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Name : MOHAMAD FARID BIN MISNAN

Title : DESIGN AND DEVELOPMENT OF DETECTION SCHEME USING MULTILINE IMAGE SCANNING FOR AERIAL MAPPING OF A SIMULATED RICE PADDY FIELD AND IMPLEMENTED ON UNMANNED AERIAL VEHICLE

Supervisor : DR. NOR HASHIM MOHD ARSHAD (MS)
DR. RUHIZAN LIZA AHMAD SHAURI (CS)

Rice is important food consumption for majority of the world population especially in our country in Malaysia. Recently, the need for food supply from this paddy agriculture sector was increased as the demand for rice amplified. Therefore, it is a necessity to increase the paddy supply to correspond with the demand. Paddy field management is an important process to control the rice quality and quantity while boosting up the demand supply. Many efforts been done by the government and non-government agriculture sector to boost this rice yield from manual until automatic agriculture process. One of the major focus and tasks in this paddy field management was pest control. In this research, pest control was selected as a future important agriculture activity. The development of custom UAV that could perform real-time mapping for pesticides spraying purpose is essentially important. Thus, two dimensional (2D) online mapping was purposed for this research and suitable image processing technique was developed. In producing the map of desired place of a paddy field, a suitable sensor has to be selected to sense the required desired features. A conventional analog camera as front end sensor was used in this work as it could provide vast raw image data that can be utilized to identify the captured image using the designed algorithm. A features identification technique was introduced in this research work via the designed of two dimensional multi-line image scanning process to identify the captured features in producing the 2D map. All designed techniques were processed directly via lightweight standalone embedded controller system for fast image processing with low computational process. In optimizing paddy crop production, a reliable transportation platform was utilized with this application where Unmanned Aerial Vehicle (UAV) was used as the platform to reduce crop destruction while applying this application. All related hardwares design are proportional with the UAV size where the utilized sensor and controller are lightweight and small-size. The image scanning and identification process was implemented on lab scale artificial paddy plantation which is design to consist the features of junction and barrier edge. All implemented techniques were processed simultaneously on embedded controller of the customized UAV to get real-time processed image and mapping data. The entire processes required data was computed via the designed MAPlog system using Visual Basic. The designed multiline scanning technique produced image accuracy which above 80% of the actual captured and processed image. Also, it features identification processing time is less than 6 ms for a single frame image scanning with the UAV flying speed about 0.125 m/s that reduced the entire mapping time and could completing the 50 m2 paddy field mapping in about 20 minute. Furthermore this technique could be used for any plantation application which has less destruction impact to the crop.