

**BST SENSOR APPLICATION:  
DIGITAL THERMOMETER**

**NOR ANIZA BINTI MAT DESA**

**SCHOOL OF MICROELECTRONIC ENGINEERING  
UNIVERSITI MALAYSIA PERLIS  
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# BST SENSOR APPLICATION: DIGITAL THERMOMETER

by

NOR ANIZA BINTI MAT DESA

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of the requirements for the degree  
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## **APPROVAL AND DECLARATION SHEET**

This project report titled A **BST Sensor Application: Digital Thermometer** was prepared and submitted by Nor Aniza Binti Mat Desa (Matrix Number: 031030594) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Electronic Engineering ) in Universiti Malaysia Perlis (UniMAP).

**Checked and Approved by**

---

(DR. JOHARI BIN ADNAN)

**Project Supervisor**

**School of Microelectronic Engineering  
Universiti Malaysia Perlis (UniMAP)**

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# **APLIKASI PENGESAN BARIUM STRONTIUM TITANATE (BST): DIGITAL TERMOMETER**

## **ABSTRAK**

Kajian dibuat ke atas prestasi pengesan *Barium Strontium Titanate* (BST) dan aplikasi terhadap alat pengukur suhu berdigit atau termometer. Buat pengetahuan umum pengesan BST yang digunakan ini masih di dalam kajian kerana pengesan BST ini merupakan pengesan BST yang pertama dikeluarkan dan fabrikasi sendiri oleh pihak Universiti Malaysia Perlis (UniMAP). Pengesan BST ini boleh dibahagikan kepada tiga kategori antaranya adalah ferroelektrik, piezoelektrik dan pyroelektrik. Pengesan BST ini boleh digunakan sebagai salah satu komponen yang boleh mengesan keamatan cahaya, kepekatan gas, ultrabunyi, dan haba. Alat pengukur suhu berdigit ini mampu mengukur suhu dan memaparkan suhu yang dikesan pada paparan tujuh ruas. Secara umumnya, rekabentuk termometer ini melibatkan dua bahagian iaitu perkakasan dan perisian. Pada bahagian perkakasan ia mempunyai gabungan beberapa litar elektronik yang boleh beroperasi mengesan suhu dan bahagian perisian pula ia melibatkan beberapa aturcara dengan menggunakan micropengawal dalam perisian MPLAB IDE V7.31. Bahasa himpunan yang digunakan adalah berkaitan PIC16F876A. Semasa menjalankan projek ini terdapat beberapa masalah antaranya kesukaran untuk memahami aturcara yang melibatkan program dalam PIC16F876A pada masa yang singkat.

# **BARIUM STRONTIUM TITANATE (BST) SENSOR APPLICATION: DIGITAL THERMOMETER**

## **ABSTRACT**

This thesis deals with the research of Barium Strontium Titanate (BST) sensor and its application as digital thermometer. In general BST sensor was still in research stage, because this sensor is the first BST sensors that have been fabricated by a group of researchers at Universiti Malaysia Perlis. Barium Strontium Titanate can be operated on three modes namely ferroelectric, piezoelectric and also pyroelectric. They can be sensitive to light, gas, ultrasonic and heat. The digital thermometer measures temperature and displays as the seven-segment display. This design consists of two parts, namely, are hardware and software. The hardware part is a combination of many electronic circuits to detect temperature and the software part involve programming the microcontroller, i.e. PIC16F876A microcontroller and using software MPLAB IDE V7.31 to assemble the code. There are many problems with this project due to the changes of BST parameters and dealing with the programming PICs in a short time period.

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## LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURE

<b>BST</b>	Barium Strontium Titanate
<b>LED</b>	Light Emitting Diodes
<b>LDR</b>	Light Dependent Resistor
<b>PIC</b>	Programmable Interface Controller
$\Omega$	Ohm (unit of resistance)
$^{\circ}\text{C}$	Degree Celcius =5/9 ( $^{\circ}\text{F}32$ )
$V$	Volt (unit of voltage)
$A$	Ampere (unit of current)