

# EXAM Programming of Interactive Systems

## 20/12/2013—Duration: 2 hours

Authorized material: any document in paper form.

Read the **entire** announcement. Be **clear**, **concise** and **precise**.

### A. Toolkit (3 points)

Figure 1 shows a dialog window for saving a file.

1. Identify the components (widgets) you can see here (you can rely on the names used in the Java Swing toolkit).

**Note:** Label the components directly on Figure 1 with a unique letter and a line pointing to it, as we did below with the “Save” button (letter A), and reference them with that letter on your exam sheet. Hand this page in at the end.

2. Identify the event listeners for the components that need one and specify the most precise event they are listening for. For example *MouseClicked* is less precise than *ValueChangeEvent*. (even if you do not know the precise name of the event listener, explain the type of events it listens for).
3. For each event listener, explain briefly what is their purpose in the interface with respect to other components (in plain english or pseudocode). We suppose that you can access the values of all components on this dialog window.

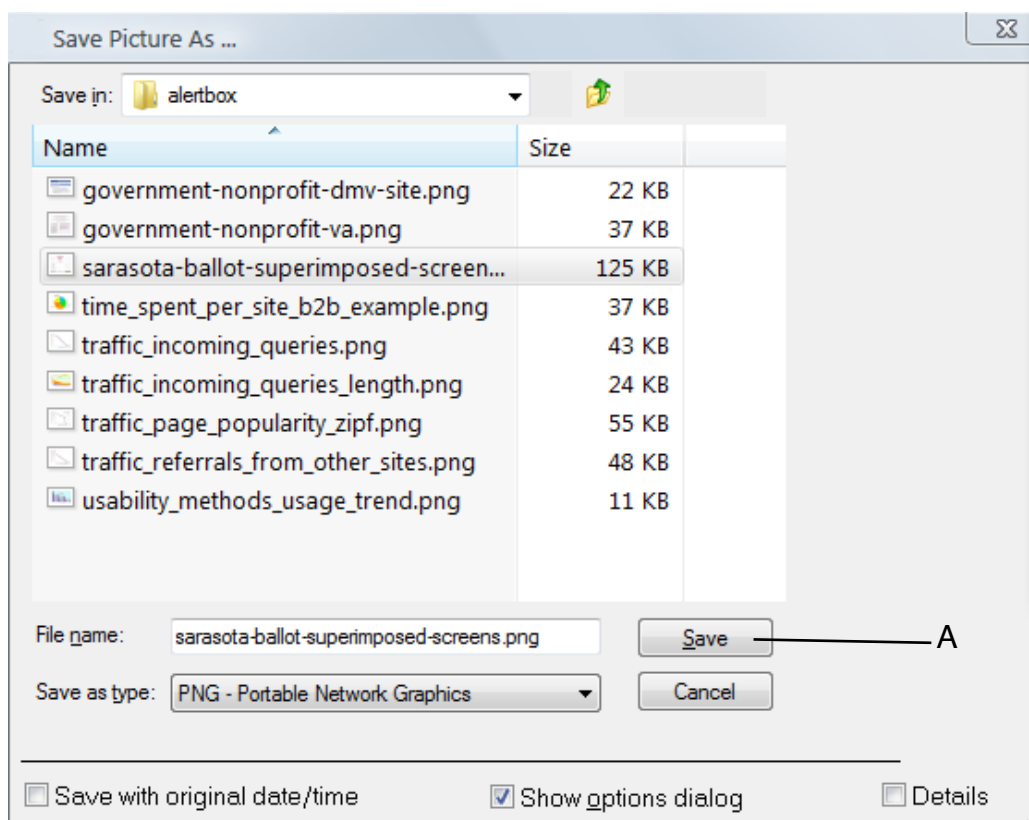
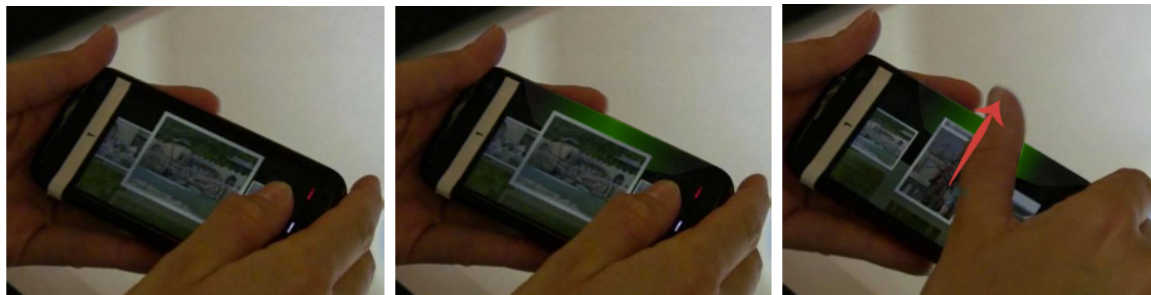


Figure 1—Save dialog

## B. MVC (4 points)

A user wants to share photos on his mobile phone with colleagues sitting around an interactive table. We can envision a variation of the interaction technique proposed by [Chehimi & Rukzio, 2010]. When the user comes close to the table a Bluetooth connection is initiated between the phone and the table and the user can see a halo on her phone indicating a zone that can be used to communicate with the table. The user can flick photos in their mobile phone towards that zone. Once a photo slides off the phone edge it disappears from the mobile and appears on the table. The transfer to the table consists of copying the flicked image to the table through the Bluetooth connection.

1. How would you implement this technique? Present a diagram indicating how the technique functions using the MVC model.  
(suggestion: identify the main points of the algorithm and the technique, and explain in which part of the MVC model they need to be treated).
2. Do you see problems with this technique as it is described? Explain.



