COURSE	Name	:	Computer-based Visual Perception
	Code	:	EE185542
	Credit(s)	:	2
	Semester	:	(Elective Course)

Description of Course

This course studies advanced visual sensing (visual perception of an image) using a camera that includes image acquisition techniques with cameras, image processing, image analysis, and computer-based image understanding. The application used is to create color segmentation, blob counters, camera-based human machine interactions, mouse cameras, and other applications.

Learning Outcomes

Knowledge

(P02) Mastering engineering concepts and principles to develop the necessary procedures and strategies for systems analysis and design in the areas of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

(P03) Mastering the factual knowledge of information and communication technology as well as the latest technology and its utilization in the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

Specific Skill

(KK03) Being able to produce system design for problem solving by utilizing other fields of study and concerning technical standards, performance aspect, reliability, ease of application, and assurance of sustainability.

(KK04) Being able to implement alternative solutions of engineering problems by concerning in factors of economy, public health and safety, culture, social, and environment.

General Skill

(KU09) Being able to develop themselves and compete in national and international level.

(KU10) Being able to implement the principle of sustainability in developing knowledge.

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

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

Mastering image acquisition techniques using cameras, segmentation, object recognition, image understanding, stereo images, and motion analysis (motion analysis).

Specific Skill

Able to implement the concept of image segmentation techniques, object recognition, image understanding, stereo images, and motion analysis for issues related to engineering problems.

General Skill

Able to use Visual Studio software and OpenCv software.

Attitude

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

Main Subjects

1. Definition, use, and application of image processing
2. Devices used for image processing
3. Binary Image Processing: (1) Threshold, (2) Adaptive Threshold, (3) Histogram, (4) Edge Detection, (5) Blob Analysis, (6) Image Compression, (7) Background Substraction, (8) Filter , (9) Contour
4. Features on Image: (1) Edge, (2) Corner, (3) PointTemplate Matching: (1) SAD, (2) SSD, (3) Cross Corelation, (4) Cross Corellation Coefficient
5. Motion Analysis, Mean Shift
6. Pattern Analysis, PCA, Gabor Filter,LBP, Viola Jones
7. Stereo Vision

Reference(s)

[1] Buku Ajar Penginderaan Visual Berbasis Komputer (Textbook of Computer-based Machine Vision), 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)

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