AY2018 Plans of Creative Factory Seminar
2018年度創造工房セミナーについて

No.	Code	Theme	Instructors (main instructor)	
1	CFS01	Methods, tools, and devices to design and produce 3D objects; 立体形状デザインと造形のための手法と技術: 触覚モデリングとラピッドプロトタイピング	COHEN, M. YOSHIOKA, R.	
2	CFS02	A computer-aided diagnosis system for screening colorectal polyps and cancer based on CT colonography and deep learning	ZHU, X.	
3	CFS03	Performance Improvement of an Application using FPGA Board	SAITO, H. KOHIRA, Y. TOMIOKA, Y.	
4	CFS04	Why our emotions are of 3-dimensions? Multi-channel reinforcement learning model and its verification based on numerical simulation under Python	LUBASHEVSKIY, I. KIRA, Y.	CANCELLED
5	CFS05	Customer Development with a lunar GIS software 月地理情報システムの顧客開発	DEMURA, H. OGAWA, Y. HIRATA, N. ISHIBASHI, S. HONDA, C. KITAZATO, K., OKUDAIRA, K. and external lecturers	
6	CFS06	Hand Motion Capture and Interaction with VR Contents	JING, L.	
7	CFS07	Development of Autonomous driving/piloting Algorithms on Programmable SoC	OKUYAMA, Y. SUZUKI, T. ASAI, N. BEN, A.	

＊ セミナーの成果を発表する「ポスターセッション（9月21日（金）開催予定）」への参加が必須です。
成績はポスターセッション終了後に決定されます（確定は10月）。
Students are required to participate in Poster Session scheduled on September 21 (Fri).
Grades will be determined after the Poster Session in October.

CFS 1	**Methods, tools, and devices to design and produce 3D objects** **立体形状デザインと造形のための手法と技術: 触覚モデリングとラピッドプロトタイピング**
Instructors	COHEN, M., YOSHIOKA, R.
Course Schedule	formal lectures: 2 days during Sept. 4-6 studio time (flexible workshop hours): Sept. 10-14 model printing (attendance not required): Sept. 17-20 poster presentation: Sept. 21
Abstract	The lectures will include a review of haptic modeling, including CAD authoring tool "Freeform / Claytools" for Geomagic Phantom Omni force-display interface, and suggestions for advanced techniques, including constructive solid geometry (CSG). There will also be "hands-on" sessions, in which each participant uses the described software to make their own creation. These objects can be applicable in many applications as new hankos, fonts, sculptures, decorations, and souvenirs. Models created by the participants will be printed using a 3D printer (Ultimaker2+ or Ultimaker3) for rapid prototyping. この講義ではハプティックモデリングについて学ぶとともに、Geomagic 製 Phantom Omni 触覚デバイスとモデリングソフト Freeform / Claytools による 3 次元触覚モデリング、constructive solid geometry などについて学びます。大部分をしめる演習では受講者が実際に上記ツールでモデリングを行い、技術への理解を深めると共にこれら技術の特徴を生かした造形物の創造プロセスを体験します。 この技術で作成される造形物には多様な用途があり、印鑑、フォント、彫刻、様々な装飾や土産物などへの応用がこれまでに試みられています。また、モデリングソフトで作成したモデルは、ラピッドプロトタイピング用3D プリンター（Ultimaker2+またはUltimaker3）を利用して造形を行います。 <Relevant links> Administration: http://www.u-aizu.ac.jp/en/graduate/curriculum/guide/seminar-cis.html#CFS http://www.u-aizu.ac.jp/graduate/curriculum/guide/seminar-cis.html#CFS Rapid prototyping: http://en.wikipedia.org/wiki/Rapid_prototyping https://ja.wikipedia.org/wiki/ラピッドプロトタイピング Home page of publisher of main CAD software: https://www.3dsystems.com/software/geomagic-freeform https://ja.3dsystems.com/software/geomagic-freeform https://ja.3dsystems.com/press-releases/geomagic/releases-new-freeform-and-claytools-3d-modeling-softwar http://support1.geomagic.com/Support/5605/5668/en-US/Article/Folder/346/Geomagic-Claytools

