

## **Performance comparison of non-invasive blood glucose level using artificial neural network and ultra-wide band antenna**

*Minarul Islam, Sabira Khatun, Kamarul Hawari Ghazali, Mohd Mawardi Saari, Mohammed Nazmus Shakib, Mohamad Shaiful Abdul Karim*

Faculty of Electrical & Electronic Engineering Technology, Universiti Malaysia Pahang, Pekan, Pahang, Malaysia

### **ABSTRACT**

Diabetes is a serious health concern, and it became more and more common to the people due to its rapidly increasing cases. People with diabetes are required to monitor their blood glucose level regularly in order to control their blood glucose concentration level (BGCL). Common monitoring methods which taken recently are either laboratory chemical analysis or using invasive device such as glucometer to do self-checking. The process is painful and intimidating as it requires to collect blood sample from fingertips or arms. To minimize the pain and suffer, a non-invasive system for BGCL measurement is highly demanded. In this research, A small pair of ultra-wide band (UWB) antenna was utilized for BGCL measurement through human earlobe. Due to its high data rate lower transmission capacity and the power is below the noise floor level, which does not affect the human body, the UWB based system is commonly used in biomedical applications. A pair of UWB antennas attached to the P400 RCM transceivers are used in the integrated device to produce a 4.7 GHz frequency and pass through the earlobe. The scattered signal pulse obtained was translated from analogue to digital discrete values and afterwards decreased discrete values were used as artificial neural network data (ANN). In this work, feed-forward backpropagation neural network (FFBPNN) has been used as an ANN module. Several experiments were carried out to investigate the optimal ANN learning algorithm (levenberg-marquardt (LM), resilient backpropagation (RP) and scaled conjugate gradient (SCG)) for performance comparison. During the investigations, LM, RP, SCG shows the performance with 89.47%, 85.96% and 82.85% respectively.

### **KEYWORDS**

Diabetes; Blood glucose level measurement; Artificial neural network; Ultra-wide band

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