

**Title**

Design and Development of Earth Sensor for 3U or lower satellite

**by**

SUBSINCHAI Ratatamanun

**Student Number**

213D5011

Department of Electrical and Space System Engineering

Kyushu Institute of Technology

**Advisor**

Prof. Mengu Cho

## Abstract

Several ways to determine the orientation of the satellite, one of the effective ways to determine the pitch and roll angle of a LEO satellite is sensing the horizon of the Earth which operates in the visible range of the electromagnetic spectrum. Unfortunately, the sensor which is implemented in this range cannot be used in eclipse such as Sun sensor.

In this case of an eclipse, the sensor that operates in infrared spectrum is a solution to detect the edge of the Earth when the satellite is in eclipse. The one of device that use infrared spectrum is Earth sensor. It also has a low power consumption and light weight so the Earth sensor is so useful for finding the position of the Earth related to the face of the sensor.

But compared to other devices, Earth sensor has lower accuracy than another sensor and bigger than some of the devices. Normally, we use Earth sensor with other sensors especially Sun sensor by using Earth sensor to calculate the pitch and roll angle of the Earth by using Thermopile to detect the edge of the Earth and determine the yaw angle by using Sun sensor.

The Earth sensor uses 4 Thermopiles detectors which has limit of the sensor for using with the small satellite. If we can decrease the size of the sensor by using just 2 Thermopile and improving the accuracy of the sensor, it will be good for development of the Earth sensor in the future. So, this thesis will focus on the way to use 2 Thermopile to calculate the pitch and roll angle of the Earth and increase the accuracy. And compare the result from 4 Thermopile and 2 Thermopile.

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