Tympanic Temperature Monitoring

Authors: Chih Yao Chang & Say Yong Ng
Supervisor: Prof. Branko Celler

Objective
- Measure human CORE body temperature via a non-contact method
- Achieve an accuracy of +/- 0.1°C
- Achieve robust calibration technique

Tympanic Membrane

The membrane shares a common blood artery with the hypothalamus which regulate the core temperature of the human body. Accurate core body temperature can be measured from the tympanic via radiation measurements.

Thermopile Sensor

The thermopile sensor is sensitive to very small change in infrared emission from the membrane. When the thermopile sensor “sees” the infrared emissions, it converts them into voltages. Accurate measurement of the ambient temperature is critical to the sensor’s output. The ambient temperature is measured by a built-in thermistor found attaching to the metal can of the thermopile sensor, which senses the can temperature of the sensor itself.

System Block Diagram

User Interface

Concept Approach

Conclusion

Built-in thermistors are successfully calibrated to +/- 0.1°C. The designed thermopile device is able to measure a +/- 0.1°C is achieve for temperature range 36°C-39°C. Future development can be implemented on a stand-alone system, i.e. a micro-controller to achieve better accuracy in a larger temperature range.