

## ELD522/ELP052 Embedded Software Development

### Task 1 - Investigation of software quality

The aim of the coursework is to investigate the quality of existing software that has developed for a specific application.

#### The application

Surface texture assessment is one of the most popular means available for investigating and predicting the physical effects that occur at a surface boundary or when surfaces come into contact. To carry out surface texture assessment, it is normal practice to process data acquired by a surface texture instrument (Fig. 1) in order either to determine statistical parameters or to obtain a frequency spectrum analysis of the data collected.

A surface texture instrument produces an analogue of the surface texture by amplifying the vertical deflections of a stylus of approximate radius  $5\mu\text{m}$  which is traversed across the surface. There is normally the ability to specify both the number of data samples acquired and the vertical magnification (or gain).

#### The software

The program is able to calculate parameters and frequency spectral data obtained from a surface texture instrument. The program is menu driven, with the following options.

*Load data from file* It is assumed that the data have been captured from the surface texture instrument and stored in a file. The format of the text file is that the first parameter is the vertical magnification used (there are eight options specified as an integer in the range one to eight) and the number of samples (here there are three options specified as an integer in the range one to three). The remaining entries are the surface texture data itself.

*Calculate the frequency spectrum data* This option calculates the Fourier transform of the data from which the frequency spectrum data are then derived.

*Save the spectral data* This stores the calculated frequency spectrum data in a text format file.

*Compute parameters* This calculates and displays the surface texture parameters.

On the Learn server, you will find the zipped project files, consisting of C source files and a Makefile that is able to build an executable under Linux and Cygwin. A number of data files captured from the surface texture instrument are also provided.

#### Task

You should produce a short technical report that describes your assessment of the quality of the given software. You should assume that you have been given the software with the purpose of recommending whether it should be sold commercially. You do **not** need to carry out tests on the code, debug the code or produce an improved version.

The report should contain (but need not be limited to) the following.

- You should include a clear introduction which sets out the contents and purpose of the report.
- Discuss software quality and how it can be assessed. Set out what the quality requirements should be for this type of software and outline what tests should be performed.
- Consider what would be a suitable set of tests to generate measurements. How would you analyse the results that would be obtained from the tests?

- Comment on the reliability of the whole system and subsystems, making reference to the code itself.
- Provide a conclusion that summarises the findings and recommends a course of action that the company you are advising should follow. What would be the advice to management about whether the embedded software is suitable for commercial use?

## Assessment

A strong report should:

- be compact and present information systematically;
- include methods from the lecture material and other documents you may find;
- wherever possible and appropriate, cite documents that back up your assumptions.

The task can be carried out individually or in groups of two. This piece of coursework is worth 20% of the module marks. The assessment will be based on the following criteria.

- Introduction, conclusions and recommendations (6%)
- Approaches available for assessing software quality (4%)
- The suitability of these approaches to the practical assessment of the given software (8%)
- Presentation and structure (2%)

## Deliverable

The report should be produced individually and be no more than 1000 words in length. The report should be submitted in pdf format to the Learn server by the date specified.



**Fig. 1** Talysurf surface texture instrument