

Medical Electronics III - 2007
Project #2
Due Date: February 21, 2008

Part I: Find practical part numbers and data sheets for the following components:

1. Mechanical relay
2. Solenoid valve
3. Solid state relay
4. Analog multiplexer
5. Tri-state buffer
6. Latch
7. Thermistor
8. DC motor
9. Brushless DC motor
10. Stepper motor
11. Optical switch
12. Optical isolator
13. Hall effect sensor
14. Mechanical switch
15. TRIAC
16. Parallel ADC
17. Serial ADC
18. DAC
19. Static RAM
20. Serial EEPROM
21. FLASH memory
22. LCD display

For each part, you should provide the following information:

- a. Part number, supplier, and price
- b. Data sheet
- c. Schematic diagram for its interface with a microcontroller
- d. Pseudo-code or state diagram for its microcontroller interfacing
- e. Embedded C code for its microcontroller interfacing
- f. Summary of potential applications

PART II: Consider the comparison between different microcontroller families. In particular, consider the microcontrollers based on 8051, PIC, and ARM cores.

1. Compare their prices and availability
2. Compare their development tools
3. Compare their technical hardware specifications. (i.e., what features they have in common and what features distinguish each family)
4. Compare their instruction sets
5. Provide your opinion about which you prefer and why.

PART III: In the second part of this course, you will be required to do a practical project using a microcontroller. In this project, you are required to provide a detailed description of the setup you will be using to do that. In particular, describe the following:

1. The part number of the microcontroller you will be using and its availability
 2. The schematic diagram for the microcontroller part
 3. The Development tools you will work with (kit, programmer, etc.) and its availability
 4. The development cycle (i.e., the process of coding, trying, debugging and fixing code).
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Part IV: Design the following microcontroller based medical devices:

1. ECG monitor
2. Infusion pump
3. Digital balance
4. Pacemaker

Each design should have the following components:

- a. Block diagram of the system
 - b. Your selection of practical components for different parts
 - c. Schematic diagram of the circuit
 - d. Your high-level description of the software (i.e., state diagram or pseudo-code)
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Notes:

1. All reports must be submitted in electronic format (preferably PDF).
2. Assume any missing information or specifications.
3. Please be concise and avoid including multiple selections for the same task. As an engineer, you should be able to select only one option that you feel best suits your application. Providing several options shows your inability to make a decision.
4. One report is to be provided by each group.
5. Provide a list of references/sources of information for each part of the project.
6. All groups must stay away from plagiarism and maintain a high standard of ethical conduct in their project preparation.

Best of luck!