Ibrahim Bin Yasir

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About Me

Robotics graduate with undergrad in Mechanical Engineering. Proficient in Mechanical Design, Control and Signal Processing (MATLAB/LabView), Prototyping (MEMS), and Programming (Python). My passion has always been to work on new interfaces that improve people's physical and mental health HRI and robotics. I am always looking to learn and contribute for the purpose betterment of quality of life. In my free time, I like to play soccer, volunteer, hike, and travel –

Education

- **Korea Advanced Institute of Science and Technology (KAIST)** South Korea
  Master of Science - Robotics *Feb 2019 - Feb 2021*
  Thesis: "Design of a flexible optical force sensor for normal and shear force measurement in haptics" **Advisor:** Prof. Ki Uk Kyung
  Courses: *Haptics, Deep Learning, Soft Robotics, Cognition Emotion, Intelligent Robotics, Rehabilitation Engineering*
- **National University of Sciences and Technology (NUST)** Pakistan
  Bachelors in Science - Mechanical Engineering *Aug 2014 - July 2018*
  Courses: *Control systems , Measurement Instrumentation, Programming, Mechatronics, Engineering Dynamics, Machine Design*

Work Experience

- **VPIX Medical** Daejeon, South Korea
  Senior Researcher Engineer (Full-time) *April 2022 - current*
  - **Endomicroscope Probe Design** : Working on improving the stability and robustness of a confocal endomicroscopic for intraoperative cancer biopsy.
    ISO 10993 packaging for use with DaVinci Robotic Platform

- **Korea Advanced Institute of Sciences and Technology - Mechanical Engineering** Daejeon, South Korea
  Contract Researcher (Full-time) *Mar 2021 - Feb 2022*
  - **Tactile Sensor Design**: Developing an EMI immune transparent optical waveguide sensor that can measure triaxial fingertip forces. The sensor can be used in wearable displays as well as robotic graspers.
  - **Lab Assistant**: "Fabricated force sensor using MEMS. Futhermore, trained on the equipment and taught graduate students how to use microelectronics for their research."

Research Experience

- **KAIST Human Robot Interaction Lab** Daejeon, South Korea
  Graduate Student *Feb 2019 - Feb 2021*
  - **Soft Actuator + Sensor**: Worked on a self-sensing soft tactile actuator based on Dielectric elastomer actuator (DEA) for wearable haptic interface. The wearable prototype demonstrated close loop system with an output force of 0.9 N, bandwidth 0-30 Hz, flexibility, and weights 3.2 g.
  - **Haptics**: Investigated various techniques and combinations of sensory haptic feedback to the upper extremity including electro-tactile, skin-stretch and vibration for intuitional sensory substitution of patients suffering from tactile and proprioceptive loss
  - **Soft Assistive Robot** : Contributed in developing a soft sensorized wearable glove using Shape Memory Alloy (SMA) coiled spring actuator for a wearable assist robot for the wrist and upper extremity. The product was successfully able to deliver the required torque and range of motion desired during activities of daily motion. (Joint project KAIST and CNU Hospital funded by NRF and Ministry of Health and Welfare)

- **RISE Lab, School of Mechanical Engineering, NUST** Islamabad, Pakistan
  Undergraduate Student *Oct 2017 - Dec 2018*
  - **Bio-inspired actuator**: Developed a bio-inspired hybrid actuator inspired by crustacean exoskeleton by incorporating rigid shells and a soft core. When actuated, the biomimetic actuator was able to produce forces up to 11.5 N at 135 KPa, satisfying the required criteria of 8N for palm grasping. The proposed soft bio-inspired hybrid bending actuator was used as a supernumerary sixth finger for rehabilitation and robot grippers.
  - **Simulation**: Utilized SOLIDWORKS for 3D modeling and ABAQUS for simulating the design.

Projects

- **Reinforcement Learning for position control (Pytorch (Python), NI-DAQ)**: Used Pytorch to demonstrate Reinforcement-Learning for Shape memory alloy (Nitinol) position control during convection cooling. The algorithm was able to replicate traditional controllers such as PID without any prior analytical modeling of the actuator. (Dec '19)
- **Emotion Recognition for Computer-Human Interaction (TensorLFlow, OpenCV)**: Implemented a real-time emotion detection algorithm by training a deep network using TensorFlow on equal distribution of CK+ and JAFFE dataset.Preprocessed via OpenCV, facial alignment and recognition using DNN and histogram correction (March '19)
- **Soft Robot Electroadhesion (Material Fabrication)**: Achieved structural enhancement of soft electroadhesion pads by using carbon fibers reinforcement inside electrodes increasing operational force. (July '18)

