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I'M스마트팜 혁신인재양성 교육연구단

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203호 ▶노외기계시스템 및 정밀농업 III

■ 좌장 : 손형일 교수 (전남대학교) ■

9:00~9:17	45	ROS/Gazebo를 활용한 농업용 로봇의 내비게이션에 대한 시뮬레이션 연구 Simulation Study of Agricultural Robot Navigation Using ROS/Gazebo 김용현(서울대학교), 신승렬, 윤창호, 강경민, 김학진*
9:17~9:34	46	Estimation of apple tree canopy height and area coverage using 3D LiDAR point clouds Md. Rejaul Karim(Chungnam National University), Mohammod Ali, Shahriar Ahmed, Md Ashrafuzzaman Gulandaz, Md Nasim Reza, Justin Sung, Sun-Ok Chung*
9:34~9:51	47	RGB-Depth 카메라와 YOLOv5 모델 기반의 양봉업 전용 벌통 자동 인식 및 운반 기술 개발 Development of Automatic Beehive Recognition and Transportation Technology Based on RGB-Depth Camera and YOLOv5 Model for Beekeeping Industry 왕평안(강원대학교), 쿠스위디얀토 루카스 위쿠, 모창연, 김수배, 한웅철*
9:51~10:08	48	Localization of a Rail Mobile Robot in Greenhouse using DeepLabCut Algorithm Tean Chen(Chonnam National University), Chulhyun Jo, Pablo Vela, Woo-Young Kim, Kyeong-Hwan Lee*
10:08~10:25	49	이산요소법을 이용한 인공월면토(KLS-1)에서의 달 탐사로버 주행성 분석 Analysis of Lunar Exploration Rover Wheel Mobility on Lunar Simulant(KLS-1) using Discrete Element Method 김지태(서울대학교), 황희수, 한현우, 오주선, 박영준*
10:25~10:42	50	다수 무인비행체 협업주행 시스템 개선을 통한 안정성, 처리속도 및 이미지 정합 수준 향상 Improvement of Stability, Processing Speed, and Image Quality by a Collaborative Control System for Multi-UAVs 이강빈(강원대학교), 한웅철*
10:42~10:59	51	Development of Nozzle Variable Control Model Based on Spray Distribution Analysis for Precise Unmanned Aerial Spraying Systems Hanif Adhitya(Kangwon National University), Seung-Hwa Yu, Xiongzhe Han*
10:59~11:16	52	Assessment of Precision and Accuracy of Cropcircle and MicaSense Sensors for Monitoring Crop Growth Dynamics During NDVI Calculation Md Asrakul Haque(Chungnam National University), Md Rejaul Karim, Shahriar Ahmed, Md Nasim Reza, Ka Young Lee, Yeong Ho Kang, Keong Do Lee, Sun-Ok Chung*
11:16~11:33	53	수확로봇의 강인 비주얼 서보잉을 위한 컴퓨터 비전 기반 오이 줄기 인식: 현장 평가 Cucumber Pedicel Detection based on Computer Vision for Robust Visual Servoing of Harvesting Robot: Field Evaluation 김창조(전남대학교), 박용현, 손형일*

Localization of a Rail Mobile Robot in Greenhouse using DeepLabCut Algorithm

Tean Chen[1,3], Chulhyun Jo[1,3], Pablo Vela[1,3], Woo-Young Kim[2], Kyeong-Hwan Lee[1,2,3*]

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Abstract

In recent years, the use of mobile robots in greenhouse environments has increased to improve the efficiency of plant cultivation and crop management. However, the precise localization of a rail mobile robot is essential for autonomous navigation in the greenhouse. In this study, we propose a novel approach using the DeepLabCut algorithm to localize rail mobile robots in greenhouse environments. A feedback control system, which includes a proportional-integral-derivative (PID) controller and vision-based tracking, enables mobile robots to navigate specific path by recognizing the position of the rail and adjusting the velocity of the mobile robot and orientation to maintain the desired path. The algorithm was able to accurately localize the robot within the greenhouse environment, with an average localization error of less than 5 cm and an accuracy rate of over 92% in the trajectory tracking of the mobile robot. In future work, we will conduct experiments in more complex greenhouse environments.

Keywords

Rail mobile robot, DeepLabCut, Trajectory tracking, Autonomous navigation, Proportional-integral-derivative(PID)

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