

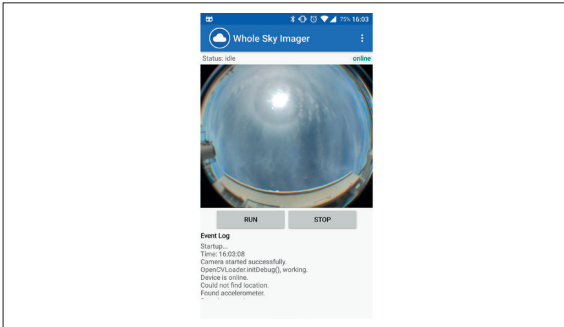


Julian Müller

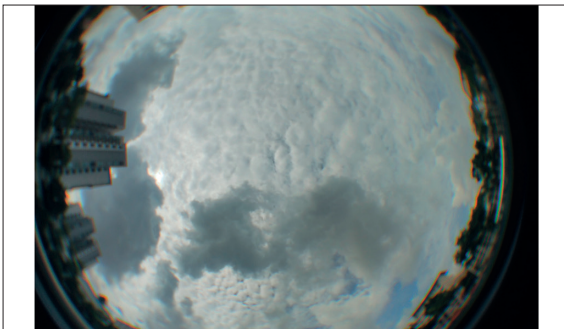
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Subject Area	Wireless Communications
Project Partner	Nanyang Technological University, Singapore

Sky/Cloud Analysis

Design of a smartphone-based Whole Sky Imager



Application Graphical User Interface



Whole Sky Image

Introduction: By monitoring cloud formation during night and day, information is gained to help understand the effects of cloud formation on various applications such as a satellite-to-ground communication, solar energy generation and weather prediction. In contrast to satellite observation, the images taken by ground-based sensors offer a higher level of detail in a specific area. Four distinct digital and fully automatic Wide Angle High-Resolution Sky Imaging Systems (WAHRISIS) have been developed at the Nanyang Technological University.

Objective: However, the current imagers are expensive and offer a limited portability due to their size and weight. In this thesis, a new whole sky imager based on a smartphone was developed and tested. The primary purpose of this approach is to provide a low-cost, highly portable, versatile and easy-to-deploy imager and to evaluate the possibilities it offers. The developed imager captures almost the entire hemisphere in three pictures with different exposures that are then merged into a tonemapped high dynamic range image on a server. An Android application and a suitable housing were created to protect the device from the hot and humid climate in Singapore.

Result: It was concluded that modern smartphones provide a powerful embedded system that offers great potential in the field of whole sky imaging, but that the quality of the created images is lower than that of photographs taken by high quality cameras. The developed imager has great potential to extend the current fleet of imagers used by providing more and new data such as GPS and compass information.



Prototype Housing with Solar Module