

ASTRODYNAMICS SYMPOSIUM (C1)  
Attitude Dynamics (1) (1)

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INVESTIGATION INTO INTEGRATED ATTITUDE DETERMINATION IN HIGH-PRECISION  
CUBESATS**Abstract**

CubeSats are becoming increasingly popular devices for security encryption applications, where a high pointing accuracy is sometimes required. Star trackers are currently the best tool available to achieve highly accurate attitude determination. Although, currently highly precise forms of these devices are both large and expensive, where the algorithms are intensive on processing and data storage. Such characteristics prove difficult for application to small satellite devices, such as CubeSats. Using an integrated network of sensors and actuators, which may include a more rudimentary star tracker, could avoid such issues developing. Use of magnetometers, horizon sensors and sun sensors are more fitted for CubeSat applications, but do not achieve the accuracy star trackers are capable of.

This paper seeks to investigate this integrated actuator and sensor design to improve the accuracy of CubeSats, whilst avoiding the issues discussed previously. The possible use of a smartphone as a star tracker is also investigated, utilising the cellular devices' economies of scale, processing power and small size. This work is done with applications to quantum key distributions between satellites, and more specifically CubeSats. The project involves development of 3 unit CubeSat's with a pointing accuracy of at least 0.01. For such a mission, a highly-accurate attitude determination and control system is required, with attitude measurements well below the desired pointing budget.