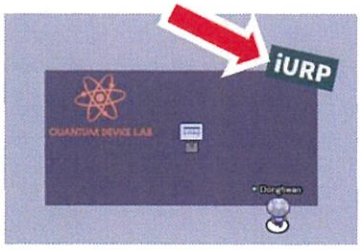
Int'l Undergraduate Research Program (iURF

- NEW program from this winter (starting in Dec 2021)
- 2-month online research participation with KAIST labs

Research Topic	Professor
Introduction to Quantum Information	Bae Joonwoo
Modeling quantum noise by nonlinear optical process with computational physics	Sohn Young0lk
Design and simulation of three-dimensional MEMS nano/micro devices	Lee Hyunjoo
Inverse Design of Broadband Antireflection Coatings and Photonic Nano-jets	Hamza Kurt
machine learning for keyword spotting voice activation	Cho Seonghwan
Ferroelectric Field Effect Transistor (FeFETs) for neuromorphic applications	Jeon Sanghun
FPGA-based Face Recognition System with Reconfigurable CNN Accelerator Design	Yoo Hoi-Jun
Understanding of Polar Codes and Decoding Algorithms	Ha Jeongseok
First-principles calculations for nanostructures	Kim Yong-Hoon
Metasurface in Nanophotonics	Jang Min Seok
Vision transformer for place localization	Kweon In So
Study of Uncertainty in Bayesian Neural Network Prediction	Yoo Chang Dong
Scalable Processing-in-memory Architecture Exploration	Kim Dongjun
Biomedical Image Analysis	Yoon Young-Gyu
Modular Universal Circuit Test and Measurement Platform	Jung Wanyeong

Applying to iURP

- 3-step application
- **Step #1:** Read the 15 proposals (from 15 labs) in the EE webpage and gather.town
- **Step #2:** Meet with the lab during the virtual lab fair
  - All iURP-participating labs are in the virtual lab fair
  - Lab booth also has the iURP proposal posted
- **Step #3:** Send email to eeio@kaist.ac.kr with your CV, transcript, and the lab you are applying to.
- Application period: Nov. 5 – Nov. 12 (KST)
  - Your application will be reviewed by the lab you applied
- Questions?
  - Email eeio@kaist.ac.kr



2021 iURP Proposal List_KAIST EE

No.	Division	Research Subject Title	Professor
1	Signal	Vision transformer for place localization	In So Kweon
2	Computer	Scalable Processing-in-memory Architecture Exploration	John Kim
3	Device	First-principles calculations for nanostructures	Yong-Hoon Kim
4	Wave	Introduction to Quantum Information	Joonwoo Bae
5	wave	Modeling quantum noise by nonlinear optical process with computational physics	Sohn, youngik
6	Signal	Study of Uncertainty in Bayesian Neural Network Prediction	Chang Dong Yoo
7	Circuit	FPGA-based Face Recognition System with Reconfigurable CNN Accelerator Design	Hoi-Jun Yoo
8	Signal	Biomedical image analysis	Young-Gyu Yoon
9	Device	Design and simulation of three-dimensional MEMS nano/micro devices	Lee, Hyunjoo Jenny
10	Wave	Metasurface in Nanophotonics	Min Seok Jang
11	Device	Ferroelectric Field Effect Transistor (FeFETs) for neuromorphic applications	Sanghun Jeon
12	Circuit	Modular Universal Circuit Test and Measurement Platform	Wanyeong Jung
13	Circuit	machine learning for keyword spotting voice activation	SeongHwan Cho
14	Communication	Understanding of Polar Codes and Decoding Algorithms	Jeongseok Ha
15	Wave	Inverse Design of Broadband Antireflection Coatings and Photonic Nano-jets	Kurt, Hamza

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iURP Research Plan

Title	Vision transformer for place localization
Summary	Visual localization is the problem of estimating the pose of a camera in a known scene. It is a key component for various tasks such as robots navigation or autonomous vehicles. Extracting robust and compact representations is a key to resolve such a problem. The recent developments in deep learning architectures demonstrated that vision transformer (ViT) are very beneficial to extract robust embeddings. However, such type of strategy has not yet been utilized for visual localization. In this iURP project, we would like to explore the relevance of ViT for visual localization.

