(FBL/PBL)

Theme name	Virtual Immersive Game Design
Teacher	Graduate School of Informatics NITSCHKE, CHRISTIAN Unit of Design Assistant Professor KITA, Yusuke
Collaborators	
Topic background	For a long time, the concept of a computer was a calculation device that is controlled by a human operator through keyboard, mouse and monitor. If aliens took such a computer from earth, what would they conclude about us humans? Probably, that we perceive our world through weak eyes, communicate mainly with our fingers, and are otherwise unable to freely move, hear, smell and sense. These days, expectations on usability and efficiency grow together with rapid advances in technology, as computational devices enter all areas of human life. A major challenge is the design of novel human-computer interfaces (HCI) that overcome the described bottleneck and enable rich, efficient and natural interaction. This should create the effect of 'immersion', where the user believes that the virtual environment is actually a real physical environment. After developing such a novel user experience, it is necessary to evaluate its implications and potential for novel application areas. These could be, for example: • teaching, training and testing of skills; • support of collaborative work and assembly of teams; • assessment of medical conditions through interaction; and • study on behavior and communication in psychology and behavior science. This will design a deeper and bigger aspect of the technology and go beyond the application of current computing technology.
Overview	In this course we want to design, implement and test such novel interaction concepts through the development of a virtual immersive multiplayer game, such as Basketball or Futsal. Computer games are an ideal application category for this task, because: • they are a major driving force behind novel developments, • they implicitly allow to demonstrate and evaluate computational concepts, • and motivate doing this in a playful manner. The goal is to create an immersive game unit for each player, that captures the players natural actions and visualizes the game scenario on a large 360° display. Multiple game units at different locations (KRP and Yoshida campus) are connected through network and operated in parallel. Participants of this project will cooperatively solve a technical sub-problem of their choice, mainly related (but not limited) to: (1) Input interface design (action recognition using Microsoft Kinect cameras), (2) Output interface design (visualization on a large tiled-screen with possible 3D extension), (3) Recording interface design (cameraman interface to capture the gameplay),

	(4) Network communication design (distributed computing, latency handling), (5) Gameplay design (3D world model, animated avatars and interactive items), (6) Game application design (to solve some larger problem through game play). Beside the technical system implementation, the aim of this course is to develop important soft skills for collaborative problem solving and work management. The detailed contents of the course will be defined upon negotiation together with the students at the beginning of the course.
Place	KRP Building #9, Room 505 (Virtual Reality System) Nishida-Lab students will operate the game units at Yoshida campus. Therefore, participants of this course can stay at KRP and do not need to come to Yoshida campus.
Conditions for participation	Welcome are participants with skills/experience related to the problems of this course. This can be technical system design, artistic content design, gameplay design, social system design etc. Required for the technical part is a background in engineering, computer science, information technology or similar fields; experience in software engineering; and practical implementation skills in a major language like C/C++, C#/.NET, Java, and Python. Desirable would be knowledge and experience in multimedia data processing, computer vision, computer graphics/visualization, game design and network programming. Also, don't forget to bring your personal Note-PC.
Number of participants	Max 10 participants. The participants will be grouped into teams, based on their wishes, capabilities and problem tasks.
Application deadline	May, 7 (Tuesday) 5PM
Target participants	The course targets Design School students, as well as motivated undergraduate (>B3) and graduate students, researchers and engineers from Kyoto University, other universities, institutes and companies. However, if the number of applicants exceeds the maximum, priority will be given to Design School students.
How to apply	(For students of this program: follow the instructions given in the guidance) By email, including the following items: To: christian.nitschke@i.kyoto-u.ac.jp Cc: fblpbl-application@design.kyoto-u.ac.jp Subject: [PBL Application] Virtual Immersive Game Design Main text: name, affiliation, position/school year, email address, web page, theme name, background/specialization, motivation and other information
Decision of participants	By email, until May, 10 (Friday)
Design theories and techniques for problem analysis and	Practical working skills: • Problem analysis and solution design • Design, implementation and evaluation of complex systems

solution finding	Soft skills • Project and (team-)work management • Presentation and discussion • Result consolidation and demonstration • English language and inter-cultural ability The course will be mainly held in English. However, motivated participants are especially encouraged to not reject this course because of lacking English skills. The level and usage of English will be flexibly adjusted based on the level of the participants, and will not count for grading the course. The aim is to create a non-intimidating atmosphere for the use of English without fear, to enable the access of globally available resources.
Method for studying theories and techniques	The course will comprise: • Mini lectures on problems and related technologies • Group-based problem solving • Practical implementation and result presentation • Weekly progress reports (PPT) with group discussion • Major intermediate and final presentations (PPT) • Preparation of results for webpage publication
Method for publishing the results	Throughout the duration of the course, we will create and maintain a webpage in the Design School web that contains: overview of the course, problems and solution methods, study progress and (intermediate) results.
Performance evaluation method	• Attendance: 30% • Final report and presentation: 30% • Activity, collaboration, comprehension of methods and theories: 40%
Special remarks	Project outcome: • Each participant will independently create a final report (2-3 A4 pages) that summarizes solved problems, progress and results. • Project results and materials (survey, presentation/discussion, source code, documentation) will be made accessible through the webpage and are well prepared to ensure the preservation of the knowledge and continuity of the course. Future plan: Building on the results of this course, we plan to offer a more research-oriented continuation course next term (PBL or Leading Project). Current participants should especially consider joining that course to study about publication and presentation of their work. The focus is the following: • Understanding research and publication process • Survey of related research areas and analysis of publication possibilities • Improvement of previous results with goal on publication • Design and implementation of experimental evaluation • Publication of a research paper including the participants names

Unit	Schedule	Place	Content
Planning Phase			
1	Begin of June	KRP	Introduction lecture • Motivation and goal of the project • Overview of problems and solution strategies • Outline and organization of the course
2			Team and problem assignment • Group brainstorming about ideas and strategies • Plenum presentation and discussion
3			Survey of tools and consolidation of strategies • Plenum presentation and discussion
Development Phase			
4			Workspace setup • Programming environment with toolkits/APIs • Run demo programs, understand sample code
5-7			Development 1 • Design and implementation of functionality/solving of each problem module • Debug and test
8			Intermediate presentation • Explain intermediate results to enable integration
9-11			Development 2 • Consolidate interfaces to related modules • Integrate modules • Test, debug, play and evaluate the game
Consolidation Phase			
12			Creation of documentation material (videos, screenshots etc.)
13			Preparation of results • Source code cleaning, documenting, packaging • Document source code project usage
14			Webpage finalization (update, cleanup)
15	End of July		Final presentation • Presentation and demonstration of results • Evaluation of course expectations and results • Submission of project reports

KRP: 9   5