

# M Usman Maqbool Bhutta

PHD CANDIDATE · DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING, HKUST, HK

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“Be so good they can't ignore you.”

## Summary

This is M Usman Maqbool Bhutta. I'm PhD candidate at (Robotics and Multi-Perception Lab) HKUST. My PhD primary research is on multi-agent SLAM system and the expected graduation (~ Mar. 2021). I developed multi-agent direct SLAM systems triggered by first loop-closure matching (see my publication section). Furthermore, I'm currently working for a better and lightweight place recognition techniques using machine learning. I'm Interested in devising a better problem-solving method for challenging tasks and learning new technologies and tools if the need arises. I've 7+ years of experience specializing in robotics R&D and project management. I previously owned an IT company, and I've part of several startups since 2011. My full profile can view here (<https://usmanmaqbool.github.io/>).

## Work Experience [7+ Years]

### RESEARCH

#### Robotics and Multi-Perception Lab, Robotics Institute

HKUST, HK

PHD CANDIDATE

Sep 2016 - Present

- PhD Supervisor: [Prof Ming Liu](#), Director of Robotics and Multi-Perception Lab ([RAM-LAB](#))
- **Research in SLAM:** I've worked mainly for the multi-agent SLAM system. To find the scale difference and excellent relative transformation between difference agents. I've produced [PCR-Pro](#) work. This work got best student paper finalist award at IEEE-CYBER 2018.
- **Research in Automation:** For smartphone glass inspection, I've introduced [Smart-Inspect](#) work. This work is accepted in IROS 2020. The patent is also under-review in the US.

#### Autonomous Systems Lab (ASL)

ETH Zürich, Switzerland.

ACADEMIC GUEST

Oct. 2019 - Mar. 2020

- Supervisor: [Prof. Roland Siegwart](#), Director of Autonomous Systems Lab ([ASL](#)), ETH Zürich, Switzerland.
- Co-Supervisor: [Dr. Cesar Dario Cadena Lerma](#), Senior Researcher at ASL, ETH Zürich, Switzerland.
- **Research in Machine Learning:** I've worked for making the better place recognition for SLAM systems. Furthermore, I've also introduced light weight representation of key-frames for better channel utilization.

#### Department of Electronics

QAU, Pakistan

MPHIL CANDIDATE

Mar. 2010 - Jun. 2012

- M.Phil. Supervisor: [Prof Hasan Mahmood](#), Department of Electronics, QAU.
- **Research in Image Processing (CNN):** I've introduced CNN-based license plate recognition of Pakistani's Cars. This work has been published in IEEE-ICALIP 2014.

### INDUSTRY AND ENTREPRENEURSHIP

#### Lisee Technology Corporation Limited

Central, HK

COO

Jan 2018 - Present

- Won funding support for company | TSSSU Support HK\$ 300,000 (Jun 19 - May 20).
- Indoor Navigation for Libray using Lisee Technology | PCF Support HK\$ 160,000 (Jun 18 - May 19).

#### Friends Corporate Technologies

Islamabad, PK

CEO

Feb 2013 - Aug 2015

50+ Projects | Electronics/ Electrical Engineering, R&D, image processing, Web Applications Development, MVC Applications

#### Federal Government of Pakistan

Islamabad, PK

SCIENTIFIC OFFICER

May 2012 - Feb 2013

Electronics/ Electrical Engineering, R&D, image processing

#### Server4Sale, LLC

Islamabad, PK

PHP DEVELOPER

Dec 2009 - Mar 2010

Php web application development for Joomla and Zend frameworks.

### ACADEMIC

#### Department of Computer Science

BZU-Sahiwal, Pakistan

LECTURER (VISITING)

Feb 2016 - Jun 2016

Teaching MCS and BS-CS courses

## Department of Physics

CTI

Teaching BS physics (Electronics related courses + Labs + Projects)

*GPSC Sahiwal, Pakistan*

*Aug. 2015 - Apr. 2016*

## Department of Electronics

INSTRUCTOR

'PHP Web Development' (a short course) offered in Department of Electronics, Quaid-i-Azam University, Islamabad, Pakistan.

*QAU, Pakistan*

*Aug. 2010 - Dec. 2010*

## Presentation

### IEEE/RSJ International Conference on Intelligent Robots and Systems [IROS, 2020]

*Las Vegas, USA*

PRESENTER AS AUTHOR

*Oct. 2020*

- Introduced **Smart-Inspect** for the micro scale localization and classification of smartphone glass defects for industrial automation.

### Technology Start-up Support Scheme for Universities (TSSSU)

*HKUST, Hong Kong*

PRESENTER AS COO LISEE TECHNOLOGY CORPORATION COMPANY LIMITED, HONG KONG.

