Human-Computer Interaction (HCI) – Coursework - 2

School of Informatics
University of Edinburgh

Digital Hospital Ward

Issued on 9th October 2014
Due by 4pm, 6th November 2014.

The aim of the coursework is to design and implement a user interface for a tablet for viewing the vital signs of the patients monitored by wireless sensors in a hospital ward of the future.

The current practice in a hospital ward is for nurses to record at regular intervals clinical observations of the patient's vital signs in a chart. This data is used to compute a partial Standardised Early Warning System (pSEWS) score which when combined with observations of the patient's stimulus-induced responses results in the final SEWS score. The value of the SEWS score informs the actions of the medical staff.

Imagine a hospital ward in the future where the vital signs of the patients: respiratory rate (breaths/minute), oxygen saturation (%), temperature (°C), systolic blood pressure (mmHg) and heart rate (beats/minute), are monitored continuously using wireless sensors and transmitted to a tablet. The pSEWS score is calculated based on the figures in Table 1 [1]. For example, a patient with the following values of the parameters: respiratory rate = 29, oxygen saturation = 92%, temperature = 38.5, blood pressure = 82/65, and heart rate = 112, has a pSEWS score of 7.

Parameter	Score						
	3	2	1	0	1	2	3
Respiratory rate (*breaths/min*)	≤8			9-20	21-30	31-35	≥36
Oxygen saturation (*%*)	<85	85-89	90-92	≥93			
Temperature (*°C*)	<34	34-34.9	35-35.9	36-37.9	38-38.4	≥38.5	
Systolic blood pressure (*mmHg*)	≤69	70-79	80-99	100-199		≥200	
Heart rate (*beats/min*)	≤29	30-39	40-49	50-99	100-109	110-129	≥130

Table 1: Scores allocated to the value of each parameter for calculating the pSEWS value

Stage 1 - Patient-View - Import the compressed file **Coursework2.zip** into NetBeans on a DICE machine.

Design a user interface to display the following information for each patient: First name, Last name, Sex, Date of birth, and the five parameters listed in Table 1 displaying live data. The names and details of the patients are listed in the file **data**/**patientList.csv**.

You are required to implement the function **displayData()** in the file **PatientJFrame.java**. Record in the file **patientview.pdf** (in less than 300 words) justifications of your design in terms of HCI design principles using annotated screen shots as reference.

[Marks – 20%]

Stage 2 – Ward-View – Design a user interface in **WardJFrame.java** for a ward consisting of six beds.

You are required to calculate the pSEWS value for each patient as described previously, and use a traffic-light model for displaying the values : 0 – 1 : green; 2 – 3 : amber; 4+ : red.

An amber or red pSEWS value should alert the nurse to examine the patient's response to external stimulus, and provide the following information about the patient state in a drop-down menu (value in brackets): Alert (0), Verbal (1), Pain (2), and Unresponsive (3).

The pSEWS value is augmented appropriately based on the nurse's response in the drop-down menu, to display the full SEWS value.

The following course of actions should be displayed based on the SEWS value:

2 – 3 : "Continue routine observation"
4 – 5 : "Involve the nurse-in-charge immediately"
6+   : "Call the registrar for immediate review"

The nurse should be able to switch between the ward-view and the patient-view as implemented in Stage 1 by clicking on the representation of a particular patient.

Record in the file **wardview.pdf** (in less than 300 words) justifications for your design in terms of HCI design principles using annotated screen shots as reference.

[Marks – 50%]

Stage 3 – History-View – Design a user interface in **HistoryJFrame.java** using **jFreeChart** (www.jfree.org/jFreeChart) for displaying the parameters of a patient over the last hour as found in the folder **data/patient** in a compelling way so that nurses can follow easily data trends and salient features are highlighted. Add a button to the Patient-View developed in Stage 1 to display historical data over the last hour.

Record in the file **historyview.pdf** (in less than 300 words) justifications for your design in terms of HCI design principles using annotated screen shots as reference.

[Marks – 20%]

Stage 4 – Evaluation – Describe a strategy (in less than 600 words) with justifications (**evaluation.pdf**), for evaluating your solution with potential users and the different stakeholders.

[Marks – 10%]

Submission: The deadline for submission is **16:00, 6th November, 2014**. You should compress the following files: PatientJFrame.java,WardJFrame.java, HistoryJFrame.java, patientview.pdf, wardview.pdf, historyview.pdf, and evaluation.pdf into a single file called **hci_coursework2.zip .** Use the DICE **submit** command for submission:

submit hci 2 hci_coursework2.zip

Assessment:
Marks will be awarded for a working implementation based on a well-imagined design with clear justifications in terms of HCI design principles.
Formative feedback will be provided by the lecturer at the weekly tutorials, and help with the coursework can be sought by emailing the Teaching Assistant - Qi Zhou (s1248478@sms.ed.ac.uk).

The summative assessment with a mark and written feedback will be available by 20th **November, 2014**.

References
[1] Paterson R, MacLeod DC, Thetford D, Beattie A, Graham C, Lam S, Bell D "Prediction of in-hospital mortality and length of stay using an early warning scoring system: clinical audit. *Clin Med* 2006, **6**(3):281-284.