Period	Topics/Tasks
Week 1 (Dec. '21)	Initiation to visual place localization (traditional techniques, existing datasets)
Week 2	Hands on deep place localization (PoseNet, NetVLAD) and metric learning
Week 3	First trial on a benchmark dataset using pretrained NetVLAD
Week 4	Extensive literature on modern place localization
Week 5	Study on the basis of Transformer networks (spatial encoding, ViT, etc)
Week 6	Development of a baseline network using ViT
Week 7	Development of a baseline network using ViT
Week 8	Exploring self-supervised approach
Week 9	Report, final experiments

Call for Participants

Prerequisites Backgrounds Qualifications	- Machine learning background - Experience with PyTorch/TensorFlow - Knowledge in 3D vision (a plus)
# of participants sought	1

Advisor and Lab Info.

Advisor	Prof. In So Kweon
Lab Name	Robotics and Computer Vision Lab (RCV)
Lab Link	**http://rcv.kaist.ac.kr**
Research Area (Division)	**Signal Division**
Contact: Teaching assistant (email)	**Yun Jae Jung <yun9298a@kaist.ac.kr>**

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iURP Research Plan

Title	Scalable Processing-in-memory Architecture Exploration
Summary	Processing-in-memory (PIM) architectures have become an important architecture to enable high performance while minimizing data movement. However, PIM architectures presents unique challenges, especially in terms of scalability. This research project will address how PIM architecture can be scaled. The students will learn about not only PIM but also interconnection networks.

Period	Topics/Tasks
Week 1 (Dec. '21)	Introduction
Week 2	Processing-in-memory (PIM) architecture review
Week 3	Interconnection network architecture review
Week 4	Study BookSim network simulator
Week 5	Analyze / understand challenges with PIM and scalability
Week 6	Explore/design microarchitectures
Week 7	Perform analysis on the potential performance benefits
	Implement proof-of-concept in simulator
Week 8	Provide preliminary results
	Summary
	Please add rows as needed

Call for Participants

Prerequisites Backgrounds Qualifications	Undergrad computer architecture Basic programming skills (C, C++, etc.)
# of participants sought	2

Advisor and Lab Info.

Advisor	Prof. John Dongjun Kim
Lab Name	Computer Systems and Network Lab
Lab Link	http://icn.kaist.ac.kr
Research Area (Division)	Computer Division
Contact: Teaching assistant (email)	Hans Kasan < hanskasan@live.com >

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iURP Research Plan

Title	First-principles calculations for nanostructures
Summary	In this iURP, participanting students will (1) study several key concepts of solid-state physics and first-principles density functional theory (DFT) calculations, and (2) perform tight-binding (TB) and DFT computer simulations for Si and nano carbon materials. Successfully completing the program, students will be able to achieve deeper understanding of nanoscience and will be ready for carrying out advanced computer simulations for nanoelectronics research.

Period	Topics/Tasks
Week 1 (Dec. '21)	Overview + Introduction: Solid state physics
Week 2	Tight binding (TB) model: Graphene
Week 3	Denstiy functional theory (DFT)
Week 4	Modeling/ K-point sampling / Geometry optimization: C-chain, graphene, Si bulk
Week 5	Density of states (DOS) / Band structure: C-chain, graphene, Si bulk
Week 6	Projected density of states / Fatband: C-chain, graphene, Si bulk
Week 7	Phonon band structure: C-chain
Week 8	Project report: Carbon nanotube (CNT) TB & DFT

Call for Participants

Prerequisites Backgrounds Qualifications	Basic quantum mechanics Basic programming skills (Python or MATLAB)
# of participants sought	2~3

Advisor and Lab Info.

Advisor	Prof. Yong-Hoon Kim
Lab Name	1st-Principles Nano-Device Computing Lab
Lab Link	nanocore.kaist.ac.kr
Research Area (Division)	Device
Contact: Teaching assistant (email)	dndhdrnl@kaist.ac.kr ronggyulee@kaist.ac.kr

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iURP Research Plan

Title	Introduction to Quantum Information
Summary	Quantum information processing opens an avenue to new information technologies beyond the current limitations but, more importantly, provides an approach to understanding information processing at the most fundamental level. What is desired is to find how Nature performs information processing with the quantum and classical systems. The iURP provides a modest step to learn quantum information about how physical systems can be manipulated by the laws of quantum mechanics, how powerful they are in practical applications, and how the fundamental results make quantum advantages.

