkalankatu 24 as 52, FIN-20700 Turku (FI). (74) Agent: JOHANSSON, Folke; Nokia Mobile Phones Ltd., P.O. Box 100, FIN-00045 Nokia Group (FI).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. In English translation (filed in Finnish).</p>	

(54) Title: AN ADD-ON UNIT FOR CONNECTING TO A MOBILE STATION AND A MOBILE STATION

(57) Abstract

The present invention relates to an auxiliary unit (20), to be coupled to a mobile station (10), which comprises a basic element (21) containing components necessary for data transmission, analyses and storage, as well as a sensor element (22) containing a sensor suitable for the non-invasive measuring of a person's bodily functions and the special electronics required by the sensor. This means that different kinds of non-invasive measurements, such as ECG, EEG, EMG, blood pressure and respiratory flow, can be taken by changing the mere sensor element (22).



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AN ADD-ON UNIT FOR CONNECTING TO A MOBILE STATION AND A MOBILE STATION

The present invention relates to an auxiliary unit, to be coupled to a mobile station, and the mobile station.

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Information on patients' bodily functions has already previously been sent by phone from a measuring point to a nursing unit. International Patent Publication WO 94/01039 describes the transmission of a patient's ECG at a digital radio frequency from a measuring point (patient) to a nursing centre. The publication
10 describes a new type of sensor for recording the ECG.

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Digital mobile stations, such as portable GSM mobile phones, provide entirely new opportunities to control remotely patients' different kinds of bodily functions. The technical problem has been that the follow-up of different kinds of bodily functions
15 requires several different types of auxiliary devices to be coupled to a transmitter, which mostly carry the same electronics but have different kinds of sensors, of course.

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An auxiliary device, to be coupled to a mobile station, has now been invented, the device having a separate sensor element, which is replaced according to the bodily function measured at a given moment.

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Thus, the object of the invention is an auxiliary unit intended to be coupled to a digital wireless telephone. This auxiliary unit comprises a basic element, which
25 contains the components necessary for data transmission, analyses and storage. The auxiliary unit also comprises a sensor element, which contains a sensor suitable for the non-invasive follow-up of a person's bodily functions, as well as the special electronics required by this sensor.

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The auxiliary unit, according to the invention, is characterised in that it comprises a basic element, which contains components necessary for data transmission,

analyses and storage, and a sensor element, which contains a sensor suitable for non-invasive measurement of a person's bodily functions, as well as special electronics required by the sensor. The mobile station, according to the invention, is characterised in that it comprises components necessary for data transmission of a non-invasive measurement, analyses and storage, a sensor element, to be coupled thereto detachably, which contains a sensor suitable for non-invasive measurement of a person's bodily functions, as well as special electronics required by this sensor.

10 The invention will be discussed below in detail by referring to the enclosed drawings, of which

Figure 1 illustrates the assembly of equipment according to the invention,

Figure 2 illustrates the implementation of a basic unit as a block diagram,

15 Figure 3 illustrates a sensor unit intended for the recording of the ECG, EEG and EMG,

Figure 4 illustrates a sensor unit intended for the measuring of a blood pressure, and

Figure 5 illustrates a sensor unit intended for the measuring of respiration.

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Figure 1 illustrates the different elements of the inventions; a mobile station, such as a mobile station 10, whereto an auxiliary unit 20 according to the invention can be coupled, which in turn comprises at least two elements, i.e., a basic element (basic unit) 21 and a sensor element (sensor unit) 22, which can be easily replaced according to the function measured or several of them can be connected in sequence.

The basic unit 21 and the sensor unit 22 are coupled to the mobile station 10, e.g., to a digital GSM mobile phone utilising a data connection 12 included therein. If necessary, several sensor units 22 can be connected to the basic unit 21 in a pile,

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as illustrated in Figure 1, by equipping the sensor units 22 with the same kind of connection as the basic unit 21.

5 The function of the basic unit 21 is to launch the measuring of the required bodily functions, to carry out the digitising of the measuring signals, to store the measuring results in a memory and, if necessary, to transmit these results, by mobile phone, to a nursing unit in the required form. If necessary, the basic unit 21 directs the user with the help of a display 13 of the phone and receives the user's commands through a keyboard 14 of the phone. The basic unit also produces the
10 operating voltages required by the sensor units either from the power supply (battery) of the mobile phone or from a separate power supply unit 11, which can be coupled to the basic unit.

15 The sensor units 22 contain the measuring units, the couplings included, relating to each bodily function, as well as the necessary measuring and control electronics so that the unit could produce, for the basic unit 21, an initial analogue voltage proportional to the measuring quantity. The sensor units 22 also contain an internal analogue and digital combination bus 23 by means of which the control and measuring signals of the units, located farther down in the sensor unit pile,
20 are transmitted to the basic unit. The operating voltages, required by the sensor units, which are produced, e.g., in the basic unit, are also transmitted through this bus 23. The sensor units 22 have been implemented so that the basic unit 21 is automatically capable of recognising which sensor units have been coupled thereto. Recognition can be carried out on the basis of a signal received from the
25 sensor unit or, e.g., so that a bus connector 23 comprises several connectors, whereupon a different sensor unit produces a signal for a different connector. An output connector 23 of the bus is connected to an input connector 26. The connection of the bus 23 to the mobile phone is established through a basic unit 15 and the phone's data connection 12.

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