

## EDUCATION

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### PhD in Computer Vision and Machine Learning

- Supervised by Prof. [Roberto Cipolla](#) ([Machine Intelligence Laboratory](#))
- Research interest:** 3D reconstruction from monocular image/video

University of Cambridge

Oct 2019 – Present

### MPhil in Machine Learning and Machine Intelligence

- Commendation** (final mark: 73/100)
- Dissertation:** Approximate Depth Estimation in Colonoscopy Images

University of Cambridge

Oct 2018 – Sep 2019

### BSc in Physics

- First Class Honours** (final mark: 84/100)
- Awards:** Best 3<sup>rd</sup> Year Project, Best Performance in Laboratory Physics, Gordon Rogers Scholarship (3,000 GBP)

King's College London

Sep 2012 – Aug 2015

## PUBLICATIONS

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### MaGNet: Multi-View Depth Estimation by Fusing Single-View Depth Probability with Multi-View Geometry

CVPR (Oral)

2022

*Gwangbin Bae, Ignas Budhytis, Roberto Cipolla*

- Proposed probabilistic depth candidate sampling and depth consistency weighting
- Introduced iterative multi-view matching where a small number of depth candidates are sampled from the current depth probability distribution to update its mean and variance

### Estimating and Exploiting the Aleatoric Uncertainty in Surface Normal Estimation

ICCV (Oral)

2021

*Gwangbin Bae, Ignas Budhytis, Roberto Cipolla*

- Estimated and evaluated the aleatoric uncertainty in CNN-based surface normal estimation
- Proposed a novel decoder framework where pixel-wise MLPs are trained on a subset of pixels selected based on the estimated uncertainty, in order to solve the bias in training towards large planar surfaces

### Deep Multi-View Stereo for Dense 3D Reconstruction from Monocular Endoscopic Video

MICCAI

2020

*Gwangbin Bae, Ignas Budhytis, Chung-Kwong Yeu, Roberto Cipolla*

- Proposed adaptive depth candidate sampling based on a pre-trained monocular depth estimation network
- Introduced a patch embedding network and novel soft-contrastive training loss for fast and accurate multi-view matching

## EXPERIENCES

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### Research Intern

- Research intern at Mixed Reality & AI Lab

Microsoft Cambridge

Apr 2022 – Jun 2022

### AI Research Intern

- Developed monocular/multi-view depth estimation methods for colonoscopy images
- Delivered multiple technical presentations in technology forums and workshops

NISI HK

Oct 2019 – Oct 2020

### Machine Learning Developer

- Designed an autonomous recycling bin that can sort the incoming garbage based on sound
- Developed garbage classification algorithms based on MFCC analysis and machine learning

Precycler

July 2017 – Apr 2018

### Assistant Drill Instructor & Squad Leader

- Instructed new recruits in basic combat skills including riflmanship and hand grenade
- Awarded two Meritorious Service Medals for distinguished performance

50<sup>th</sup> Infantry Division – ROK Army

Oct 2015 – July 2017

### Research Intern

- Conducted a research on Quirks (imaginary particles introduced to explain missing mass problem)
- Constructed computer simulations to generate Quirks collisions under varying conditions

King's College London

July 2014 – Aug 2014

## AWARDS

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### Kwanjeong Educational Foundation Scholarship (30,000 USD)

Jun 2018

- Awarded to talented Korean students studying in international universities

### SK National Start-Up Competition – Grand Prize (1st Place)

Nov 2017

- Presented the project on Precycler (autonomous recycling bin)

### 25<sup>th</sup> International Young Physicists' Tournament – Gold Medal (1st Place)

July 2012

- Korean team coach - supervised national team members conducting researches on 17 topics

### 24<sup>th</sup> International Young Physicists' Tournament – Gold Medal (1st Place)

July 2011

- Korean team captain - highest score of the tournament for the research on flame dynamics under electric field

## TECHNICAL SKILLS

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- Proficient in designing and training neural networks, using **PyTorch** and **TensorFlow**
- Proficient in **Python**, good working knowledge of **MATLAB** and **C++**