Period	Topics/Tasks
Week 1 (Dec. '21)	Introduction & Overview
Week 2	Quantum Theory to Information Technologies
Week 3	Qubit
Week 4	Bipartite Quantum Systems
Week 5	Quantum Computing
Week 6	Quantum Communication
Week 7	Entanglement
Week 8	Summary

Call for Participants

Prerequisites Backgrounds Qualifications	General Physics, Calculus, Linear Algebra
# of participants sought	10

Advisor and Lab Info.

Advisor	Prof. Joonwoo Bae
Lab Name	Quantum Information Theory
Lab Link	**https://sites.google.com/view/qitkaist**
Research Area (Division)	**Quantum Information Technologies (WAVE)**
Contact: Teaching assistant (email)	**Hyeokjea Kwon (hyukjaekwon@kaist.ac.kr)**

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iURP Research Plan

Title	Modeling quantum noise by nonlinear optical process with computational physics
Summary	Spontaneous photon pair generation by nonlinear optical process is at the heart of creating pure single photons for the variety of applications: photonic quantum computing, single photon generation, quantum communications, quantum entanglement. In this work, iURP student will learn fundamentals of photonics and nonlinear optics through guided reading and discussion in the first half of the program. Based on this knowledge, students will be asked to build a simulating software that can predict the number of quantum photons produced by noise process.

Period	Topics/Tasks
Week 1 (Dec. '21)	Review of the background of student and the project summary
Week 2	Select topics of nonlinear optics for students to cover
Week 3	Fundamentals of integrated photonics
Week 4	Understanding nonlinear electric susceptibility
Week 5	Nonlinear optical process 1: Spontaneous four-wave mixing (SFWM)
Week 6	Nonlinear optical process 2: Spontaneous Raman scattering
Week 7	Building SFWM simulator for SMF-28 optical fibers (1)
Week 8	Building SFWM simulator for SMF-28 optical fibers (2)
Week 9	Building SFWM simulator for SMF-28 optical fibers (1)
Week 10	Building Raman scattering simulator for integrated photonic waveguides (1)
Week 11	Building Raman scattering simulator for integrated photonic waveguides (2)
Week 12	Building Raman scattering simulator for integrated photonic waveguides (3)

Call for Participants

Prerequisites Backgrounds Qualifications	Understanding of Maxwell's equation and wave phenomena Experience of computational language such as Python, MATLAB, Wolfram Mathematica and ETC
# of participants sought	2

Advisor and Lab Info.

Advisor	Prof.
Lab Name	Quantum device laboratory
Lab Link	https://qdl.kaist.ac.kr
Research Area (Division)	Wave
Contact: Teaching assistant (email)	daehan96@kaist.ac.kr

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iURP Research Plan

Title	Study of Uncertainty in Bayesian Neural Network Prediction
Summary	As an alternative to neural network defined by fixed valued parameters, Bayesian Neural Network (BNN) has its parameters defined by a distribution. It is particularly useful when data is scarce (esp. in the medical field) and overfitting is the main problem. Recent study has shown correspondence between deep BNN and Gaussian Process and here we examine this correspondence to leverage our understanding of uncertainty of BNN prediction based on MVFI and HMC.

Period	Topics/Tasks
Week 1 (Dec. '21)	Bayesian Learning
Week 2	Study Gaussian Process (GP)
Week 3	Application of GP for regression and classification on Benchmark Dataset
Week 4	Bayesian Neural Network/Correspondence with GP
Week 5	Approximate Inference in BNN
Week 6	Application of BNN on Segmentation + Continual Learning
Week 7	Comparing Approx. vs exact Inference (MVFI and HMC)
Week 8	Write up and Presentation

Call for Participants

Prerequisites Backgrounds Qualifications	Calculus, Probability and Statistics, Basic Machine Learning, Programming
# of participants sought	2

Advisor and Lab Info.

Advisor	Prof. Yoo Chang Dong
Lab Name	Artificial Intelligence and Machine Learning (AIM)
Lab Link	**http://www.slsp.kaist.ac.kr**
Research Area (Division)	**Signal**
Contact: Teaching assistant (email)	**Yoon Sunjae/ Yoon Hee suk**

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iURP Research Plan

Title	FPGA-based Face Recognition System with Reconfigurable CNN Accelerator Design
Summary	Applications are invited for an iURP Research Plan focused on integrating the state-of-the-art Machine learning algorithm with fully custom designed Digital system on FPGA. From the algorithm profiling to SW-HW co-optimization, students will experience end-to-end, SW-HW co-optimized AI system design. The project will instructed by the Prof. Yoo and at least one graduate student working on the same topic. The project has a fundamental focus, in developing practical energy-efficient IoT system with high performance accelerator, and can be furtherly developed after the iURP.