CFS 2	**A computer-aided diagnosis system for screening colorectal polyps and cancer based on CT colonography and deep learning**
Instructors	Xin Zhu
Course Schedule	June 11 – September 21 (Details are to be informed by the course instructor.)
Abstract	Colorectal cancer (CRC) is one of the most popular cancer in the world. Adenoma and sessile serrated polyp lesions claim over 95% of CRC precursors. The incidence of CRC is reduced 76-90% through the early diagnosis and removal of colorectal polyps. Colonoscopy is the golden standard for the detection of colorectal polyps but experienced physicians are needed to perform colonoscopy examinations. Recently, CT colonoscopy has been developed and regarded as an additional tool for detecting colorectal polyps and cancer. Physicians are unnecessary to obtained CT colonoscopy images, and radiation dosages have been significantly reduced in advanced CT colonoscopy examinations. Therefore, CT colonoscopy may be a tool for screening colorectal polyps and cancer. However, the interpretation of CT colonoscopy is time-consuming and requires about 30 minutes for each case. In order to improve the efficiency of interpreting CT colonoscopy, we expect to develop a computer-aided diagnosis system for screening colorectal polyps and cancer CT colonography and deep learning based on CT colonography and deep learning. In this creative factory seminar, students will learn how to build a medical image database using open database and clinical database, learn the knowledge of machine learning and deep learning, and implement AI technology to clinical medicine. A seminar will be given by a guest lecturer to introduce the basic knowledge and technology of deep learning.

CFS 3	Performance Improvement of an Application using an FPGA Board
Instructors	SAITO, H., KOHIRA, Y., TOMIOKA, Y.
Course Schedule	June 18 – September 21 *Product Creation Period: July 1 – September 17
Abstract	Objective: The main objective of this seminar is to accelerate an application using a field programmable gate array (FPGA) board. Through this seminar, students learn circuit design, performance improvement, or power optimization. Moreover, students learn how to use a tool such as Electronic Design Automation (EDA) tool for their development. Through the seminar, students study 1. how to model and application using a language 2. how to use a tool 3. how a synthesized circuit or a program code works on an FPGA board 4. evaluation of the developed circuit or code Method: 1. Selection of an application such as an image processing 2. Modeling of the application using a language 3. Synthesis of an integrated circuit using Altera Quartus Prime or Xilinx Vivado 4. Simulation of the synthesized circuit or the program code using a simulator 5. Execution of the synthesized circuit or the program code

CANCELLED

CFS 4	**Why our emotions are of 3-dimensions? Multi-channel reinforcement learning model and its verification based on numerical simulation under Python**
Instructors	LUBASHEVSKIY, I., KIRA, Y.
Course Schedule	August 27 – September 12 *Product Creation Period: September 4 – September 14
Abstract	"The proposed seminar is focused on the emotions as additional informational channels enhancing our adaptation to changing environment. From this standpoint emotions, on one side, enable us to avoid stagnation caused by lack of objective information and make human activity more efficient. On the other side, emotions can be responsible also for chaotic human behavior, which should be avoided. According to the modern theory called Lövheim cube (Med Hypotheses, 78:341–348, 2012) our emotions can be represented as the mixture of three kinds of basic emotions related to three biochemical components. This theory, however, remains open the question why this dimension of emotions is equal to three, i.e., whether there is some biological necessity for this number of independent components. The general goal of seminar is to verify the hypothesis that 3D structure of emotions is optimal with respect to depressing the stagnation and minimizing the risk of chaos emergence. The investigation will be based on the multi-channel reinforcement learning developed by I. Lubashevsky, the Lövheim cube theory of emotion, and their numerical analysis based on Python. The result of seminar shall be: (i) the development of algorithm for describing the adaptation governed by multichannel reinforcement learning with rewords evaluated emotionally; (ii) creating Python-based program for numerical investigation of the analyzed problem. Participants' benefit includes: - acquisition with basic elements of modeling nonlinear random processes and visualizing scientific results under Python; - publication of results provided gaining success. "

