**Assignment SEE 3223 Microprocessor**
**Semester: 2012/13**
**Academic Session: I**


**TITLE** : _____

**NAME** 1 _____
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*\* Submit your title and group members to me by 7<sup>th</sup> November 2012*

Develop an embedded system using AVR ATMEL32 or other microcontrollers you can find (PIC, Arduino, Motorola, Philips, etc). The system can be of any applications and must include ALL of the following specifications:
  i. **INPUT**: can read from peripheral device (i.e. digital inputs, analog, serial, etc)
  ii. **OUTPUT**: can produce output (i.e. LED, seven segments, LCD, motors, etc).
  iii. **INTELLIGENCE**: involves some simple algorithm or intelligence according to the purpose of the system. For example, the system can be 'an intelligent lift', 'automatic car parking counter', 'electronic dice', 'smart home', etc.

You have to construct the complete circuit either using *AVR ATMEL32* or **use other microcontroller** but on your group own expenses. You may expand the circuit using either proto-board or solder all the components on a strip board.

Your group has to submit a report prior to the demonstration. Your report should not be more than 5 pages and consists of **Introduction, Problem Background, Objective, Methodology (Design specification, Hardware design and Software design), Results** and **Conclusion**. Please append your **Circuit diagram**, l**ist of components** and **codes**.

Finally, your group has to present and demonstrate the system in 10 minutes (7 minutes presentation + 3 minutes Q&A). The presentation is tentatively scheduled on **3<sup>rd</sup> December** or 24<sup>th</sup> December 2012. Table 1 shows the marks allocation for Report, Presentation and Demonstration.

Table 1: Marks allocation

|  | Marks |
|---|---|
| Report and Presentation | 60 |
| Demo<br>*Simulation (AVR Studio) (max 30)*<br>*Actual embedded system (max 40)* | 40 |

**Guideline**

1. Identify what microcontroller you want to use. Suggested options:
   i.  AVR Development Board (http://www.ebay.com/itm/AVR-development-board-for-ATmega32-mega32A-mega32L-kit-tool-/130762625261?pt=LH_DefaultDomain_0&hash=item1e720f50ed)
   ii. Arduino (www.cytron.com.my)
   iii. PIC (www.cytron.com.my)
   iv. Any microcontroller start kit you can find in FKE's laboratory
2. Construct your system (you may start with a simple system first, i.e., blinking LEDs). You may construct and decorate your system as creative/interesting as possible. For example, you may construct a small model home to show how 'smart lighting system' works.
3. Write your program, compile and download the machine code in your embedded system.
4. Run it and go back to step 3 if improvements are required.
5. Prepare a presentation slide to explain and describe your system. The presentation should include Introduction, Problem Background, Objective, Methodology (Design specification, Hardware design and Software design), Results (Demo) and Conclusion.
6. All expenses are to be borne by your group members.

| | |
|---|---|
| Inputs | Switch, keypad, IR, thermometer, force sensor, LDR, rheostat, encoder, DIY input, smoke, adour, compass, etc |
| Outputs | LED, LCD, Seven segment, DC motor, Servo motor, Stepper motor, Buzzer, GSM, wireless, etc |

*Past project:* **3D LED Cube powered by Arduino**
*http://www.youtube.com/watch?feature=player_embedded&v=lfLtEOxgtwo*

*Prepared by Dr Yeong Che Fai*
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