Class keywords	Point clouds, Stereophotogrammetry, LiDAR, Drone (UAV), Rock mass classification

1. Goals

국문

광산이나 터널과 같이 암반에 건설되는 구조물의 시공과정에는 암반 노출면에 대한 조사가 필수적이다. 최근 이러한 암반 노출면에 대한 조사와 분석 과정을 무인화, 자동화하여 안전한 작업환경을 조성하고 조사 자료를 기반으로 신속한 굴착/보강설계를 수행하기 위한 노력이 지속되고 있다. 이 강의에서는 입체사진측량과 드론 등을 활용한 디지털 암반 조사방법과 AI를 이용한 불연속면 분석 및 암반분류에 관한 최신의 기술들을 다룬다.

영문 <필요시 작성>

t is inevitable to survey rock exposures for the construction of rock mass structures such as a mine or traffic tunnel. An unmanned automatic survey and analysis on those construction sites is under development to make the working site safer and to accelerate the design process of excavation/ reinforcement. The course will deal with recent development in digital survey using photogrammetry and drones as well as technology of discontinuities recognition and rock mass characterization using artificial intelligence.

2. Textbooks

-Elements of Photogrammetry with Applications in GIS (3rd or 4th ed.)/ R.R.Wolf & B.A.Dewitt/McGrawHill (2000, 2014)
-LiDAR Remote Sensing and Applications/ P.Dong & Q.Chen/ CRC Press (2018)
-Drone Photography & Video Masterclass/ F. Kennedy/ Ammonite Press (2017)

3. Evaluation method

성적부여 방식 : Relative grading

등급제 여부 : A~F

Item	Attend	Assignment	Midterm	Final exam	수시평가	태도	기타	합계
Percentage	10	40	0	50	0	0		100%
Information		교재 및 문헌조사 발표		지필				

출석 규정 : Students who are absent over 1/3 of whole classes will get the grade of "F" or "U".

기타 사항 :

4. Max. no. of students

10 students at max

5. Lecture plan

Basic eduacation type: Theory introduction and students' presentation

1. Acquisition of point clouds
1.1 Photogrammetry [Elements of Photogrammetry with Applications in GIS/R.R.Wolf & B.A. Dewitt]
{1} Introduction [Chap.1]
{2} Principles of Photography and Imaging [Chap.2]
Cameras and Other Imaging Devices [Chap.3]
{3} Image Measurements and Refinements [Chap.4]
Object Space Coordinate Systems [Chap.5]
{4} Vertical Photographs [Chap.6]
Stereoscopic Parallax [Chap.8]
{5} Introduction to Analytical Photogrammetry [Chap.11]
Fundamental Principles of Digital Image Processing [Chpa.15]
{6} Aerotriangulation [Chap.17]
Terrestrial and Close-Range Photogrammetry [Chap.19]
1.2 LiDAR [LiDAR Remote Sensing and Applications/P.Dong & Q.Chen]
{7} Principles of LiDAR Remote Sensing [Chap.2]

		Basics of LiDAR Data Processing [Chap.3] {8} LiDAR for Geoscience Applications [Chap.6] 1.3 Use of Context Capture 2. Drone [Drone Photography & Video Masterclass/ F. Kennedy] 2.1 Fundamentals {9} Introduction [Chap.1] Equipment [Chap.2] Still Photography [Chap.5] {10} Shooting Video [Chap.6] 2.2 Operation {11} 2.3 Hands-on practice 3. Joint survey using digital images and point clouds {12} 3.1 Joint trace survey and analysis 3.2 Joint surface survey and analysis {13} 3.3 Site application and analysis 4. Digital rock mass classification {14} Literature review and presentation A-fully-automatic-image-based-approach-to-quan_2021_International-Journal-of Development-and-application-of-UAV-SfM-photogra_2021_International-Journal-o Semi-automatic-extraction-of-rock-discontinuities-_2018_International-Journa {15} Summary and final examination