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Gait Research System User's Manual

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Gait Research System

User's Manual

This paper describes how to assemble and start the Gait Research System, to collect the necessary information and explains how to react to some possible system events.

At this moment the system is used for research data acquisition purposes. The hardware includes the following equipment: a pair of insole sensor sets, a pair of acquisition boxes, Pocket PC computer and a set of cables.

System software consists of the firmware data acquisition and data transition programs for acquisition boxes, Pocket PC data writing program, Microsoft DataSync data exchange program, and PC software set for data viewing and selection.

The system hardware is shown in the picture bellow.

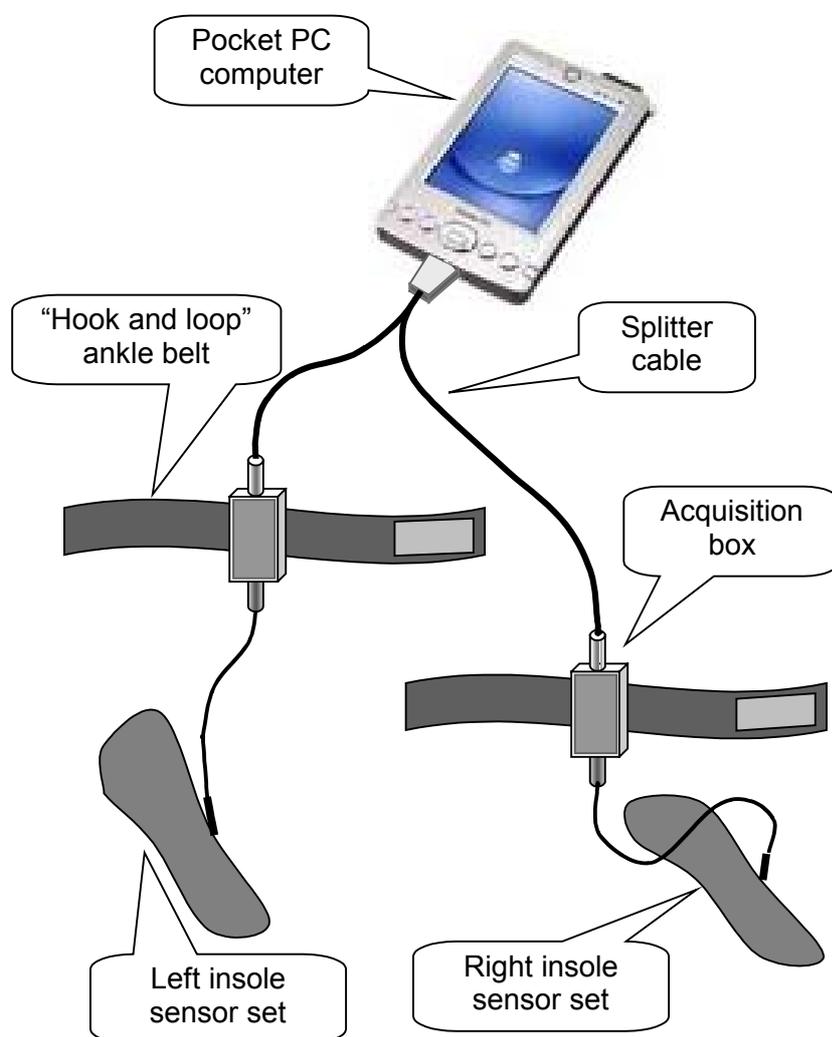


Fig 1. Carrier patient set

1. The carrier set assembling

A patient encloses the insole sensor sets into his/her footwear. Then s/he fastens the pair of sticky belt with acquisition box at her/his ankles and connects insole connectors to acquisition boxes. After fastening the belt bag with the Pocket PC at the waist, the patient can connect the splitter cable to the computer and to both acquisition boxes. Then it is possible to run the Pocket PC acquisition program ("GoodGate") with the rightmost button that is located under the Pocket PC screen. When s/he'll answer several standard start questions (see below) the program will run and the patient can put the computer into the bag and begin walking.

Notice, that the left and right acquisition boxes are different. Putting on the ankle belts, patient should be guided by special marks on connectors and acquisition boxes. The same shape marks should be connected together. *On the contrary*, the splitter cable connectors for acquisition boxes are the same and can be exchanged.

2. The acquisition program starting

The Pocket PC application **GoodGait.exe** can be started either like any application, by selecting **GoodGait** in the main menu **Start**, or by pushing the button which was associated with this application. Currently it is the rightmost programmable button.

When application starts, it asks about working rule:



Fig 2. Initial application dialog

There is no reason to create a new file for the patient, if he already has a correspondent file in the Pocket PC memory. But if the patient is a new one, it is necessary to create a new file, defining mandatory attributes.

2.1. Creating a new data file

First of all it is necessary to give the new file a name. The application automatically suggests a unique digit name. However, it is recommended to define a meaningful name (the patient name, for example).



Fig 3. New file open dialog

The next step is to fill in mandatory information in a special form:



Fig 4. Patient data defining dialog

The “**Kbd**” button allows the user to show or hide the “screen keyboard” for typing. The filling fields are checked by the application and all incorrectness is accompanied with the special messages.

After completing the form, user can confirm data by pushing the “**OK**” button. When the user is ready to begin the data collecting process s/he close the starting dialog box either by stylus or pushing associated button. (Currently it is the rightmost programmable button.)

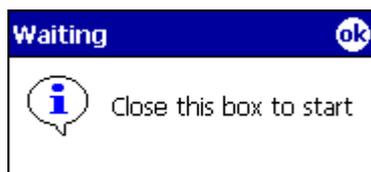


Fig 5. Start acquisition dialog

This moment the acquisition runs.