Period	Topics/Tasks
Week 1 (Dec. '21)	[Seminar] An overview of Face Recognition network structure; [Project] Software design task assignment
Week 2	[Seminar] A brief introduction on CNN inference and training; [Project] Software design plan
Week 3	[Seminar] Training and testing of Face Recognition training based on Pytorch; [Project] Software design evaluation
Week 4	[Seminar] An overview of digital system desing; [Project] Hardware accelerator design task assignment
Week 5	[Seminar] A brief introduction on FPGA and its design; [Project] Hardware accelerator design plan review
Week 6	[Seminar] Deep learning accelerator design preview; [Project] Hardware accelerator design review
Week 7	[Seminar] Introduction to embedded system and software; [Project] Face Recognition Demo system design task assignment
Week 8	[Seminar] RISC-V based embedded system design guide; [Project] Face Recognition system design plan
Week 9	[Project] Face Recognition system design evaluation
	Please add rows as needed

Call for Participants

Prerequisites Backgrounds Qualifications	Computer Architecture, Digital system design(experience of FPGA project preferred), Computer Aided Design of VLSI(experience of Verilog preferred), Deep-learning Algorithm(experience of any ML project preferred),
# of participants sought	1~2

Advisor and Lab Info.

Advisor	Prof. Hoi-Jun Yoo
Lab Name	Semiconductor System Lab
Lab Link	**http://ssl.kaist.ac.kr/**
Research Area (Division)	Circuit Division
Contact: Teaching assistant (email)	**zhiyong_li@kaist.ac.kr**

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iURP Research Plan

Title	Biomedical image analysis
Summary	The goal of this iURP research is to learn basics and hands-on experiences of biomedical image processing, with an emphasis on processing optical fluorescence microscopy images of biological tissues.

Period	Topics/Tasks
Week 1 (Dec. '21)	(Study) basics of optics
Week 2	(Study) basics of optics
Week 3	(Study) basics of optical microscopy
Week 4	(Study) biomedical image registration
Week 5	(hands-on) biomedical image registration
Week 6	(hands-on) biomedical image registration
Week 7	(Study) biomedical image segmentation
Week 8	(hands-on) biomedical image segmentation
Week 9	(hands-on) biomedical image segmentation
Week 10	(hands-on) biomedical image segmentation
	Please add rows as needed

Call for Participants

Prerequisites Backgrounds Qualifications	Signal processing (convolution, LTI system, Fourier series, Fourier transform) MATLAB or Python
# of participants sought	1

Advisor and Lab Info.

Advisor	Prof. Young-Gyu Yoon
Lab Name	Neuro-Instrumentation and Computational Analysis Lab
Lab Link	https://nica.kaist.ac.kr/
Research Area (Division)	Biomedical imaging, Biomedical image processing (Signal)
Contact: Teaching assistant (email)	Gyuri Kim (gyuri2102@kaist.ac.kr)

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iURP Research Plan

Title	Design and simulation of three-dimensional MEMS nano/micro devices
Summary	• Literature survey on various microfabrication methods of three-dimensional MEMS nano/micro devices • Design three-dimensional nano/micro devices • COMSOL simulation on the flexibility and stretchability of the designed devices

Period	Topics/Tasks
Week 1 (Dec. '21)	• Literature survey on three-dimensional nano/micro devices • Tutorial on COMSOL Multiphysics simulation
Week 2	
Week 3	
Week 4	• Design three dimensional nano/micro devices
Week 5	
Week 6	
Week 7	• COMSOL simulation on the flexibility and stretchability of the designed devices
Week 8	
Week 9	
Week 8	• Final presentation

Call for Participants

Prerequisites Backgrounds Qualifications	• Interest in semiconductor microfabrication and devices • Interest in biomedical engineering
# of participants sought	1

Advisor and Lab Info.

Advisor	Prof. Hyunjoo Jenny Lee
Lab Name	Brain/bio Medical Microsystems Lab (BMM)
Lab Link	http://bmm.kaist.ac.kr/
Research Area (Division)	Biomedical devices
Contact: Teaching assistant (email)	Contact professor first (hyunjoo.lee@kaist.ac.kr)

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iURP Research Plan

Title	Metasurface in Nanophotonics
Summary	The purpose of this research plan is to provide the basic concepts and applications of metasurface in nanophotonics to the participants. The program covers the definition, classification and development status of the metasurface along with recent research trends as well as their applications.

