CSE321   Project 3

Objective: To apply the embedded and real-time systems concepts learned in the course.

This is a demonstration project that includes a presentation of your completed project. For this project you will work in groups of two.

What to do?

1. Choose your group members. At most two in a group.
2. Given the limited time, you have been given a choice among three types of demonstration project : (i) Android Application, (ii) Scribbler Robot project and (iii) Arduino ; We will be able to provide Scribbler or Arduino, one per team. (Note: some other embedded systems have been suggested: Raspberry Pi and Texas MSP by students. You are also welcome to use these provided you can support yourself for technical details.)
3. Android Application: Choose an application based on the online material available and Panya's demo material. There are several very good resources available online for Android application development (including the ones on YouTube).
4. Scribbler Robot Application: we have about 18 Scribblers; that will accommodate about 9 groups. More people can choose to work on the Android project, however the number of groups that will work on the Scribbler is limited by the resources that we have unless you want to buy the units yourself.
5. Material on Scribbler is available here: http://cs.brynmawr.edu/~dkumar/Myro/Text/June09/PDF/LCRJune2009.pdf Unlike Android resources this may be the ONLY resource available on Scribbler.
6. For the Scribbler and Android project you CANNOT repeat projects from last year.
7. We will be using Arduino Uno hardware; For Arduino details look at the link: http://arduino.cc/en/Main/Software ; This page has download details and also details of many examples. Go through the examples before deciding on your problem. (For example, do not repeat "blinking LED" as your project.)
8. You will have to get approval for your project idea either from Panya or myself. I want the ideas finalized by this Friday (11/16) class time.
9. Once the idea is approved you will work on the project design, implementation and presentation and the documentation (in the form of Report).
10. You will submit the presentation and the report online for grading.
11. Your presentation should include a Classes, Responsibilities and Collaboration (CRC) diagram of how you divided the responsibilities of your project among the team members.
12. Your report should include a Use Case diagram and a class diagram explaining the design of your application.
13. Your grade will be based on completion of your project, presentation, and your report.
14. Also part of your project 3 grade will include grade for attending the presentation by others.
15. The presentation will be short about 5 minutes, and will be during the week of 12/3 in class and during recitations; we will plan the order of presentation soon.
16. Finally, the due date for the submission of the Report and presentation online is: 12/10/2012.

What to do with Arduino?

1. Once the Arduino development Env. is installed, go to Getting Started in the Help menu, to upload and run a sample program, "LED Blink"; observe the *setup* and *loop* functions. *Setup* function is used to initialize the conditions and *loop* function is the cyclic executive.

2. Understand the Arduino Uno hardware on the board.

See http://docs-asia.electrocomponents.com/webdocs/0e8b/0900766b80e8ba21.pdf

3. Look at File → Examples and run the many examples that are provided with the IDE.

4. Understand the Sketchbook concept and also sketches.

5. Arduino Uno (R3) is connected via USB port and the File→Upload is used to load the "Sketch" into the board.

Arduino Hints:

Here are some links for Arduino:

1. http://arduino.cc/en/Guide/HomePage

2. http://arduino.cc/en/Main/Software (get the Arduino IDE software from here)

3. http://mattters.com/science-projects/news/tft01-arduino-lcd-shield-in-stock

4. http://www.meetup.com/buffalolab/members/1627521/

5. http://arduino.cc/en/Reference/HomePage

6. http://web.cecs.pdx.edu/~EAS199/A/notes/06/whats_this_void_loop.pdf

7. http://docs-asia.electrocomponents.com/webdocs/0e8b/0900766b80e8ba21.pdf

8. http://web.cecs.pdx.edu/~eas199/A/topics/pdf/PWM_output_Arduino.pdf

9. http://www.ladyada.net/library/arduino/unofaq.html

10. http://randommusicdesign.blogspot.com/

(I had some difficulty initially and this was the solution that I found online; This may not be the case for you. This is may be a solution for a problem that you may or may not encounter).

"If your computer doesn't recognize your Arduino and won't install the proper drivers, this fix may work. I used it for my Arduino UNO with Windows 7 64-bit, so steps may vary for other devices and operating systems. I'm writing this from memory so sorry if there are some gaps.

1) Go to the "Unknown device" which is the Arduino.
2) Click around in the "Hardware" tab to open a window with the "Update Driver" button on it. Click it.
3) Choose the option to find the driver from a list on your computer. Then choose "Let me pick from a list of device drivers on my computer".
4) Scroll down and choose "Ports".
5) Choose "Arduino LLC" and then "Arduino UNO". If there is no "Arduino LLC" option, follow the steps below:
a) Click the "Have Disk" button.
b) Point to the Arduino folder, then to the "drivers" folder, then select the .inf file for your particular device (In my case it was Arduino UNO.inf).
6) Install the driver. Ignore any warning messages about verification of publication.
7) The Arduino should now be listed as a COM port instead of an unknown device. In the IDE click Tools > Serial Port and select the new COM port. In my case it was COM5.")

Scribbler Details:

The Scribbler robot is from Parallax, and its host language is BASIC. The attachment of a Fluke and Bluetooth connectivity, along with IPRE IDE for Python gives you the ability to program in the robot in Python. The component list you will get include:

1. Parallax Scribbler Robot
2. Its CD
3. IPRE CD
4. Fluke
5. Bluetooth Dongle
6. (you will have to buy batteries, if the batteries they come with don't work)
7. A small instruction manual for IRPE/Python interface

You will have to design a sophisticated project that utilizes the capabilities of the items listed above.

Android details:

If you are using Java and ADK, make sure you have three tiers: front-end, persistence layer accessible through SQLLite and cloud deployment on Google Cloud Services (free for basic deployment).

You can use Java and ADK or C/C++ and Native Development Kit (Thanks to Brian Wilcox) for pointing this out. (I heard from him that many in the class including Dan are currently using NDK /C development on Android). Let me quote Brian here:

"The NDK allows you to code C / C++ on Android and allows you to work with the hardware more directly. Otherwise Android is pretty similar to plain Java coding.

http://developer.android.com/tools/sdk/ndk/index.html "