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VISION BASED ATTITUDE DETERMINATION AND CONTROL SYSTEM FOR HIGH ACCURACY  
DEEP SPACE NAVIGATION**Abstract**

Deep space navigation requires the most complex attitude control system of all. Precise pointing ability is very much essential when it has to travel a very long distances in space. The system must be able to point precisely in the direction of the target, which may be any deep space object. Another reason for designing this particular system is that, for deep space missions the requirement of fuel will be very much more, to operate more number of instruments just for determining attitude. The attitude control system must be designed to operate with less number of instruments and must consume less fuel. To meet all these challenges here we describe a system which uses CCD Camera as a single source for attitude determination. For high accuracy navigation a new method called pixel to pixel variation estimation algorithm is developed. A unique CCD Camera takes the pictures of the target object and its surroundings. The camera is made up of certain number of pixels. The starlight is absorbed into pixels, for each individual pixel a database is created, for every new image taken at that time the data of that particular pixel goes into that particular pixel data base. The variation of data at regular interval of time is calculated, if there is no variation of data in the particular pixels in images taken at different time intervals then it indicates the vehicle is stable, if the data in the pixel data base is continuously varying then it indicates that the vehicle is not stable. There are different methods to calculate Roll, Pitch and Yaw of the space vehicle.