- **ASME National Human Powered Vehicle Competition (3D Modelling Simulation)**: Fabricated and designed a Human driven vehicle for American Society of Mechanical Engineers event IMEC 16.Improved the design to recumbent-driven and used derailleurs for a twist-chain assembly for steering. Additionally, structural tests and rollover protection that enabled us to win the competition. (April '16)
- **Ball Throw analysis (FSR, ultrasonic IMU sensors and Arduino)**: Analyzed the momentum and position of a cricket ball via ultrasonic sensor, FSR and placing IMU on the blower's hand to predict if it was into or above the stumps. (Dec '15)

Publications

- **Conference Poster**: Ibrahim Bin Yasir, Jung-Hwan Youn, Sajjad Hussain Ki-Uk Kyung "Design of a Transparent, Simple, and Flexible Optical Force Sensor for Measurement of Triaxial Forces" ICAE 2021
- **Conference Paper**: Jung-Hwan Youn, Ibrahim Bin Yasir, Ki-Uk Kyung "Self-sensing Soft Tactile Actuator for Fingertip Interface" IROS 2020
- **Journal Paper**: Jaeyeon Jeong, Ibrahim Bin Yasir, Jungwoo Han, Cheol Hoon Park, Soo-Kyung Bok, Ki-Uk Kyung, "Design of Shape Memory Alloy-Based Soft Wearable Robot for Assisting Wrist Motion ", Applied Sciences, 2019
- **Conference Poster**: Jaeyeon Jeong, Ibrahim Bin Yasir, Jungwoo Han, Ki-Uk Kyung, "Design of SMA-based Actuator and its Application to a Wearable Robot for Wrist ", AMSM 2019
- **Conference Poster**: Geonwoo Hwang, Ibrahim Bin Yasir, Kyujin Hyeon, Ki-Uk Kyung, "Carbon Fiber Reinforced Electro-adhesion Pad for a Soft Gripper", AMSM, 2018
- **Patent**: Ibrahim Bin Yasir, Umer Niazi, Fahd Imtiaz, Yasar Ayaz, "A novel bio-inspired hybrid bending actuator with automatic locking", IPO, Pakistan (Filing process underway)

Honors and Awards

- KAIST Graduate Scholarship 2019-2021
- Daedeok High School (Lecture and Mentoring) 2021
- Pioneers 2071 (Master of Ceremonies)
- Graduate Student Mentor 2020-2021
- Fauji Foundation Scholarship 2017-2018
- ASME's Human Powered Vehicle Challenge- National Champion 2016
- 1st DICE International Symposium on Automotive and Manufacturing Engineering (SAME)
- Model United Nations Abbottabad- Outstanding Diplomacy Award
- Shahbaz Sharif Scholarship (Matric) for Academic Excellence

Skills Summary

- **Laboratory**: MEMS, Polymer Synthesis, 3D Printing, Laser cutting, Mold making and machining, PCB design
- **Tools**: MATLAB, UNITY, SolidWorks, Blender,OriginLab, KiCad, 3D Motion Capture, COMSOL,LabView
- **Languages**: Python, C++

Internships

* **Qadri Group, Sugar and Cement Plant Manufacturers, *Lead for Manufacturing*** Lahore, Pakistan
  July - Aug 2017
  · Achieved annual cost reduction of 5.27 million (PKR) by identifying and optimizing nozzle drilling. For employee safety, formulated an optimized layout of the entire factory floor by analytically calculation and Simulated using DIALUX-EVO

* **Atlas Honda Limited, *Intern*** Sheikhupura, Pakistan
  June - July 2016
  · **DownTime Improvement**: Learned techniques to optimize the assembly line time Honda CD 70 and 125 motorbikes. Achieved reduction of downtime by increasing the Overall Equipment Effectiveness (OEE)

* **Pakistan Aeronautical Complex, *Intern*** Kamra, Pakistan
  Aug 2016
  · Examined operation of K-8, F-7, and FT-5 aircraft in the Aircraft Rebuild Factory (ARF). Studied various operations involved in the manufacturing and assembly of the aforementioned aircrafts.

Mentoring Volunteering

Graduate Student Mentor Daejeon, South Korea
Help freshmen settle into University by helping them socially and academically. *June 2019 - May 2022*

International Student Mentor Daejeon, South Korea
Introduce robotics to high-school students and guide them during science club activities *May 2021 - August 2021*

Hunehar (Child Eduucation NGO) Islamabad, Pakistan
Worked for opening a school child education for underprivileged children. *Jan 2017 - Jan 2018*

Justajoo (NGO) Lahore , Pakistan
Distributed food among the needy during the fasting period for Muslims *June 2016- July 2016*

Shifa Eye Hospital Rawalpindi, Pakistan
Helping regular eye patients and conducted an eye camp in rural areas *June 2014*