*Jan. 2019*

- Introduced Lisee technology in front of selection committee panel and won TSSSU 2019-20 funding of the amount of HK\$300,000.

### IEEE Int. Conf. on CYBER Technology in Automation, Control, and Intelligent Systems [IEEE-CYBER 2018]

*Tianjin, China*

PRESENTER AS AUTHOR

*Jul. 2018*

- Introduced **PCR-Pro** for the estimation of information matrix and scale difference for pose graph SLAM.

### IET-Young Professionals Exhibition and Competition (IET-YPEC) 2018

*CityU, Hong Kong*

PRESENTER AS COO LISEE TECHNOLOGY CORPORATION COMPANY LIMITED, HONG KONG.

*Jul. 2018*

- Introduced Lisee technology at IET-YPEC 2018.

### Campus Challenge @ HKUST Transportation

*HKUST, Hong Kong*

PRESENTER AS PARTICIPANT

*May 2018*

- HKUST got 80+ proposals for this competitions, and arranged a roadshow. My proposal got selected for the audience award after getting maximum votes.

### High Tech Innovation and Entrepreneurship

*HKUST, Hong Kong*

PRESENTER AS ENTREPRENEUR

*Dec. 2017*

- Introduced my study related to the flying cars.

### World First Youth Robotics Development Forum 2017

*Shangri-La Shenzhen, China.*

PRESENTER AS AUTHOR.

*Nov. 2017*

- Introduced my work related to multi-agent SLAM system.

## Education

### Ph.D. Candidate in Robotics at RAM-LAB, Robotics Institute

*HKUST, Hong Kong*

DEPARTMENT OF ELECTRONIC & COMPUTER ENGINEERING, THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

*Sep. 2016 - ~Feb. 2021*

- PhD Supervisor: **Prof Ming Liu**, Director of Robotics and Multi-Perception Lab (**RAM-LAB**)
- Exchange Supervisor: **Prof. Roland Siegwart**, Director of Autonomous Systems Lab (**ASL**), **ETH Zürich**, Switzerland.
- Exchange Co-Supervisor: **Dr. Cesar Dario Cadena Lerma**, Senior Researcher at ASL, **ETH Zürich**, Switzerland.
- Got PEEF CCMS PhD scholarship from Pakistan and overseas research award (ORA).
- Research: Multi-Agent SLAM System, Place Recognition, Autonomous Car and Deep Learning for automation industry.

### M.Phil. in Electronics

*QAU, Pakistan*

DEPARTMENT OF ELECTRONICS, QUAID-I-AZAM UNIVERSITY, ISLAMABAD, PAKISTAN.

*Mar. 2010 - Jun. 2012*

- M.Phil. Supervisor: **Prof Hasan Mahmood**, Department of Electronics, QAU.
- Research: Signal and Image Processing
- Grade: A

### M.Sc. in Electronics

*QAU, Pakistan*

DEPARTMENT OF ELECTRONICS, QUAID-I-AZAM UNIVERSITY, ISLAMABAD, PAKISTAN.

*Mar. 2010 - Jun. 2012*

- 2nd position** in batch
- Projects: completed 9+ projects related to C++, Verilog/HDL and Micro-controller programming.

### B.Sc. in Mathematics and Physics

*BZU, Pakistan*

BAHAUDDIN ZAKARIYA UNIVERSITY, MULTAN PAKISTAN

*Mar. 2010 - Jun. 2012*

- Grade: 1st Division

## Honors & Awards

### INTERNATIONAL

July, 2018	<b>Best Student Paper Finalist Award</b> , IEEE Int. Conf. on CYBER Technology in Automation, Control, and Intelligent Systems	Tianjin, China
May, 2018	<b>Audience Award</b> , Campus Challenge - Transportation, HKUST	HKUST, HK
Nov, 2017	<b>Best Mapper Award</b> , Robotics and Multi-Perception Lab, HKUST	Shenzhen, China
May, 2017	<b>Completion Award</b> , The Graduate Teaching Assistant Training, HKUST	HKUST, HK
Dec, 2016	<b>Best External Award</b> , Robotics and Multi-Perception Lab, HKUST	Shenzhen, China
Nov, 2016	<b>Completion Award</b> , Author Workshop, Elsevier Publishing Campus	HKUST, HK

