INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS
DEPARTEMEN TEKNIK ELEKTRO
Program Studi Sarjana (S1) Teknik Elektro

INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FACULTY OF INTELLIGENT ELECTRICAL & INFORMATICS TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
Bachelor Degree Program in Electrical Engineering

1	**Nama Mata Kuliah / *Course Name***	:	Penginderaan Visual Elektronika / *Machine Vision*
2	**Kode Mata Kuliah / *Course Code***	:	EE234753
3	**Kredit / *Credits***	:	2 SKS
4	**Semester / *Semester***	:	0

Deskripsi Mata Kuliah / *Course Description*

Mata kuliah ini mempelajari tentang penginderaan visual secara elektronik (persepsi visual terhadap suatu gambar) dengan menggunakan kamera yang meliputi teknik akuisisi gambar dengan kamera, pengolahan gambar, analisis gambar, dan pemahaman berbasis gambar pada perangkat sistem chip (Raspberry Pi). Aplikasi yang umum banyak digunakan untuk membuat pemisah objek berdasarkan warna, pengenalan wajah, penghitung kendaraan, deteksi objek bergerak dan lain-lain. / *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.*

Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah / *Program Learning Outcomes Charged to The Course*

1. Menguasai konsep, prinsip, dan prosedur yang mempertimbangkan aspek ekonomi, sosial, dan lingkungan dalam sistem tenaga listrik, sistem kendali, telekomunikasi multimedia, atau elektronika. / *Mastering the concepts, principles, and procedures which considers economical, social, and environment aspects in power systems, control systems, multimedia telecommunications, or electronics.*
2. Menguasai pengetahuan faktual tentang teknologi informasi dan komunikasi, serta teknologi terkini dan penerapannya dalam sistem tenaga listrik, sistem kendali, telekomunikasi multimedia, atau elektronika. / *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.*
3. Mampu menerapkan alternatif pemecahan masalah keteknikan pada sistem tenaga, sistem kendali, telekomunikasi multimedia, atau elektronika dengan

memperhatikan faktor ekonomi, kesehatan dan keselamatan masyarakat, budaya, sosial, dan lingkungan. / *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.*

4. Mampu memanfaatkan alat perancangan analitik dan rekayasa berbasis teknologi informasi dan komputasi tepat guna untuk melakukan kegiatan rekayasa pada sistem tenaga listrik, sistem kendali, telekomunikasi multimedia, atau elektronika. / *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.*
5. Mampu menerapkan teknologi informasi dan komunikasi (TIK) dalam rangka pelaksanaan pekerjaannya. / *Able to implement information and communication technology (ICT) in the context of implementation of his/her work.*
6. Mampu menerapkan kewirausahaan dan memahami kewirausahaan berbasis teknologi. / *Able to apply entrepreneurship and understand technology-based entrepreneurship*.
7. Menunjukkan sikap tanggung jawab terhadap pekerjaan di bidang keahliannya secara mandiri. / *Demonstrating attitude of responsibility on work in his/her field of expertise independently.*
8. Menginternalisasikan semangat kemandirian, perjuangan dan kewirausahaan. / *Internalizing spirit of independence, struggle and entrepreneurship.*
9. Berusaha semaksimal mungkin untuk mencapai hasil yang sempurna. / *Trying his/her best to achieve perfect results.*
10. Bekerja sama untuk dapat memanfaatkan potensi yang dimilikinya secara maksimal. / *Working together to be able to make the most of his/her potential.*

Capaian Pembelajaran Mata Kuliah / *Course Learning Outcomes*

1. Memahami teknik akuisisi citra, segmentasi, pengenalan, pemahaman citra, dan perangkat keras yang digunakan dalam machine vision. / *Understand the technique of image acquisition, segmentation, recognition, image understanding, and hardware used in machine vision.*
2. Menguasai teknik akuisisi citra, segmentasi, pengenalan, pemahaman citra, dan perangkat keras yang digunakan dalam machine vision. / *Mastering the technique of image acquisition, segmentation, recognition, image understanding, and hardware used in machine vision.*
3. Mampu menggunakan Visual Studio, OpenCv Library. / *Able to use Visual Studio, OpenCv Library.*
4. Mampu menginternalisasikan semangat kemandirian, perjuangan, dan kewirausahaan. / *Able to internalize the spirit of independence, struggle, and entrepreneurship.*

Pokok Bahasan / *Contents*

1. Pengenalan visi mesin. / *Introduction of machine vision.*
2. Perangkat yang digunakan untuk visi mesin. / *Device used for machine vision.*
3. Pemrosesan Citra Biner: (1) Ambang Batas, (2) Ambang Batas Adaptif, (3) Histogram, (4) Deteksi Tepi, (5) Analisis Blob, (6) Kompresi Gambar, (7) Pengurangan Latar Belakang, (8) Filter , (9) Kontur. / *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. Fitur: (1) Tepi, (2) Sudut, (3) Titik. / *Features: (1) Edge, (2) Corner, (3) Points.*
5. Pencocokan Template: (1) SAD, (2) SSD, (3) Korelasi Silang, (4) Koefisien Korelasi Silang. / *Template Matching: (1) SAD, (2) SSD, (3) Cross Correlation, (4) Cross Correlation Coefficient.*
6. Analisis Gerak, Pergeseran Rata-rata. / *.Motion Analysis, Mean Shift.*
7. Analisis Pola, PCA, Gabor Filter, LBP, Viola Jones. / *Pattern Analysis, PCA, Gabor Filter, LBP, Viola Jones.*

Prasyarat / *Pre-requisite*

Metode Numerik. / *Numerical Method*

Pustaka / *Reference*

[1] Buku Ajar Penginderaan Visual Elektronika, Ronny Mardiyanto, 2018. / *[1] Buku Ajar Penginderaan Visual Elektronika, Ronny Mardiyanto, 2018.*

[2] Linda G. Shapiro, Visi Komputer, Prentice-Hall, Inc., 2001. / *[2] Linda G. Shapiro, Computer Vision, Prentice-Hall, Inc., 2001.*

[3] Milan Sonka dkk, Pemrosesan Gambar: Analisis, dan Visi Mesin, Brooks dan Cole Publishing, 1998. / *[3] Milan Sonka dkk, Image Processing: Analysis, and Machine Vision, Brooks and Cole Publishing, 1998.*

[4] Ramesh Jain, Visi Mesin, McGraw-Hill, Inc., 1995. / *[4] Ramesh Jain, Machine Vision, McGraw-Hill, Inc., 1995.*

[5] Gary Bradski dan Adrian Kaehler, Mempelajari OpenCV: Computer Vision dengan OpenCV Library, O'Reilly Media, Inc., 2008. / *[5] Gary Bradski and Adrian Kaehler, Learning OpenCV: Computer Vision with OpenCV Library, O'Reilly Media, Inc., 2008.*