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Abstract

Engineering and the Built Environment
School of Electrical and Information Engineering

Master of Science

Evaluation of lightning location system over Johannesburg by high-speed cameras

by Haydn Gareth Fensham

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This research describes an approach to evaluating the performance of the South African Lightning Detection Network (SALDN) over Johannesburg, South Africa, using high-speed video footage of lightning events. The performance evaluation includes the flash detection efficiency, stroke detection efficiency and median location accuracy (locations of known attachments and flash cluster approach) of the SALDN. The proposed methodology has three subsections: time-correlating cloud-to-ground stroke data from the SALDN with ground truth lightning events (high-speed camera footage), determining the detection efficiency and determining the location accuracy. Results indicate that the SALDN has a flash detection efficiency of 84.9 %, stroke detection of 69.1 % and has a median location accuracy of 59.2 m and 124.4 m using locations of known attachments and flash cluster approaches respectively for cloud-to-ground lightning over Johannesburg.