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주최

(사)한국농업기계학회
KSAM Korea Society for Agricultural Machinery

스마트팜 연구센터
Smart Farm Research Center

밭농업기계개발연구센터
UPLAND•FIELD MACHINERY RESEARCH CENTER

구두발표Ⅳ ▸ 인공지능 및 정보처리 I (Room323B)

[좌장 : 김기석 교수(서울대)]

13:00~13:12 115 **초분광 영상을 이용한 소고기 보관 상태 판별모델 개발**
Development of Beef Storage Status Determination Model using Hyperspectral Imaging
박성민, 홍석주, 조철훈, 김기석

13:12~13:24 116 **STRAWBERRY LEAF COLOR ESTIMATION USING MACHINE LEARNING APPROACHES BASED ON SOIL PHYSICOCHEMICAL PARAMETERS**
Bolappa Gamage Kaushalya Madhavi, Gun Ho Lee, Hyeon Tae Kim

13.:24~13:36 117 **데이터 특성에 따른 기계학습기반 온실 내부 환경 예측 모델개발**
Development of greenhouse interior environment prediction model based on machine learning according to data characteristics
오광철, 김석준, 박선용, 조라훈, 전영광, 이충건, 김대현

13:36~13:48 118 **인공지능 모델과 공공 기상데이터를 활용한 깊이별 밭 토양온도 및 토양수분함량의 예측 및 정확도 평가**
Estimation and Accuracy Evaluation of Soil Temperature and Water Content by Depth Using Artificial Intelligence Model and Public Weather Data
김대현, 유정상, 이중용

13:48~14:00 120 **Real-time sound monitoring using 2D convolutional neural network (CNN) for pig diseases symptoms detection in pig farm**
레자 나심, 하케 아스라쿨, 카림 레자울, 송민호, 김국환, 정성욱

14:00~14:12 122 **토마토 종자의 비파괴 발아 검사를 위한 엑스선 영상기술의 적용**
Application of X-ray imaging technique for nondestructive inspection of tomato seed viability
홍석주, 박성민, 김상연, 김응찬, 이창협, 김성제, 노승우, 누르히스나, 류지원, 김대영, 김기석

14:12~14:24 123 **초분광 영상 기반 고등어 신선도 비파괴평가기술 연구**
Non-destructive Freshness Evaluation Technique of Chub Mackerel based on Hyperspectral Images
류지원., 박성민, 홍석주, 김상연, 김응찬, 이창협, 김성제, 노승우, 누르히스나, 김대영, 임도훈, 김기석

14:24~14:36 124 **Embedded High Accuracy Compact Transformer Vision System for Real-Time Health Detection During Seedling Transplanting**
김민재, 정유, 이은서, 이경환

14:36~14:48 126 **An Autonomous Navigation System based on Error State Kalman Filter and Topological Map**
주야오빈, 김우영, 이경환

14:48~15:00 127 **드론 RGB 영상 이용 작물 분류를 위한 랜덤 포레스트 기반의 최적 식생지수 추출**
Optimal extraction of vegetation index based on Random Forest for crop classification using RGB images from unmanned aerial vehicle
장규진, 김동욱, 강민석, 김학진

An Autonomous Navigation System based on Error State Kalman Filter and Topological Map

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YaoBin Zhu[1,3] Woo-Young Kim[2] Kyeong-Hwan Lee[1,2,3*]

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Abstract

The application and exploration of Unmanned Ground Vehicle in the field of agriculture are accelerating. However, precise localization and navigation on large high-definition map remains a huge challenge. In this study, we developed an autonomous navigation system based on Error-State Kalman Filter and topological map. This system includes four components: localization, map optimization, path planning and speed controller. Specially, the localization algorithm adopts Error-State Kalman Filter to fuse six-axis IMU data with RTK-GPS data which including yaw angle information. It not only inherits the characteristics of non-accumulation of GPS errors, but also has the high-frequency characteristics. For global path planning, the topological method is applied to optimize a large size and high precision map, significantly improves the speed while ensuring vehicle safety and path smoothness. This algorithm abbreviated a 12,000 by 12,000 pixels map and generated a safest global path in 100 millisecond. Our system was applied to the UGV experiences, the results showed that the UGV traveled at a speed of 0.8m/s under different paths, the RMS values of the lateral and direction error are about 2.5cm and 3.2° respectively.

Keywords

Navigation system, Localization, Error-State Kalman Filter, Topological, UGV

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