Period	Topics/Tasks
Week 1 (Dec. '21)	Course Overview
Week 2	Introduction to Metasurface 1
Week 3	Introduction to Metasurface 2
Week 4	Applications of Metasurface in Nanophotonics Overview
Week 5	Interaction Period
Week 6	Examples of Application: Amplitude Modulation
Week 7	Examples of Application: Phase Modulation
Week 8	Examples of Application: Nonlinear Metasurface
Week 9	Dynamic Metasurface
Week 10	Summary and Interaction Period
	Please add rows as needed

Call for Participants

Prerequisites Backgrounds Qualifications	Electromagnetism
# of participants sought	

Advisor and Lab Info.

Advisor	Prof. Jang, Min Seok
Lab Name	Nano-optics lab
Lab Link	**http://janglab.org**
Research Area (Division)	**Wave division**
Contact: Teaching assistant (email)	**huili@kaist.ac.kr**

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iURP Research Plan

Title	Ferroelectric Field Effect Transistor (FeFETs) for neuromorphic applications
Summary	As the research and development of artificial intelligence accelerates, the research demand for electronic devices that will replace the role of neurons to imitate human neural networks is also rapidly increasing. Devices based on ferroelectric film are also attracting attention as strong candidate for such research. In this program, we plan to develop a ferroelectric thin film with optimal characteristics as a neuromorphic device and analyze the characteristics of FeFET based on it.

Period	Topics/Tasks
Week 1 (Dec. '21)	Introduction to hafnia ferroelectric and its transistor memory (Lab Seminar)
Week 2	Fabrication process of MFM Capacitor
Week 3	Fabrication process of Ferroelectric FET (FeFET)
Week 4	Measurement of FeFET devices (Ferroelectric capacitor and FeFET characteristics) Guide to data plot program(Origin)
Week 5	Prerequisites of FeFET for Neuromorphic device application (Individual study)
Week 6	Data analysis : memory window, switching speed
Week 7	Data analysis on FeFET reliability characteristics
Week 8	Data analysis : Extraction of Neuromorphic related Characteristics
Week 9	Summary & Data report

Call for Participants

Prerequisites Backgrounds Qualifications	Introduction to Physical Electronics and Device Physics
# of participants sought	There is no limitation

Advisor and Lab Info.

Advisor	Prof. Sang-Hun Jeon
Lab Name	ANTONIS Lab
Lab Link	http://antonis.kaist.ac.kr/
Research Area (Division)	Device Division
Contact: Teaching assistant (email)	Gi-Uk Kim : kimgiuk@kaist.ac.kr Tae-Seung Jung : taeseung97@kaist.ac.kr

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iURP Research Plan

Title	Modular Universal Circuit Test and Measurement Platform
Summary	The group needs a universal platform for testing various analog / digital circuits, including power converters, ADCs, sensors, processors, and AI accelerators. Now we rely on bulky measurement equipment, and modular PCB-based system will ease the testing and measurement. We are looking for a student who can help us build PCB hardware and/or software stacks for controlling these modular units.

Period	Topics/Tasks
Week 1 (Dec. '21)	Project requirements discussion
Week 2	Introduction to Altium Designer - Schematic
Week 3	Introduction to Altium Designer – Layout
Week 4	Architecture design Component value calculation Schematic design 1
Week 5	Schematic design 2
Week 6	Board layout 1
Week 7	Board Layout 2 Sending design files to PCB manufacturer
Week 8	Control software development in Python Testing serial interface messages
Week 9	Embedded application development in C
Week 10	Board assembly Testing

Call for Participants

Prerequisites Backgrounds Qualifications	Basics on analog / digital electronic circuits Experience on area-efficient PCB design Python programming skills for embedded system control Basics of C programming for microcontrollers
# of participants sought	1 or 2

Advisor and Lab Info.

Advisor	Prof. Wanyeong Jung
Lab Name	Smart Energy-Efficient Design Laboratory
Lab Link	https://seed.kaist.ac.kr/
Research Area (Division)	Circuit
Contact: Teaching assistant (email)	**Michal Gorywoda** **hotwater@kaist.ac.kr**

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iURP Research Plan

Title	machine learning for keyword spotting voice activation
Summary	This research aims to evaluate the performance of various artificial intelligence machine learning codes for keyword spotting voice activation application. Recognition accuracy of about 30 keywords will be evaluated for various neural network model and their complexity will also be investigated.

