


Project - Thermometer

Lab  12:30 W  2:00 W  3:30 W  
 Section  11:00 F  12:30 F

TA/Instructor initials: \_\_\_\_\_



Item	Outcome	Score	Max.
Thermometer Operation (15 points)			
Checkpoint 1			
• Splash screen with student's name	Yes/No		1
• Temperature sensor responds to temperature changes, displays on LCD	Yes/No		3
• Temperature display changes in 0.1 degree steps	Yes/No		1
• Deduction for late check-off (-2 for 1 day late, -4 for 2 days late)			
Checkpoint 2			
• Servo motor adjusts indicator to point at correct temperature	Yes/No		2
• Rotary encoder can adjust threshold between 50 and 90 degrees	Yes/No		1
• Threshold stored in EEPROM and retrieved when restarted	Yes/No		1
• Red and green LEDs operate including blinking	Yes/No		1
• Buzzer sounds warning if temperature too high	Yes/No		1
• Deduction for late check-off (-2 for 1 day late, -4 for 2 days late)			
Checkpoint 3			
• Thermometer sends local temperature to remote thermometer	Yes/No		1
• Thermometer receives remote temperature and displays on LCD	Yes/No		2
• Buttons can select which temperature to show on the servo's dial	Yes/No		1
• No late check-offs allowed			
Code Organization (15 points)			
• Code is indented properly and includes comments	Yes/No		1
• Program broken into separate files based on function	Yes/No		1
• Correctly initializes appropriate I/O ports	Yes/No		1
• EEPROM data checked for valid value	Yes/No		1
• DS18B20 routines are correct	Yes/No		2
• Temperature calculation ( <b>no FP</b> , uses fractional degree C)	Yes/No		2
• TIMER2 used correctly for PWM signal	Yes/No		1
• Buzzer and LED blinking uses timers for delay	Yes/No		1
• USART receiver uses ISR properly	Yes/No		1
• Review Question 1: Cost analysis provided and reasonable	Yes/No		2
• Review Question 2: Sensible and well-thought-out response to potential reliability issues and mitigation	Yes/No		2
Open ended comments:			

## Review Problems

1. Cost Analysis: Assume we are building 1000 units of this system. Use the provided part numbers (see the webpage) and the digikey.com or jameco.com website to find the total cost per unit (again assume we build a quantity of 1000 units) for these thermometers. Itemize the part costs (list each part and its unit cost when bought in units of 1000) and then show the final cost per unit below. Note: You only need to price the components used in the project (not all the components in your lab kit. Also, you do not need to account for the cost of the circuit board or wires. In a real environment we would manufacture a PCB (Printed Circuit Board). As an optional task, you can search online for PCB manufacturers and what the costs and options are in creating a PCB.
2. Reliability, Health, Safety: Assume this system was to be sold to consumers for use at their home.
  - What scenarios might you suggest testing (considering both HW and SW) before releasing the product for use?
  - How might you make your design more reliable? By reliability we don't just mean keeping it running correctly (though you should consider that), but also how you can detect that a connected component has failed to gracefully handle such situations. You can consider both HW and SW points of failure, issues related to the operational environment, etc. and how to mitigate those cases. and how to mitigate those cases.