ABSTRACT

Nano satellite has recently developed mostly for monitoring and resource exploration purposes. In general, nano saellite uses either active or passive attitude control to point its instrument. Some of its actuators are reaction wheels, magnetic torque or magnetorque, and jet. Reaction wheel is commonly used as an actuator due its pointing accuracy. Reaction wheel is a rotating motor on the body of nano satellite. Due to the existence of inertia of rotating motor, nano satellite will rotate on the opposite direction of the motor rotation direction. Power consumption of the motor on the reaction wheel has to be minimalized, due to slow charging process of solar array on the nano satellite. Once the nano satellite loses its power, it will be lost in space. Thus, the attitude control system of nano satellite must be designed using optimal control method.

In this final project, author designs attitude control system of nano satellite and also analyzes it. Designed system will use reaction wheels as actuators and use LQR (linear quadratic regulator) controller. To measure the attitude of nano satellite, IMU (inertial measurement unit) MPU6050 is used as a sensor.

On simulation process, the initial angle of nano satellte is twenty degrees. Within fourteen seconds nano satellite will return back to zero degrees position. Based on calibration process error measurement of pitch angle is -2,88^o, while the error measurement of roll angle is -0,635^o. Reaction wheel will rotate on the opposite direction to achieve zero degree position. Angular speed of motor is proporsional to the angle difference refer to zero degree position.

Keyword: LQR (linear quadratic regulator), nano satellite, attitude control system, nano satellite