Period	Topics/Tasks
Week 1 (Dec. '21)	basic study of python, tensorflow and machine learning
Week 2	basic study of python, tensorflow and machine learning
Week 3	basic study of python, tensorflow and machine learning
Week 4	basic study of python, tensorflow and machine learning
Week 5	investigation of neural network model
Week 6	investigation of neural network model
Week 7	evaluation of neural network model
Week 8	evaluation of neural network model
Week 9	evaluation of neural network model
Week 8	evaluation of neural network model
	Please add rows as needed

Call for Participants

Prerequisites Backgrounds Qualifications	statistics, signal processing, and some basics of machine learning.
# of participants sought	1~2

Advisor and Lab Info.

Advisor	Prof. SeongHwan Cho
Lab Name	Cho's Circuits and Systems Lab
Lab Link	https://ccs.kaist.ac.kr/
Research Area (Division)	Circuit
Contact: Teaching assistant (email)	T.A. Pangi Park (pangipark@kaist.ac.kr)

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iURP Research Plan

Title	Understanding of Polar Codes and Decoding Algorithms
Summary	In this project, the participating students learn the basics of error-correcting codes and a specific coding technique, polar coding. Recently, polar coding has taken a lot of interest due to its capacity-achieving performances. Thus, the undergraduate research project must provide a unique opportunity for the students to have a solid understanding of theories and techniques which have been recently discovered in the coding theory society.

Period	Topics/Tasks
Week 1 (Dec. '21)	Linear Codes
Week 2	Linear Codes
Week 3	Decoding Algorithms
Week 4	Maximum Likelihood Decoding/MATLAB Practice
Week 5	Polar Codes
Week 6	Polar Codes
Week 7	Understanding of Successive Cancellation Decoding (SCD)/MATLAB Practice
Week 8	Implementation of SCD/MATLAB Practice
Week 9	Implementation of SCD/MATLAB Practice
Week 10	Implementation of List Successive Cancellation Decoding (List-SCD)
Week 11	Implementation of List Successive Cancellation Decoding (List-SCD)
Week 12	Performance Evaluations

Call for Participants

Prerequisites Backgrounds Qualifications	1. Linear Algebra 2. Probability Theory
# of participants sought	1 or 2

Advisor and Lab Info.

Advisor	Prof. Jeongseok Ha
Lab Name	Coding and Communications Lab
Lab Link	http://cocoa.kaist.ac.kr/
Research Area (Division)	**Communications**
Contact: Teaching assistant (email)	**Han, Seokju at enfgui@kaist.ac.kr**

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iURP Research Plan

Title	Inverse Design of Broadband Antireflection Coatings and Photonic Nano-jets
Summary	Increasing the efficiency of solar cell or boosting the performance of photodetectors require suppression of the reflected amount of power. Hence, antireflection coatings (ARCs) are very crucial structure in photonics. Meanwhile, special focusing of incident light in space provides many benefits in the applications of optical sensing and spectroscopy. Photonic nano-jets (PNJs) have narrow spot size and long depth of field. Instead of designing photonic structures using conventional approaches, we propose utilizing advanced analysis tools based on inverse design to obtain new type ARCs and PJs.

Period	Topics/Tasks
Week 1 (Dec. '21)	Optics of Dielectric Multilayers
Week 2	Conventional Antireflection coating (ARC) design
Week 3	ARCs in solar cell and photodetector
Week 4	Photonics micro-ring/disk structures
Week 5	Integrated elements to focus light
Week 6	Photonic nanojets generation with conventional methods
Week 7	Maxwell wave analysis basics
Week 8	Inverse design in photonics
Week 9	Modelling of ARC parameters with inverse design
Week 8	Modelling of photonic nanojets with inverse design
	Please add rows as needed

Call for Participants

Prerequisites Backgrounds Qualifications	Basic background in electromagnetics field theory and wave analysis using numerical methods are required.
# of participants sought	Two undergraduate students from TED University, Ankara (Electrical and Electronics Eng.)

Advisor and Lab Info.

Advisor	Prof. Hamza Kurt
Lab Name	MetaPhotonics Lab
Lab Link	https://kurtresearch.com/
Research Area (Division)	Wave Division
Contact: Teaching assistant (email)	Junhyeong Kim wnsgud@kaist.ac.kr