### DOMESTIC

Sep 2016	<b>CCMS PhD Scholarship</b> , Won Chief Minister Marit Scholarship (CCMS) scholarship award by Punjab Government (PEEF), Pakistan for pursuing my PhD studies at HKUST, HK	Lahore, PK
Sep 2013	<b>Participant</b> , Painting for peace (Pakistan-India-Afghanistan) event, a part of the Harmony initiative	Islamabad, PK
Apr 2013	<b>Participant</b> , Case Spark in business plan competition	Islamabad, PK
Apr 2013	<b>Participant</b> , Case EPICA	Islamabad, PK
Apr 2013	<b>Participant</b> , How to be a Better Playwright Workshop by PNCA and US Embassy Pakistan	Islamabad, PK
Oct 2012	<b>Participant</b> , Punjab Youth Festival	Lahore, PK
Oct 2011	<b>Participant</b> , Int'l Youth Conference and Festival	Islamabad, PK
Sep 2011	<b>Participant</b> , Asian Youth Conference and Peace Festival	Lahore, PK
Apr 2011	<b>Completion Award</b> , Acting and Directing Theater Workshop by PNCA and US Embassy Pakistan	Islamabad, PK
Dec 2011	<b>Participant</b> , National Drama Festival	Islamabad, PK
Dec 2010	<b>Instuctor of short Course</b> , PHP Web Development' at the Department of Electronics, QAU	Islamabad, PK
Apr 2013	<b>Completion Award</b> , Running River Rafting course by Adventure Foundation of Pakistan	Mansehra, PK
Apr 2013	<b>Completion Award</b> , Paragliding course by QAU Adventure Club	Islamabad, PK
Dec 2008	<b>Award of Honor</b> , Finance Secretary of Electronics Student Society (ESS) at QAU	Islamabad, PK

## Academic Activities

IROS	<b>Referee Service</b> , IEEE/RSJ RA-L and International Conference on Robotics and Automation	2020
Spr 2020	<b>Teaching Assistant</b> , EESM 5547 - Multimedia Signal Processing	HKUST, HK
ICRA	<b>Referee Service</b> , IEEE/RSJ International Conference on Robotics and Automation	2020
Spr 2019	<b>Teaching Assistant</b> , EESM 5547 - Multimedia Signal Processing	HKUST, HK
CASE	<b>Referee Service</b> , IEEE International Conference on Automation Science and Engineering	2019
IROS	<b>Referee Service</b> , IEEE/RSJ International Conference on Intelligent Robots and Systems	2019, 2018
Fall 2018	<b>Teaching Assistant</b> , ELEC4820 - Medical Imaging	HKUST, HK
Spr 2018	<b>Teaching Assistant</b> , EESM 5547 - Multimedia Signal Processing	HKUST, HK
Spr 2017	<b>Teaching Assistant</b> , ELEC 1010 - Electronic and Information Technology	HKUST, HK

## Research Publications

<b>Loop-box: Multi-Agent Direct SLAM Triggered by Single Loop Closure for Large Scale Mapping</b>	Journal Paper
M USMAN MAQBOOL BHUTTA*, MANOHAR KUSE, RUI FAN, YANAN LIU, MING LIU IEEE Transactions on Cybernetics (IF: 11+)	Oct 2020
<b>Smart-Inspect: Micro Scale Localization and Classification of Smart Phone Glass Defects for Industrial Automation</b>	Conference Paper
M USMAN MAQBOOL BHUTTA*, SHOAB ASLAM, PENG YUN, JIANHAO JIAO, MING LIU IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020)	Oct 2020
<b>Multiple Lane Detection Algorithm Based on Optimised Dense Disparity Map Estimation</b>	Conference Paper
HAN MA, YIXIN MA, JIANHAO JIAO, M USMAN MAQBOOL BHUTTA, MOHAMMUD JUNAID BOCUS, LUJIA WANG, MING LIU, RUI FAN Accepted in IEEE International Conference on Imaging Systems and Techniques (IST 2018)	Oct 2018

## **PCR-Pro: 3D Sparse and Different Scale Point Clouds Registration and Robust Estimation of Information Matrix For Pose Graph SLAM**

*Conference Paper*

M USMAN MAQBOOL BHUTTA\*, MING LIU

*Jul 2018*

Presented in IEEE Int. Conf. on CYBER Technology in Automation, Control, and Intelligent Systems (**IEEE-CYBER 2018**), and won **Best Student Paper Finalist Award**.

## **An intelligent approach for robust detection and recognition of multiple color and font styles automobiles license plates: A feature-based algorithm**

*Conference Paper*

M USMAN MAQBOOL BHUTTA\*, HASAN MAHMOOD, AND HAROON MALIK

*Jul 2014*

Published in IEEE International Conference on Audio, Language and Image Processing (**ICALIP 2014**).

## **Efficient Reset Design Techniques**

*Journal Paper*

QAMAR, ZOHA, BUSHRA YASEEN, AND USMAN MAQBOOL

*2015*

Published in Science International Lahore