



2026년 8월 졸업예정자 기계공학과 박사 학위청구논문 공개발표

- 일시: 2026년 06월 05일, 금요일, 11:00 a.m.
- 장소: 공과대학 1A-218호

Development of an Automated Self-Administered Eye Disorder Screening System with Applications in Healthcare

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Abstract

Eye disorders are frequently overlooked during routine physical examinations, despite their potential to cause visual impairment. Early screening and timely intervention are therefore essential. However, existing approaches are often constrained by customized hardware, task-specific instruments, or supervised learning paradigms that require extensive labeled data, thereby limiting their scalability and accessibility. A deep-learning-based ellipse-fitting method is proposed to achieve accurate and stable pupil localization under challenging conditions, including blinking, partial occlusion, and illumination variation. Building upon this pupil-tracking framework, this dissertation further proposes an automated, self-administered eye disorder screening system implemented on a VR device, including evaluations of strabismus, pupil reflection, diplopia, and contrast sensitivity. The proposed system is validated in hospital and remote healthcare settings.

[사용언어: 영어]