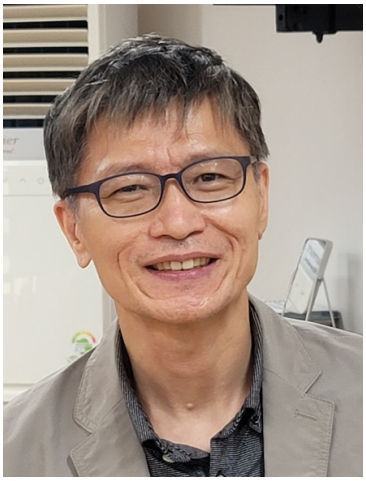
INTERVIEW WITH RESEARCH TEAM OF MULTIDIMENSIONAL INSIGHT LAB IN YONSEI UNIVERSITY, SOUTH, KOREA

Lab website : http://insight.yonsei.ac.kr/gnuboard/
Youtube link : https://www.youtube.com/channel/UC68Rvsp15g1xReaKt86QnHA/



Professor Sang Hoon Lee

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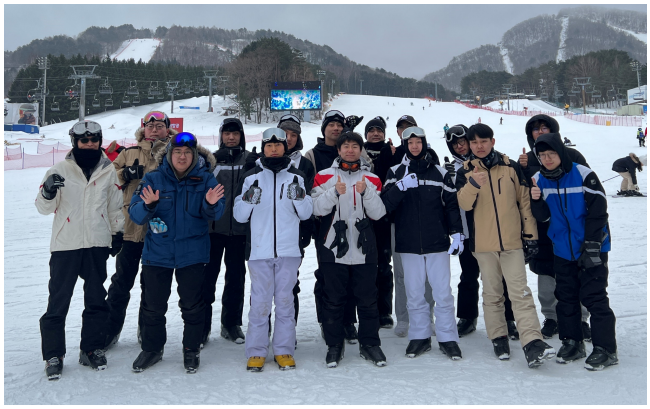
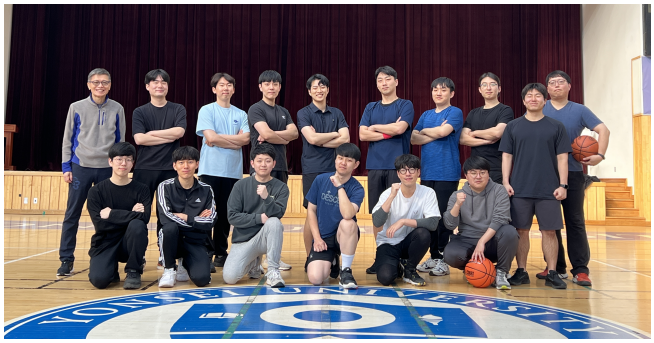
Sang Hoon Lee is a professor at School of Electrical and Electronic Engineering, Yonsei University, South Korea. Prof. Lee established Multi Dimensional Insight Laboratory in 2003. Recent research interests are Image/Video Quality Assessment, Artificial Intelligence Multi-Modal Signal processing, 3D Multi-Camera Systems, 3D reconstruction, Human Avatar Modeling and Synthesis Assessment, 3D Face/Pose/Motion/Cloth Synthesis Assessment



Human Multi Dimensional Insight

Our lab not only engaged in regular weekly meetings and seminars, but we also pertake in a variety of leisure activities beyond research. We organize a membership training (MT) in winter and summer. While skiing and having tea time at the top of the mountain, we helped and taught each other, which served as a great opportunity for the researchers to become closer. Playing basketball allowed us to foster a sence of teamwork. Eventually, aiming for a relaxed atmosphere where conversations are not strictly confined to work.



Research Team : (Left to right) Prof. Lee, Moonkyeong Choi, Sangwoo Seo, Hyunse Yoon, Jaekyung Kim, Jungwoo Huh, Mingyu Jang, Seokkeun Choi, Hoseok Tong, Jungsu Kim, Seongjean Kim, Yeseung Park, Hyucksang Lee, Seonghwa Choi, Jeonghaeng Lee, Kyungjune Lee, Seongmin Lee, Suwoong Heo

Your lab's name is quite unique. Can you tell us the origin of its name?

Our lab was first established in 2003. Initially, the name of the lab was the Wireless Network Laboratory. In the early 2000s, OFDM/MIMO-based 3rd/4th generation communications were leading the industry, and Yonsei University, in collaboration with Samsung Electronics on a long-term project, focused extensively on developing core technologies, which our lab also participated in. Therefore, our main research areas were OFDM/MIMO based radio resource management, network protocol design, and cross-layer optimization between multimedia and wireless networks. Starting from 2010, communication technology showed excellent performance, approaching the theoretical link capacity of Shannon's theory, which led us to shift our research focus to the increasingly important area of multimedia data. In fact, with my background as a Ph.D in image and video processing, it was relatively easier for us to approach the field of image analysis based on visual perception. One of the research areas was Quality-of-Experience (QoE) studies focusing on the visual fatigue of 3D stereoscopic images and videos. Although we faced challenges in migration, the advent of deep learning technology later made it a great junction for our current field of processing 3D data by combining computer graphics and computer vision. The gradual migration to AI technology occurred in 2015, and it became unnecessary to change the lab's name.

