Task Example

Air Flow Alarm for Flextraction

Phasor Design

Task Outline

Phasor Design was commissioned by Flextraction Limited to assist in the development of an airflow alarm. Local Exhaust Ventilation (LEV) systems are necessary to maintain safe working conditions by dust extraction and fume extraction in the workplace. Over time the efficiency of these systems may reduce by, for example, filtering becoming blocked or hoses becoming fractured. An audible alarm to alert the operator to the presence of reduced air extraction efficiency was required.

The project was part of a Knowledge Transfer Partnership (KTP) with de Montfort University in Leicester and was part funded by the European Regional Development Fund (ERDF).

Background

An accurate, robust and low cost method of measuring airflow had to be developed as a necessary first step. By bringing together air movement expertise with Flextraction, product development skills from de Montfort University and electronics know-how from Phasor Design the solution was found with complete material costs around £50.

Careful characterisation of operating systems was carried out by staff at Flextraction to ensure a reliable method of detection was possible.

Battery performance

A key requirement was battery performance. The following issues arise:

- Battery life should be adequate – a two-year life was the target.
- Low battery and failed battery states should be indicated to the operator.
- Battery replacement should be easily achieved.
- Battery cost should be acceptable.
- Recycling of batteries should be possible.

Embedded software

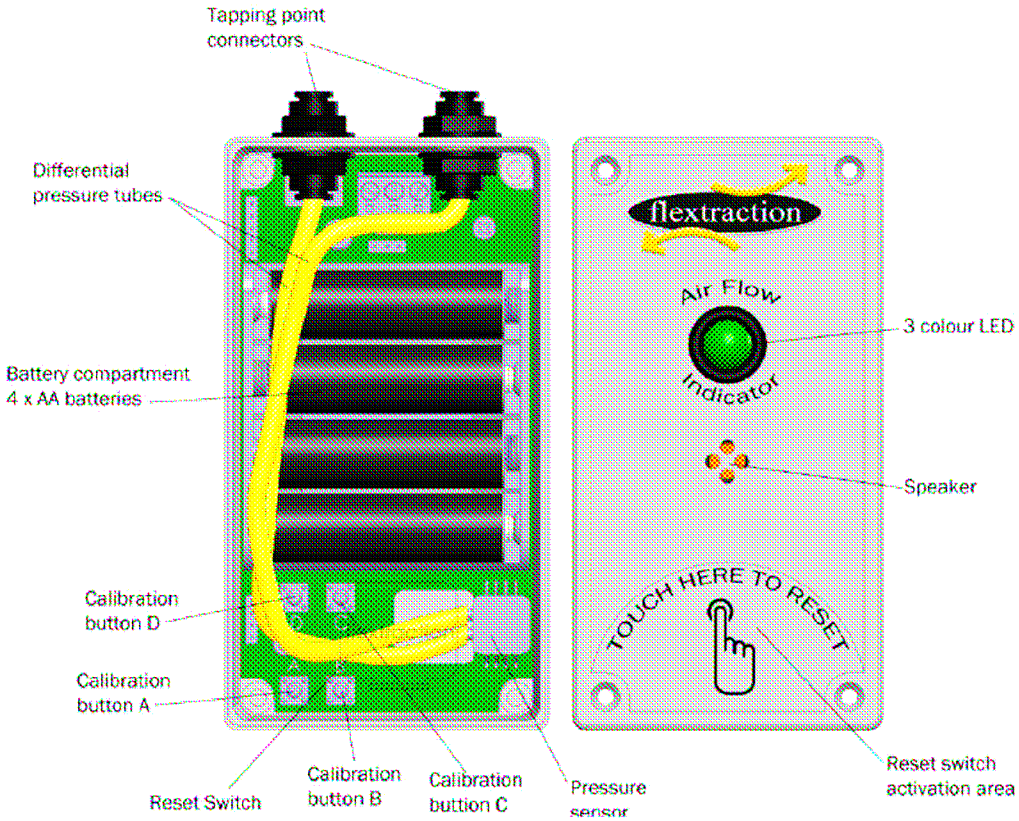
A significant portion of the development effort was in embedded software. An eight-bit microcontroller with integral analogue to digital conversion is the heart of the system, which measures airflow, carries out signal processing on the measurements, and manages the battery. Additional features include driving the sounder and operating the capacitive sensor switch.

The use of a capacitive sensor to reset the unit avoids piercing the case, which may allow ingress of dust etc. It also avoids the cost of a robust switch, which would have added to the cost.

The requirement for signal processing to remove spurious signals became clear during development. By experiment it was found that the sensor was capable of resolving high frequency variation in pressure. These variations obliterate the wanted signal, which can only be resolved by careful analysis. This aspect of the project was unexpected and illustrates the nature of product development where key features become visible only after initial work.

Conclusions

The airflow alarm was realised as a product, which is now in production. Acceptably low production costs where achieved in industrial volumes.



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For more details contact:

Simon W Day
Phasor Design

14 The Crescent,
Market Harborough
LE16 7JJ
UK

+44 1858 432148

swd@phasor-design.uk.com

www.phasor-design.uk.com

Michael Marsden
Head of School
School of Design
Faculty of Art, Design and Humanities

De Montfort University
Leicester
LE1 9BH
0116 2577530

Email address: mmarsden@dmu.ac.uk