*Figure 2— In this example a user is approaching a digital table with their mobile. A halo appears at the edge of the mobile. The user can flick the image towards the halo. When the image slides off the edge of the mobile it disappears and reappears on the table.*

### C. State machines (4 points)

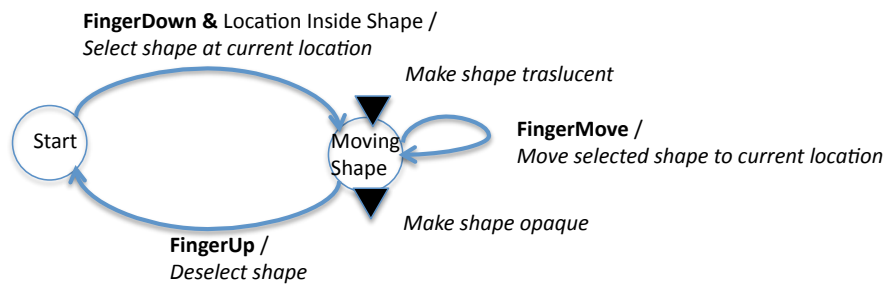
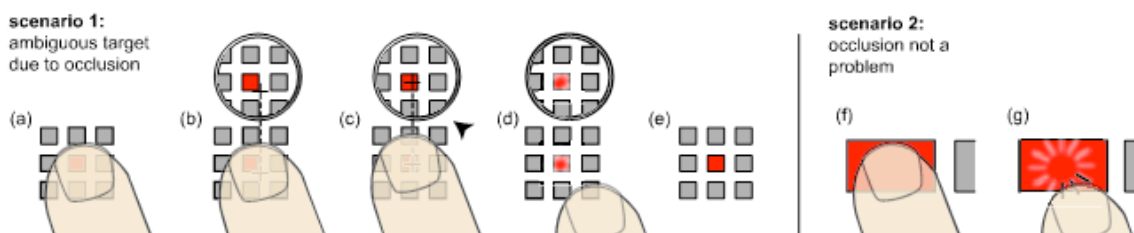


Figure 3—Example of a state machine describing the dragging of a shape in a touch interface.

In this exercise, we ask you to describe state machines graphically. The actions should be described in pseudocode. Variables and functions can be introduced as long as their meaning is clearly defined. Figure 3 shows an example of graphical representation of a state machine. Circles represent **states** and arrows represent **transitions** between them. Transitions are fired when an **event** (in bold, FingerDown, FingerUp and FingerMove) occurs and if an optional condition, called **guard** (after the “&”), is fulfilled. **Actions** can be associated to transitions (after the “/”) or when entering or leaving a state (black triangles).

In CHI 2004 Voget et Baudich introduced Shift, a technique for selecting small targets on a touchscreen that are occluded by the user’s finger (next Figure). When the user touches the screen, Shift creates a callout showing a copy of the occluded screen area and places it in a non-occluded location. The callout also shows a pointer representing the hotspot (center) of the finger. Using this visual feedback, users guide the pointer into the target by moving their finger on the screen surface and commit the target acquisition by lifting the finger. Over large targets, in contrast, no callout is created and users use their screen normally.



You can assume the existence of a list of all objects `shapeList[]` and the functions:

- `boolean inside(x, y, shape)` that returns true if point located at (x, y) is inside object shape.
- `boolean shape.isLarge()` that returns true if a shape is large enough to not require the invocation of Shift.
- `void callout(int center_x, int center_y, int pos_x, int pos_y)` that creates a visual callout of the screen centered at center\_x,y and places so that at position pos\_x,y.
- The event Timeout can be called after n milliseconds after the `Arm(n milli-sec)` function is called.

1. Propose a state machine for the Shift interaction. Do not forget the pointer interaction inside the callout, and to give visual feedback for selected objects.

#### D. Design (5 points)

1. An elevator panel will require buttons for 4 floors (parking, main floor, second and third floor), door open, door close, stop, and activate emergency intercom. Propose a design for these buttons. Draw them in a single *horizontal* row. Use the psychology principles (gestalt laws) of *similarity* and *proximity* to help users. Explain your choices given these principles.
2. The interface for a typical elevator is still based on physical buttons that allow the user to select a specific floor, hold the door open, close the door, or ring the alarm bell. With the price of flat panel displays dropping, it is possible that in the coming years we will see touch screen LCD panels replacing the existing designs.
  - a. What are the advantages of completely replacing an entire typical elevator button panel with a touch-screen LCD panel?
  - b. What are the disadvantages of that complete replacement?
  - c. Suggest a hybrid design combining the current interface and an LCD touch screen that maximizes the advantages and minimizes the disadvantages.
3. You drag a folder to make a copy of its contents. A shadow of these contents appears on the screen showing files moving together to the new folder. Which design principles and psychology principles do you see in the example?

#### E. Evaluation (4 points)

Examine the following interface for a drag prescription refill.

1. Critique the interface using 3 usability criteria (you can choose which ones).
2. Redesign the interface to fix these problems.

The screenshot shows a web form titled "Prescription Refill Service". The form has a blue header bar with the title and a small logo. Below the header, the main title "PRESCRIPTION REFILL SERVICE" is displayed in large, bold, black letters. The form contains several input fields: "Your name:" with a text box, "Date: \*\*" with a text box, "Doctors Name:" with a text box containing "Dr.", and "Medicine Name:" with a dropdown menu. The dropdown menu is open, showing a list of medicines: Prozac, Claritan, Allegra D, Singulair, Propecia, Viagra, and Paxil. At the bottom left, there is a note: "\*\* Use MM/DD/YYYY". At the bottom right, there is a "Submit!" button with a colorful, multi-colored circular icon next to it.