CFS 5	**Customer Development with a lunar GIS software** **月地理情報システムの顧客開発**
Instructors	DEMURA, H., OGAWA, Y., HIRATA, N., ISHIBASHI, S., HONDA, C., KITAZATO, K., OKUDAIRA, K., and external lecturers
Course Schedule	Aug. 20 (Mon) - Sept. 18 (Tue) *Product Creation Period: Aug. 21 (Tue) - Sept. 20 (Thu) except for classes every Monday
Abstract	This course is a Customer Development with a lunar GIS, Gekko (http://fructus.u-aizu.ac.jp/gekko_info/en/index.html). Students will be supervised by UoA and external professors. Students make user-story-maps after interviews to researchers, then consider/design refinements of current Gekko, finally output a definition of requirements. This course is supported by FY2017-19 Coordination Funds for Promoting AeroSpace Utilization MEXT, Japan. Textbook 1: Lean Customer Development (in Japanese) ISBN-10: 4873117216 ISBN-13: 978-4873117218 Textbook 2: The Agile Samurai: How Agile Masters Deliver Great Software (in Japanese) ISBN-10: 4274068560 ISBN-13: 978-4274068560 Class Schedule #1 Aug. 20(Mon) Lectures; Basic Knowledge's of Customer Development, Lunar Science, Data Analysis, and Gekko #2 Aug 21 (Tue) Interview 1 and Making User-Story-Map #3 Aug 27 (Mon) Interview 2 and Making User-Story-Map #4 Sept 3 (Mon) or 18 (Tue) Definition of requirements Final Presentation: Sept. 21(Fri) Poster Presentation --- 月 GIS のひとつ月光（http://fructus.u-aizu.ac.jp/gekko_info/index.html）を例に取って、ユーザ顧客開発を実践する。 会津大学教員と外部講師が指導して研究者へのインタビュー後にユーザーストーリーマップを作成し、現行の月光の改修可能性を探り、開発要件定義を行う。 本コースは文科省宇宙航空科学技術推進委託費に基づいて行われる。 Textbook 1: リーン顧客開発 （オライリージャパン） ISBN-10: 4873117216 ISBN-13: 978-4873117218 Textbook 2: アジャイルサムライー達人開発者への道ー （オーム社） ISBN-10: 4274068560 ISBN-13: 978-4274068560 スケジュール #1 8/20(月) 座学:顧客開発、月科学、データ解析、GIS 月光*の基礎知識 #2 8/21(火) インタビュー&ユーザーストーリーマップ作成 1 #3 8/27(月) インタビュー&ユーザーストーリーマップ作成 2 #4 9/3(月) or 9/18(火) 要件定義まとめ 9/21(金) 成果発表会(ポスター)

CFS 6	Hand Motion Capture and Interaction with VR Contents
Instructors	JING, L.
Course Schedule	August 27 – August 31
Abstract	"Virtual Reality is a promising technology to change many field like game, movie, robot control, and so on. But currently, the interaction method is limited to traditional controller, which is not intuitive to operate the virtual objects. Therefore, in this CFS, we kick start a brand-new project to provide a mutual interaction method with the virtual objects. We will make use the wearable motion capture method to detect the natural hand motion with a digital glove, so that people can operate the virtual objects in the same way as they operate the real objects. The course will take 5 days in the end of August. Through the course, we can learn the fundamental knowledge on the data processing, space motion tracking, and 3D representation. Most important, we can experience how to make use of the learned knowledge and skills to solve the practical problems and how to build an end-to-end system from the sketch. It is more like a hackason, and we hope any students with strong motivation to join and enjoin. Seminar Schedule: Aug. 27~31 (5 days) 1st day: Introduction on MoCap Platform 2nd day: Modeling of 3D VR Contents 3rd day: Project based Learning 4th day: Project based Learning 5th day: Presentation on project outcome

CFS 7	Development of Autonomous driving/piloting Algorithms on Programmable SoC
Instructors	OKUYAMA, Y., SUZUKI, T., ASAI, N., BEN, A.
Course Schedule	June - September
Abstract	Multiple companies develop vehicles capable of autonomous driving and piloting. These vehicles can run/fly autonomously without any drivers/pilots. Currently, self-driving technologies employ some specialized devices such as GPS, maps, LiDARs, and other sensors. The fully automated driving/piloting vehicles must have a responsibility of protecting humans with a general monocular camera and image recognition for multiple tolerance. However, existing embedded processor systems have a difficulty of real-time image recognition due to the calculation complexity of algorithms. Technological innovation by FPGA and programmable SoC is indispensable for this realization. In this class, we aim to develop an implementation of vision based algorithms on FPGA required for safety autonomous driving/piloting. Participants who join in this class must have following previous knowledge about Python, C language, and FPGA development. Participants will learn about Data recording/playing, camera calibration, and path following and vehicle control. After that, participants will solve project-based assignment selected by following topics. 1. Map generation and localization 2. Object detection and traffic light detection 3. Path generation and path planning Participants must implement a circuit of a part of these algorithms on programmable SoC board. Schedule June: (a) Understanding about Data recording/playing, camera calibration (b) Path following and vehicle control. July: Project selection and Implementation Two times project meetings per week August: Self-working September: September 7th: Deadline of the project assignment. Making poster and reports until 20th September.