# COOLING SYSTEM BY USING FIBER BRAGG GRATING AS TEMPERATURE SENSOR

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# ABSTRACT

This paper proposes to design a cooling system by using Fiber Bragg grating (FBG) as a temperature sensor. The metrology system was developed for detecting temperature by monitoring shifted of Bragg wavelength, the movement of Bragg wavelength shifted are used to indicate the temperature change at surrounding, when the temperature reach the set maximum surrounding temperature, the cooling system will be turn on and maintain the environment temperature. The optical fiber will provide the broadband light source and FBG will reflect the Bragg wavelength and transmit other. The system is based on FBG as a physical quantity sensor, power supply to supply voltage to cooling system and wavelength meter is used as a collecting data instrument. The temperature will be controlled by the intensity of light bulb. The system will be running under the Agilent VEE software. Agilent VEE will be used as a tool to display the data for temperature variation

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# Chapter 1

# INTRODUCTION

## 1.1 Background study.

Dramatic improvement and demand of fiber optic technology in industry either in telecommunication or sensor cannot be denied anymore. Every researcher around the world is busy with their study in fiber optic technology [4]. To make sure we do not fall behind with the others, a study in this topic need to done as soon as possible. In 1978 at the Canadian Communication Research Center (CRC), Ottawa, Ont., Canada the first formation of permanent grating was found [7]. At first, the observation of photo-induced refractivity in fiber was only a scientific curiosity, but over the time it has become the main role in optical communication and sensor system.

General temperature sensor have short range of measurement which are up to $150^0$C, this will be limitation to the industry that use high temperature instrument such as steel factory, glass factory or nuclear reactor. Fiber Bragg grating have larger range of measurement, up to $1500^0$C, this will be a good replacement for conventional temperature sensor [5]. As for now many factories trying to implement this technology, so they would not fall behind with their competitor. Beside the superiority of the Fiber Bragg grating of large range of measurement. Fiber Bragg grating also immune to EMI. For airplane, even a slight error could lead to fatal problem, which are airplane crash. Airplane factory need to use Fiber Bragg grating as airplane temperature sensor so that, problem regarding to the EMI problem do not happen to the airplane.