VitalSignSIM

Vital Signs Monitor Simulator

– User Manual –

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Developed by:

Luís Monteiro, MSc

Carla Sá Couto, PhD

Contributions:

Abel Nicolau, MSc

Installation

- This simulator was developed for Microsoft Windows operating systems. It has not been tested on other systems, so its operation is not guaranteed.
- This software has been optimized for monitors with a resolution of 1366 x 768 pixels.
- For a correct installation you must follow the following steps:
    - Run the VisualBasicPowerPacksSetup executable found in the downloaded folder before installing VitalSignSIM.
    - VitalSignSIM will be installed in the directory where the folder is placed, so it is advisable to place the folder, for example, in Documents.
    - Run setup file from the sent folder.
    - Installation completed. The program is ready to be used.

Recommendations

- To enhance the realism of the simulation scenario, it is recommended to install the software on a portable computer, connecting to the computer a monitor with the recommended resolution and a wireless keyboard. For the audible signals to be audible, the monitor must have built-in speakers. The computer must be hidden. In this way, the trainee only observes the monitor and the instructor controls the software without interfering in the scenario.

Overview

- VitalSignSIM is an application that mimics a vital signs monitor and can be coupled with a low-fidelity simulator or standardized patient providing an increase in the realism and complexity of the simulation.
- It was designed to be easy to use and include a set of characteristics, such as: appropriate monitored signals, simulated signals in real time, inclusion of audible signals, presetting four scenarios and remote manipulation of vital signs.
- It consists of two interfaces: the instructor interface that allows the preparation of the scenario (Fig. 2) and the trainee interface that simulates a non-invasive vital signs monitor (Fig. 3)
- The monitor includes 3 numeric signals (heart rate, oxygen saturation rate (SpO2) and non-invasive blood pressure) and 1 graph (electrocardiogram).
- Sound signals inherent to the monitor (heartbeat) and others that can be used to give more realism to the scenario were included: baby's aspiration and crying (eg for paediatric or obstetric scenarios).
- VitalSignSIM can be controlled remotely via a wireless keyboard, allowing real-time adaptability of vital signs and facilitating the mobility of the instructor.

Fig. 2 – Instructor interface: Scenario preparation screen.

Fig. 3 – Trainee interface: Vital signs monitor.

Instructor interface: Scenario preparation screen

- In this interface, the user can:
  - Define the initial values for the different vital signs (Fig. 4),
  - Select which signals are monitored at the beginning of the scenario (Fig. 5),
  - Define the limits for the different visual alerts (Fig. 6).

- In the "Initial values" tab (Fig. 4) there are four pre-defined scenarios (normal, hypotension, hypertension and hypoxia), and it is also possible to enter other values according to the scenario to be created.

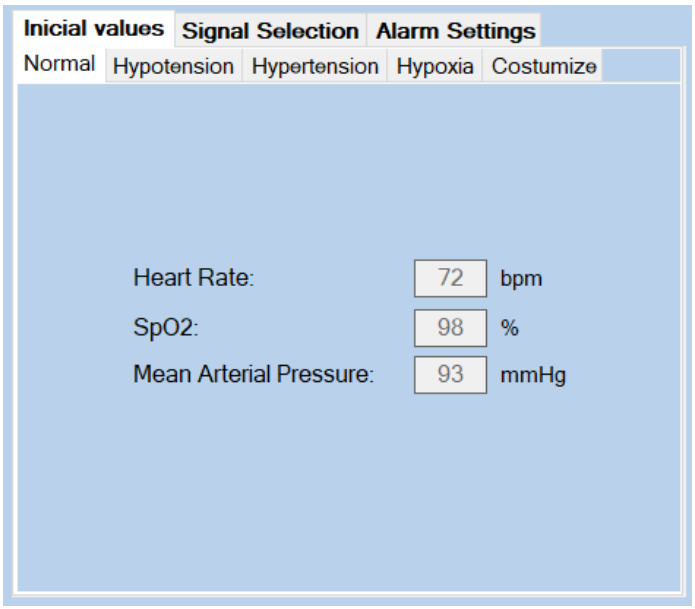

Fig. 4

- In the "Signal Selection" tab (Fig. 5) it allows the selection of which vital signs are monitored at the beginning of the scenario. Note that, during the scenario, the signals may also be turned on and off, overlapping the previous selection. The update rate for blood pressure is also selected in this tab and can be changed during the scenario.