2.2. Appending an old data file

After viewing file attributes (editing is disabled), user starts acquisition by pushing “OK” button.



Fig 6. Existing file personal data showing up

3. Data acquisition process

When data acquisition is running normally, we can see the specific data charts on the screen. For the best viewing it is possible to change chart's scales using the spin buttons in the bottom part of the screen.

The charts colors are assigned:

Color	Sensor
Red	Left toe sensor
Green	Left heel sensor
Blue	Right toe sensor
Magenta	Right heel sensor

Such order is applicable to the spin button location.

Notice, the chart scale change by spin buttons has no influence on acquired data being written into Pocket PC file. It only changes the display for monitoring.

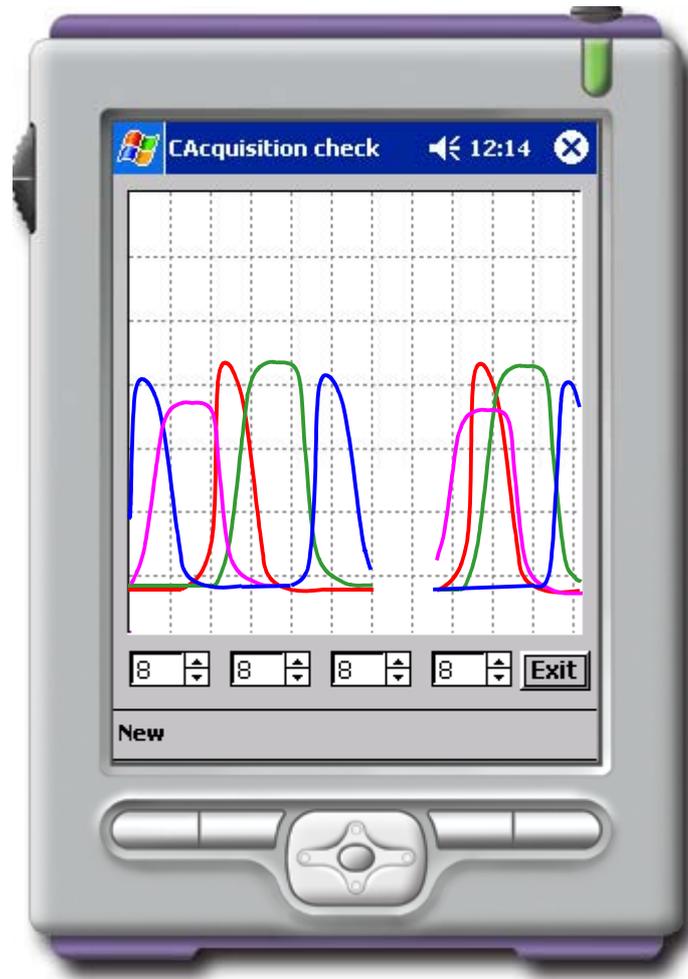


Fig 7. Current data acquisition charts

3.1. Acquisition suspending and resuming

When user doesn't want to collect data, or s/he is going to stop walking for a long-term period, s/he can suspend the data acquisition process by pressing the knob that is associated with the application (rightmost button is located under the Pocket PC screen).

The appropriate message box informs about suspending:

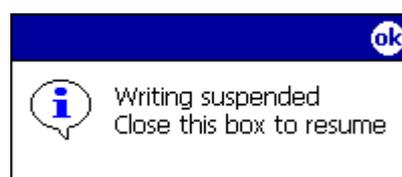


Fig 8. Suspending message box

After clearing the message box away, the data acquisition would continue. This operation can be done either by stylus, or pressing associated button.

3.2. How to stop the data acquisition

It is enough to push “Exit” button to stop application running. All data will be saved in the data file.

Notice, if the patient isn't going to use the set for a long time, it is better to disconnect acquisition boxes from the splitter cable. This action prevents the battery power consumption, breaking the supply circuit.

3.3. Acquisition warnings and errors

Warning and errors during data acquisition are related to hardware problems, such as disconnection or low batteries. The following message boxes show up, if Pocket PC doesn't receive data samples from one of the acquisition boxes:

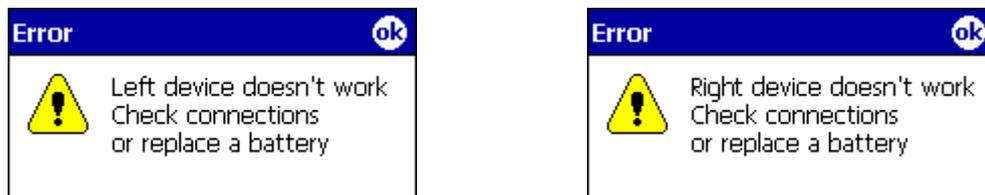


Fig 9. Data absence message boxes

In such a case the user must check the connections first. If they are correct, it is necessary to replace the battery. Each acquisition box has one AAA battery as a power supply source. After battery replacement the message disappears automatically.

If the battery still works, but its charge isn't enough, the user can get a message like these:



Fig 10. Discharging battery warning message boxes

Those warning signals mean that the battery charge is not enough, and it's time to prepare a fresh one. You can clear such message box away by pressing the “OK” button.

4. Transferring data to a desktop PC

In order to transfer the data files it is necessary to synchronize Pocket PC and desktop computer, using the Microsoft ActiveSync program. To establish a direct link between the two computers the user need to plug a cable or a cradle. After entering the Microsoft ActiveSync select Explore icon. When Mobile Device window shows up, you can do the usual copy-paste or drag-and-drop operation to copy data file into a gait research data folder.

5. The data processing

The data viewing and selection can be carried out using Gait Research Data Viewer application. All information about this process is presented in its User's Manual.