Suah Kim

Research Professor / Postdoctoral Researcher

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Analytical researcher with experience in data analysis. Reliable & ethical researcher with excellent communication and creative problem-solving skills.

Work Experience

2019.03 – Current **Research Professor (Postdoctoral Researcher)**
Korea University, Seoul
Provided technical advices and led graduate students in variety of research topics around security and signal processing. Collaborated closely with corporations in solving security issues and applying novel data analytics to solve challenging issues. Applied for grants and proposals for funding related to the research.

2013.03 – 2019.03 **Researcher**
Multimedia Security Lab, Korea University, Seoul
Conducted research in variety of topics in security and signal processing. Managed interns and assisted in projects. Organized writing grants and proposals for funding with Professor Hyoung Joong Kim.

2016.04 – 2016.11 **Visiting Scholar**
Sun Yat-sen University, Guangzhou, China
Selected as one of the finalists for "Young Scientist Exchange Program between The Republic of Korea and The People's Republic of China" program. Conducted research in image compression and format preserving encryption with Professor Fangjun Huang and his team.

Education

2013.03 – 2019.02 **Ph.D. & Masters: Information Security**
Korea University, Seoul, South Korea
Under supervision of Professor Hyoung Joong Kim

2007.09 – 2012.08 **Honours in Bachelor of Mathematics**
University of Waterloo, Waterloo, Ontario, Canada
Changed major from System Design Engineering

Goals

- Develop new research field about compression properties in enhanced multimedia and encrypted multimedia.
- Build new public dataset to share.
- Promote & practice open research.
- Conduct reproducible research.
- Actively promote and organize International collaborations.
- Create research environment that promotes openness, collaboration and creativity.

Current Research

Signal Processing
- Automatic image enhancement with compressive properties.
- GAN generated deepfake image detection.
- SNS enhanced image database collection.

Security
- File size reducing format preserving image encryption.
- Highly incentivized decentralized CDN cluster.

Software

MATLAB	●●●●● Excellent
Python	●●●●○ Very Good
Linux	●●●●◐ Excellent
JavaScript	●●●●○ Very Good
html	●●●●○ Very Good
Java	●●●○○ Good
C/C++	●●●○○ Good
Latex	●●●●◐ Excellent

Key Publications

2019.08 **[SCI, 1st] Reversible data hiding with automatic brightness preserving contrast enhancement**
IEEE Transactions on Circuits and Systems for Video Technology

2019.11 **[SCI, 1st] Skewed histogram shifting for reversible data hiding using a pair of extreme predictions**
IEEE Transactions on Circuits and Systems for Video Technology

Current Funding

2019.12 – 2020.11 **[PI] Machine Learning Based Deepfake Image Manipulation Detection** *National Research Foundation of Korea, $24,000 USD*

2019.06 – 2021.05 **[PI] High Efficiency Reversible Image Enhancement**
National Research Foundation of Korea, $130,000 USD

2018.04 – 2020.12 **[CO-I] Development of on-off hybrid blockchain technology for real-time large-scale data distribution**
Institute for Information and Communications Technology Promotion (Korea), $37 million USD

Journal Publications [link]

2019 **[SCI, 1st] Reversible data hiding with automatic brightness preserving contrast enhancement**
IEEE Transactions on Circuits and Systems for Video Technology

2019 **[SCI, 1st] Skewed histogram shifting for reversible data hiding using a pair of extreme predictions**
IEEE Transactions on Circuits and Systems for Video Technology

2019 **[SCIE, 1st] Reversible Data Hiding in JPEG Images Using Quantized DC**
Entropy

2017 **[SCIE, 2nd] Improved reversible data hiding in JPEG images based on new coefficient selection strategy**
Eurasip Journal on Image and Video Processing

2015 **[SCIE, 2nd] Linear collaborative discriminant regression classification for face recognition**
Journal of Visual Communication and Image Representation

2015 **[2nd] Breaking character and natural image based CAPTCHA using feature classification**
Journal of the Korea Institute of Information Security and Cryptology

2015 **[SCIE, 2nd] Reversible watermarking based on compensation**
Journal of Electrical Engineering and Technology

Language

English	●●●●● Proficient
Korean	●●●●● Proficient
Japanese	●●○○○ Basic
German	●○○○○ Basic

Past Research

CAPTCHA Security

■ Generated an artificial image data based using two CAPTCHA samples provided by the bank. Then, used deep learning CNN based neural network to automatically break CAPTCHA. Assisted the service provider to improve their CAPTCHA system.

Wireless Encryption Security

■ Collected small samples of randomly generated wireless passwords by a company and used GPUs to statistically find a pattern in the generated passwords. The pattern is then used to break all the other wireless networks provided by the company; the company updated their generator to be secure.

Reversible Data Hiding

■ Developed a novel method to hide data in images in a way that it is reversible. The method generated watermarked images with less distortion than existing work. Also, pioneered a new field where reversible data hiding can be used to automatically enhance the image in a reversible way.

Patents

■ (Pending) Original image storage device using enhanced image and application therefor

■ (Pending) Compressive Image Encryption

Conference Publications [link]

2019 **[1st] JPEG Encryption with File Format Preservation and File Size Reduction**
IEEE GCCE

2019 **[1st] Automatic Contrast Enhancement Using Reversible Data Hiding with Distortion Minimization**
IEEE ICIVC

2018 **[1st, Best paper award] Intrusion detection and mitigation system using blockchain analysis for bitcoin exchange**
ACM CCIOT

2015 **[2nd] Weighted sparse representation using a learned distance metric for face recognition**
IEEE ICIP

2015 **[1st] Automatic contrast enhancement using reversible data hiding**
IEEE WIFS

2015 **[2nd] Metadata protection scheme for JPEG privacy & security using hierarchical and group-based models**
IEEE ICTA

References

■ [Link] Hyoung Joong Kim, Professor at Korea University, South Korea, thesis advisor.
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■ [Link] Vasily Sachnev, Professor at Catholic University of Korea, South Korea, research collaborator.
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■ [Link] Fangjun Huang, Professor at Sun Yat-sen University, China, research collaborator.
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