Introduction to the Lecture

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MCI

B.Sc Digital Image Processing

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First Steps

- The goal of this lecture is to introduce you to image processing and its wide applications in industry
- We shall have a wide focus on the technologies and the methods which make image processing an essential discipline for engineers. The structure for this lecture is as follows.
- This lecture is a total of 4 SWS with a total of thirty (60) UE.
    - With 60 UE is devoted to lectures.

Introduction

- Lecture materials and all possible supplements will be present in its Github Repo.
  - You can easily access the link to the web-page from <u>here</u>.

> Github is chosen for easy access to material management and CI/CD capabilities and allowing hosting websites.

- In the lecture some exercises are solved using programming and can be accessed from the <u>Repo website</u>.

Introduction

- The student should be comfortable with working with physical problems and have a basic understanding of material science along with calculus.

Requirements	Taught Lecture	Code	Degree	Outcome
Python	Programming I	PRG I	B.Sc	Python Programming
Linear Algebra	Mathematics I	MAT I	B.Sc	Signal Processing
				Image Processing
-				Camera Technology
-				Statistical Analysis

Table 1: Distribution of materials across the semester.

Description	Value
Official Name	Image Processing
Lecture Code	MRV
Module Code	MECH-B-5-MRV-IMP-ILV
Degree	B.Sc
Lecture Name	Drive Systems
Semester	5
Season	WS
Assignments	Personal Assignment Group Assignment
Lecturer	Daniel T. McGuiness, Ph.D
Module Responsible	BnM
Software	Python
SWS Total	4
UE Total	0
ECTS	5

Table 2: Information regarding the lecture.

- The lecture will have a single personal assignment comprising of a set list of questions which you can use programing languages to solve on your own.

- There will also be a group assingment where you will team up with your classmates to come up with ideas for applying image processing concepts to problems.

Assignment Type	Value
Personal Assignment	40
Final Exam	60
SUM	100

Table 3: Distribution of materials across the semester.

Title
Fundamentals of Image Processing
Computer Vision: Algorithms and Applications
Feature Extraction and Image Processing for Computer Vision
Digital Image Processing
Types Of Camera Sensor
Introduction To Quantum Efficiency
Dark Current
Linearity - Imaging Topics
Camera Gain - Educational Notes
Introduction to Scientific Cameras
What is Scientific Imaging Quality?
The Complete Guide to Industrial Camera Lenses
Getting it Right: Selecting a Lens for a Vision System

Table 4: Lecture sources which can be useful during the course of the lecture. For more information on sources, please consult the repo.

- The content and unit distribution of the lecture is as follows where a unit is defined as 45 min lecture.

Topic	Units	Self Study
Mathematical Fundamentals	4	8
Perception	4	8
Camera	4	8
Image Formats	4	8
Cameras	4	8
Optics	4	8
Displays	2	4
Noise	4	8
Histogram Operations	4	8
Morphological Operations	4	8
Blurring Filters	2	4
Edge Detection	4	8
Convolutional Neural Networks - I	4	8
Convolutional Neural Networks - II	4	8
Convolutional Neural Networks - III	2	4
Project Showcase - I	4	8
Project Showcase - II	2	4
Sum	60	120