COURSE	Name	: Machine Vision
	Code	: EE184944
	Credits	: 3
	Semester	: Elective

Description of Course

This course studies the visual sensing of electronics (visual perception of an image) using a camera that includes image acquisition techniques with cameras, image processing, image analysis, and image-based understanding of on chip system devices (Raspberry Pi). The common applications widely used to create object separators by color, facial recognition, vehicle counters, moving objects detection and others.

Learning Outcomes

Knowledge

(P04) Mastering the concepts, principles, and procedures which considers economical, social, and environment aspects in power systems, control systems, multimedia telecommunications, or electronics.

(P05) Mastering the factual knowledge about information and communication technology, and the latest technology and its applications in power systems, control systems, multimedia telecommunications, or electronics.

Specific Skill

(KK04) Able to implement alternative solutions of engineering problems in power systems, control systems, multimedia telecommunications, or electronics by concerning in factors of economy, public health and safety, culture, social, and environment.

(KK05) Able to utilize analytical and engineering design tools based on appropriate information and computation technology to perform engineering activities in power systems, control systems, multimedia telecommunications, or electronics.

General Skill

(KU12) Able to implement information and communication technology (ICT) in the context of implementation of his/her work.

(KU13) Able to apply entrepreneurship and understand technology-based entrepreneurship.

Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

(S10) Internalizing spirit of independence, struggle and entrepreneurship.

(S11) Trying his/her best to achieve perfect results.

(S12) Working together to be able to make the most of his/her potential.

Course Learning Outcomes

Knowledge

Understand the technique of image acquisition, segmentation, recognition, image understanding,

and hardware used in machine vision.

Specific Skill

Mastering the technique of image acquisition, segmentation, recognition, image understanding, and hardware used in machine vision.

General Skill

Able to use Visual Studio, OpenCv Library.

Attitude

Able to internalize the spirit of independence, struggle, and entrepreneurship.

Main Subjects

1. Introduction of machine vision
2. Device used for machine vision
3. Binary Image Processing: (1) Threshold, (2) Adaptive Threshold, (3) Histogram, (4) Edge Detection, (5) Blob Analysis, (6) Image Compression, (7) Background Subtraction, (8) Filter, (9) Contour
4. Features: (1) Edge, (2) Corner, (3) Points
5. Template Matching: (1) SAD, (2) SSD, (3) Cross Correlation, (4) Cross Correlation Coefficient
6. Motion Analysis, Mean Shift
7. Pattern Analysis, PCA, Gabor Filter, LBP, Viola Jones

Reference(s)

[1] Buku Ajar Penginderaan Visual Elektronika, Ronny Mardiyanto, 2018
[2] Linda G. Shapiro, Computer Vision, Prentice-Hall, Inc., 2001
[3] Milan Sonka dkk, Image Processing: Analysis, and Machine Vision, Brooks and Cole Publishing, 1998.
[4] Ramesh Jain, Machine Vision, McGraw-Hill, Inc., 1995
[5] Gary Bradski and Adrian Kaehler, Learning OpenCV: Computer Vision with OpenCV Library, O'Reilly Media, Inc., 2008

Prerequisite(s)

EW184004 Numerical Method