# CHAPTER 1

# INTRODUCTION

## 1.1 Background History

In this project, the purpose of a Heat Indicator by using BTST thin film sensor is to indicate whether the room is hot or not and indicate by LEDs array. Beside that, it also to see the potential of BTST thin film as a heat sensor. Therefore, by choosing the specific the range for the system measure in range of temperature room and indicated it to subjective condition from cool to hot by referring to the number of LEDs light on. Temperature was chosen as a constant for this design application. As the knowledge, the heat actually depends to temperature and the fundamental of this statement will be explained in Chapter 2: Literature Review. Meanwhile, for the transducer circuit, the Wheatstone bridge will be used for measuring the unknown resistance at the sensor to measure the environment temperature. The design of this circuit will be explained in details in the Chapter 3: Methodology.

In the main, there are three parts to build for this system which are sensor part, data acquisition and conversion part and also the user interface (output port for application). For this project, LED indicator was used for output port to determine the condition whether the room is in hot condition or not.

Besides that, this project was developed in order to design and also develop product for application of Barium Tantalum Strontium Titanate (BTST) thin film sensor. In other hand, the needs for knowledge, understanding how Barium Tantalum Strontium Titanate (BTST) thin film sensor fabrication process and also how it works are important. Furthermore, the Barium Tantalum Strontium Titanate (BTST) thin film sensor was used to see the potential of this material as a new sensor material.

To sum it all, this project gives the experience in handling the hardware and software part such learn hands-on component, system level design prototyping and testing to provide and implement sensor that is user friendly and also given new experience in new sensing technology manufacturing which is Barium Tantalum Strontium Titanate (BTST) thin film sensor where is sensor is actually still in research stage.

## 1.2 Objectives

1.2.1 Design and develop product for application of BTST sensor.

1.2.2 Understand the BTST sensor in fabrication process.

1.2.3 Understand the mechanism and characteristic of the sensor that is used.

1.2.4 Understanding the design application and to provide and implement the sensor in user friendly environment.

1.2.5 Able to program microcontroller using PIC16F876A

1.2.6 To experience and learn hands-on component (handling hardware and software programming) and system level design prototyping and testing.

## 1.3 Scope of work

This project consists of two main parts which are software and hardware. The ideas of the design are summarized as follow:

1.3.1 Design an application which has capability to detect the changes of heat in a room surrounding using BTST Thin film sensor.

1.3.2 Program PIC 16F876A to digital or encode the analogue signals send by sensor.

There are three major activities specifically design, simulate and testing the circuit; programming the PIC 16F876A microcontroller and the last, integrate both parts and see the application whether it works properly or not.

## 1.4 Overview of thesis

This thesis is organized in five chapters to report on the activities and also discuss the results and analyzed it. Therefore, in each of the following subtopics will explain and described contents of the chapter in general.

1.4.1 In Chapter 1 which is the introduction, it explains the objective and the work scope of the project. It also describe why study it needed.

1.4.2 In Chapter 2, the literature review; the general description of the parameters used in the project are being discussed and analyzed.

1.4.3 Chapter 3 discusses the methodology process that being used on the way to complete the whole project. The description of the software and hardware are also described in this chapter.

1.4.4 Chapter 4 discusses the results and also the analyzed of results.

1.4.5 Chapter 5 is all the project is summarizes the physical description. Recommendations for future improvement and advancement for this project are also being discussed. It’s explaining business planning for commercialization by discussing how to promote and commercialize this project as a new product that is affordable to all customers.