We decided on our lab's name to maintain flexibility due to the ever-changing flow of research, and looking back, it seems to have been a wise decision. They say change is the only constant in research... except for the coffee machine, which has been constant in its refusal to work properly (laugh).

What insights guide the research topics in your lab, and what technologies are you focusing on from a long-term perspective?

Currently, AI technology is evolving at a remarkable pace. When AI technology first emerged, we believed that once the development of algorithms reached a saturation point, the competition for data acquisition would accelerate. Now, it seems we are at that period. In response to the question of what our next target technology will be, it is creating AI that can share emotions with humans. This often feels like a technology introduced in movies, seemingly far into the future. However, with sufficient data and supportive algorithms, implementing technology necessary for life is becoming a common reality. Yet, it's when AI technology can touch human emotions that AI will truly integrate deeply into our lives.

Therefore, our lab is working to create a virtual human akin to a real person and breathe life into AI technology by synthesizing it in human form, enabling it to experience emotions that a person can feel. Acquiring data is considered one of the most crucial components for this. We are developing a camera system to acquire 4D human data and contemplating from various angles how to infuse individual emotions into it.

It seems that the endpoint of such technology will lead to a flow towards a human-centric metaverse. While the continuous development of generative AI has made it easy to create 2D contents such as images, the quality for synthesizing in the 3D domain is still insufficient for service. This indicates that the evolution of generative AI in the 3D domain and a human-centric metaverse will likely be the ongoing trend.

What was the most crucial element in pursuing these goals?

The importance of data is increasing more than ever. To address this, we have developed a camera system. Constructing the current system required a significant amount of time and effort. Among the challenges were communication between me and my students, among students themselves, and even between the school and the lab. Understanding why we need to build the system, how to construct it, and what needs to be built first required a lot of effort to narrow down thoughts and reach a consensus. Additionally, the technical approaches and research methods vary among lab members, as do their interests. Overcoming these differences and deciding what to prioritize and what to place as a secondary concern required much deliberation.

Another crucial element is vision for the future. With the camera system we have constructed so far, the results have visibly improved, we have started to acquire visually pleasing high-quality data.

At this point, we are contemplating how to organize the results and how to persuade others with our findings in a research paper. I believe that organizing these results and allowing individuals to develop their vision through this process could be a driving force for further research progress.

Besides research, what kind of activities are conducted in your lab?

Our lab not only engages in regular meetings and seminars related to research and development but also participates in various leisure activities beyond research. First and foremost, at the end of each semester, we go on a 2 nights and 3 days membership training in winter and summer. During this period, lab members are encouraged to share not only about their research but also personal updates and goals, or to brainstorm creative research topics in a relaxed atmosphere. Moreover, a unique and advantageous aspect of our lab is that, in addition to me, many students have a deep appreciation for music. We have been active like a small club, utilizing our strengths in composition, piano, guitar, vocals, etc., to create music together. Recently, we went beyond just creating songs to producing final tracks and releasing them on music sites. If you're interested, please visit our website. We warmly welcome support through the purchase of our music. It won't be that expensive (laugh). Lastly, when the lab schedule is relatively free or there's something to celebrate, we also have group meals at restaurants near the campus.

The reason we engage in such a variety of activities beyond research is based on the premise that, in addition to professional teamwork, the interpersonal relationships formed in lab life are also very precious. Aiming to brighten the lab atmosphere and achieve better results, we plan to continue these activities in the future.

What message would you like to impart to the younger generation?

Sometimes, when I talk to students working with AI, I liken it to the flow of water in a stream. The flow is fastest at the surface, between the water and the air, and slows down as you go deeper, due to the friction with the bottom. This surface speed can be compared to the trend-following implementation techniques of AI algorithms. Without analyzing how things work on the inside, one risks being swept away aimlessly by the strong current. To counteract this, one must row deeper or stir the bottom to propel the boat forward, requiring much hidden effort. Additionally, collaborating with fellow students to establish a technological foundation is essential. Otherwise, time may be wasted aimlessly. It's crucial to assess whether one can withstand such rapid currents. If you prefer to proceed calmly, laying a solid foundation with a long-term perspective, it's important to delve into slower currents at the bottom, where one isn't swept away and can research at their own pace. For instance, if you can acquire data, you can gain insights from it and, from there, find clues to human emotions.

I believe that rather than being dazzled by the high-performing algorithms created by major AI corporations, maintaining your pace and building your research from the ground up will lead to positive outcomes.

What message do young generations wish to convey to professors and senior researchers?

Young generations learning and engaging with AI feel that the field is changing very rapidly and sensitively. New technologies and papers are emerging quickly, and trends shift rapidly each year. They invest a lot of time in keeping up with and understanding these trends and request more time to concentrate on these trending technologies. While learning new software and trends is an exciting process, merely following them can sometimes cause us to lose sight of the core of our research. Placing importance on running and learning deep learning software may lead to forgetting what our actual research goals were. I believe that finding the core of one's research and setting the direction for it is a truly challenging process. It's like wandering around in a forest, thinking you are walking straight when, in fact, you might be lost. At this point, the guidance of senior researchers in establishing the core of research and providing direction can be immensely helpful. Tasks like code review and bug fixing can be sufficiently handled among peers, but the grand task of defining the core and direction of research benefits greatly from the experience of senior researchers. Even if the passion for learning leads young generations astray, it seems beneficial to engage in discussions with the senior generations more frequently to create positive synergy.