Hand-in date: 6 February 2015

14ELC018 Real-time software engineering
Task 2 Washing Machine Device Drivers (30%)

Introduction

Working in groups and using the techniques learned in the lectures and laboratory sessions, you are required to write code to implement C++ device drivers and demonstrate their operation on the STM Discovery board in the control of the Bytronic washing machine simulator.

Documentation has been supplied on the Learn Server that includes the following.

- Bytronic washing machine operation.
- STM32F3 Discovery Board user and reference guides.
- A set of project files (these are the ones provided for the washing machine laboratory) as a starting point for your code.

Specification of the task

Write a complete set of device drivers written in C++ for the individual units on the washing machine, namely the buzzer, motor on/off, motor direction of rotation, seven-segment display, the door switch and the accept, cancel and program select buttons. You should also implement a timer class to allow the washing machine cycles to be timed in task 3.

You will also need to develop suitable classes to represent the board level devices you need for the project (this will principally be the input/output ports).

Your device drivers will need to include appropriate members and member functions that will allow the washing machine application to be written in task 3 to be as independent as possible of the details of the underlying hardware implementation. In turn, the device drivers should also be largely independent of board-specific classes, so as to make it as simple as is possible to re-map the drivers to an alternative target platform.

For this task, application code should also be provided to demonstrate in a user-friendly way the functionality of the device drivers. This should allow a user unfamiliar with your code easily to test the full range of the operations of your individual device drivers. The writing of the full application code that implements the high-level operations of the washing machine is not needed and this will form part of task 3.

You should start with the source code provided on the Learn server for the washing machine laboratory. All of the code you develop must be fully object-oriented and all source files placed in the `Src` directory and all header files in the `Inc` directory of the project.

Deliverables

1. A report submitted electronically to include the following.
   - Title page.
   - Standard cover sheet.
   - A brief introduction to the task, how to interact with the code and any shortcomings in its operation.
2. A full set of ARM-MDK project files submitted electronically in a zip file.
3. A live demonstration of the code being executed (on a later date to be determined).

Marking scheme

Device driver implementation (15%). Test software (5%). Commenting and structure of the code (5%). Live demonstration (5%).