

An Experimental Thermistor Blanket

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The location of warm objects like humans and coffee cups is the subject of research areas as disparate as Sudden Infant Death Syndrome (SIDS) studies, intelligent homes and ergonomics.

Figure 1 shows that we have been working on is the prototype of a larger proposed one that would detect the presence of infants who are bed-sharing with parents. To test this idea out we have inserted thermistors into a grid on a rectangle of woolen material. Wool is a good insulator and does not melt when drops of solder are accidentally spilled. The pattern helps us to maintain our grid dimensions. A ribbon cable connects the thermistors to a socket leading to an analogue multiplexer which in turn is connected to a computer via an analogue to digital IC.

The resistance and hence the temperature of each thermistor is determined via look-up tables in the computer. The position of each thermistor is determined by a unique port number. Hence the position of the warm object can be determined from the relative heats of adjacent thermistors.

On a large blanket lying on a mattress the position of an infant can be readily determined and hence gross movements tracked over each sleep. We are currently initially testing to determine the effectiveness of this method. A smaller version of this blanket reliably determined the position of a cup filled with warm water anywhere on the small textile rectangle.

This thermistor blanket has been stimulated by a study at our polytechnic's nursing department

is trying to see if there is a relationship between bed-sharing and Sudden Infant Death Syndrome. Currently the relative positions of the mother and infant are determined by infra-red cameras. Our thermistor method is an attempt to provide a less invasive way of determining their relative positions over a night's sleep. By storing values related to average distance between the subjects we might be able to assist in the SIDS study.

This thermistor blanket is a result of a direct collaboration between the IT and Fashion Schools at Otago Polytechnic. The use of conductive thread is a recent breakthrough emanating from the textile experts.

Note the thermistors are there to measure presence or absence of warm objects against a colder ambient temperature. They are not reliable enough to measure temperature directly.

Advantages:

- Inexpensive
- Non-invasive

Disadvantages:

- Cludgy, wires everywhere, thermistor readings tend to drift all the time



Figure 1:
**Portion of prototype thermistor blanket
(underside shown) (Sandy W. model)**