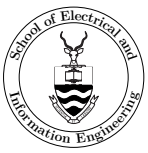

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
School of Electrical and Information Engineering
ELEN2006 Microprocessors

PROJECT: Microcontroller Water Temperature Monitor

1 Introduction

Setting the correct shower temperature when first opening the hot and cold taps is an art. If one applies too much cold water, an unpleasant surprise awaits and if too much hot water is present one may be burned. On cold days, spending time on the iterative process of adjusting taps and feeling the water temperature is a tedious process.

A microcontroller based temperature sensor that has a colourful LED indication of the water temperature is a possible solution to this predicament. For added value, a readout of the precise temperature on a 7-segment display is beneficial to setting an energy efficient geyser temperature.

2 Requirements

You are required to implement this temperature display device by using a thermistor, a two digit 7-segment display and a RGB (Red, Green, Blue) LED for temperature indication.

The colour of the LEDs should indicate to the user the temperature of the thermistor (and therefore the water it may be submerged in). The actual temperature should also be shown on the 7-segment displays.

The coloured LED intensity should be controlled using PWM in order to interpolate from blue (too cold) through green (good temperature) towards red (too hot).

It is critical that the performance of your device is adequately quantified in your report. Marks will be awarded based on the accuracy of the temperature measurement and the smoothness of the colour interpolation.

The laboratory testing will entail dipping the thermistor into water with different temperatures and observing the colour of the RGB LED and comparing the actual temperature with that displayed.

2.1 Deadlines

The project is constrained by the following deadlines:

- 18^{th} September 2015 - Laboratory testing and code submission.
- 21^{th} September 2015 - Report hand in (electronic submission, 07h50 deadline).

3 Assessment

The report is to be submitted electronically (**only in pdf, maximum 5 pages**) and counts for 75% of the project mark. The laboratory testing, which verifies the operation of your device, accounts for the remaining 25%. Circuit quality is assessed in addition to the operation of the device. The assessment report is attached.

END

University of the Witwatersrand, Johannesburg
School of Electrical and Information Engineering
ELEN2006 - Microprocessor Engineering

Ver 4.3

COURSE PROJECT ASSESSMENT FORM
(INDIVIDUAL SOURCE CODE AND REPORT)

Student Name:
Student Number:

Final Mark:
(NB: Late?)

	Unacceptable	Poor	Acceptable	Good	Excellent	Brief description of outcome	Justification for outcome rating if NOT rated *Acceptable*
Background & Problem Understanding						Identification of requirements, assumptions, success criteria and constraints. Contextualisation with respect to relevant literature and existing solutions.	
Quality of Engineering Output						Quality of output achieved (functionality, maintainability, reliability). Evidence of insight, originality or attention to detail. Application of appropriate engineering methodology to arrive at output.	
Critical Analysis & Evaluation						Validation and critique of final output. Discussion of tradeoffs. Recommendations for future work and possible improvements.	
Technical Communication						Quality as a professional & technical document: target audience; logical structure; style, language and tone; support material (graphical/tabular/math); Format; citation & referencing.	

Rating	General Interpretation
Unacceptable	No evidence provided; invalid/irrelevant approach, method, execution; completely flawed.
Poor	One or more major flaws, otherwise complete; one or more components very poor.
Acceptable	No more than minor flaws, otherwise complete; no distinguishing features.
Good	Shows insight; some distinguishing feature(s).
Excellent	Exceptional insight and multiple distinguishing features.

All outcomes are weighted equally.
If any outcome is rated Unacceptable*, then the overall mark will be capped at 40%.*

Late Submission *(Penalty on Final Mark)*	**Submitted deliverables late?**
	Within 1 Hour: -5%
	Before 16h30: -15% **Penalty:** 0
	See School policy on late submissions.

Mark Adjustment *(Examiners Discretion)* ±2%	

Examiner's Overall Comments:		**Date:**	
		Signature:	