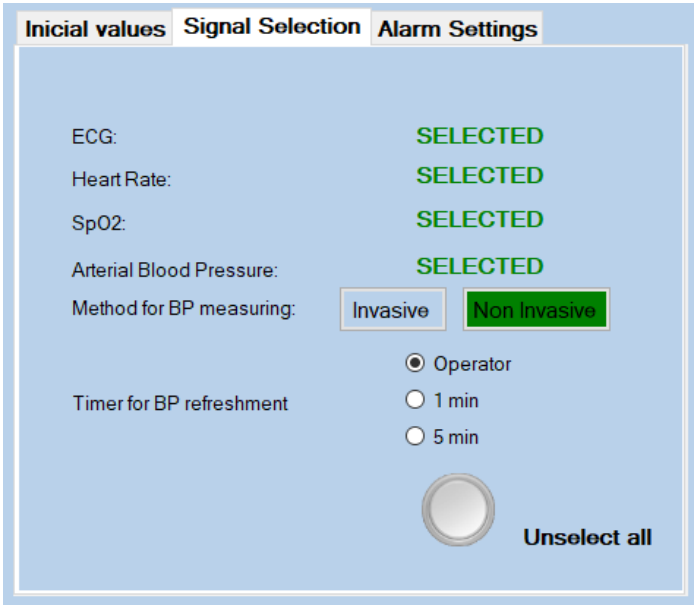

Fig. 5

- In the “Alarm Settings” tab (Fig. 6), the limits for visual alerts of heart rate and blood oxygen saturation rate can be configured. These alerts can be enabled or disabled for the scenario. Once turned on, they cannot be turned off during the scenario.

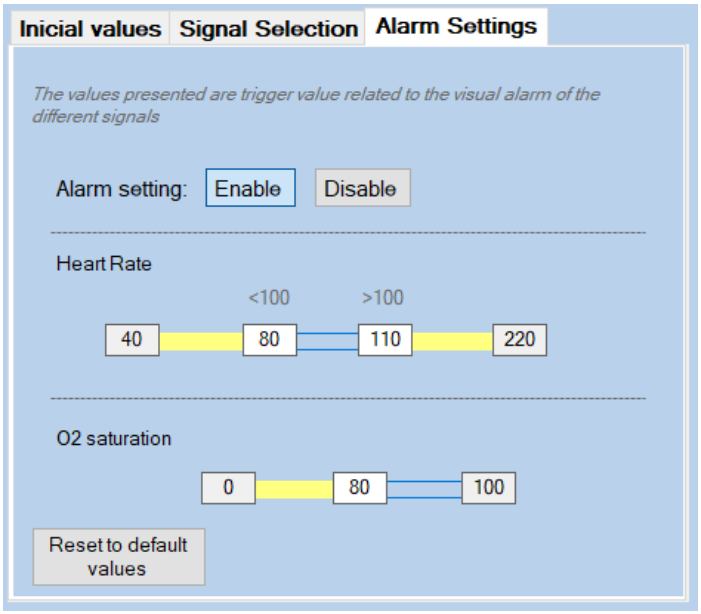

Fig. 6

Trainee interface: Vital signs monitor

- VitalSignSIM (Fig. 7) presents vital signs in numerical and graphical form. The signs presented in numerical form are: heart rate, oxygen saturation rate (SpO2) and blood pressure. The only signal represented graphically is the electrocardiogram.
- The electrocardiogram mimics 3 rhythms: sinus, asystole and ventricular fibrillation. When the last two rhythms are selected, all other signals change accordingly to preset values.
- The blood pressure update can take place automatically at intervals of 1 or 5 minutes or “on request”. With each new reading, blood pressure values will vary slightly, but always close to the values defined at the beginning of the scenario.

Fig. 7

Control and manipulation of signals

- The control and manipulation of the signals can be done directly on the computer keyboard or through a wireless keyboard (avoiding the instructor's interference in the scenario). The following table shows which keys to use and their function. Fig. 8 shows a standard keyboard with the indication of these same functions to facilitate control by the instructor.

Keybind	Function	Obs
F1	ECG	ON/OFF Function
F2	Heart Rate	
F3	O2 Saturation	
F4	Blood Pressure	
A	↑ Heart Rate	All ascents and descents are 3 units of variation.
Z	↓ Heart Rate	
S	↑ SpO2	
X	↓ SpO2	
D	↑ Systolic Pressure	
C	↓ Systolic Pressure	
F	↑ Diastolic Pressure	
V	↓ Diastolic Pressure	
G	⟳ Blood Pressure	Update of blood pressure values.
1	Baby Cry	ON/OFF Function
2	Aspiration	
Q	Ventricular Fibrillation	
W	Asystole	
E	**Manual** update of blood pressures	Changes the way your blood pressure is updated. It only works in “non-invasive” mode.
R	Blood pressures updated **every minute**	
T	Blood pressures updated every **5 minutes**	
Spacebar	End scenario	


Esc
F1 ECG
F2 H R
F3 SpO2
F4 BP
F5
F6
F7
F8
F9
F10
F11
F12
PrtSc SysRq
Pause Break
Ins
Del
Baby Cry
Aspiration
Backspace
Tab
Ventric. Fibrilat.
Assyst
Manual BP
1min BP
5min BP
Enter
Caps Lock
HR
SpO2
Sys BP
Diast BP
BP
Shift
HR
SpO2
Sys BP
Diast BP
Shift
Ctrl
Fn
Alt
End Scenario
Alt Gr
Ctrl
Pg Up Home
Pg Dn End

Fig. 8