

# Curriculum Vitae

## **Imran Cheema**

Electrical Engineering Department, LUMS, Opposite Sector U, DHA, Lahore.

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Bio-Agri-Photonics Lab, <http://web.lums.edu.pk/~bap/>

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### Education

McGill University, Montreal, Canada.

**PhD Electrical Engineering (Photonics)**

Thesis defended: Sep 2013

*Supervisor:* Andrew Kirk

University of Colorado Boulder, USA.

May 2007

**MS Electrical Engineering (Photonics)**

University of Engineering & Technology Lahore, Pakistan

April 2002

**BS (with honors) Electrical Engineering (Electronics, Communications and Signal Processing)**

### Professional Experience

**ASSISTANT PROFESSOR**, EE Dept., Lahore University of Management Sciences, Lahore

Jan 1, 2016 to Date

**ASSISTANT PROFESSOR**, EE Dept. FAST-NU, Lahore

Jan 7, 2014 to Dec 31, 2015

**POSTDOCTORAL RESEARCHER**, *Photonics Systems Group*, ECE Dept. McGill Univ.

Oct 1, 2013 to Nov 30, 2013

**LECTURER**, ECE Dept. McGill University

Jan 1, 2013 to May 15, 2013

**OPTICAL ENGINEER**, *Oerlikon Optics Inc.*, Golden, Colorado, USA

June 11, 2007 to May 2, 2008

**LECTURER/LAB ENGINEER**, ECE Dept., Univ. of Engineering and Technology Lahore,

December 30, 2002 to July 15, 2004

## **Highlights**

- Peer-reviewed publications: 14 Journal Articles (12 published, 2 under review), 14 Conference papers
- I submitted a total of 14 grants at LUMS. Received funding on 11 grants.
- Rs 68.8 million funded grants, developed photonics research lab at LUMS, primarily from the external funded grants.
- Our lab is picked up by a May 2022 Forbes article, "[Engineers Are Unsung Heroes Of Global Health](#)," for our efforts towards developing diagnostics for TB.
- Vice Chancellor's Award for Teaching Excellence 2022.
- Graduated 2 Ph.D. students and 7 (6+1 graduating in May 2023) MS students.
- Member, undergraduate curriculum committee EE, 2016 to date.
- Convenor External relations and outreach committee, EE, Sep 2022 to date

## **Honors and Awards**

- Vice Chancellor's Award for Teaching Excellence 2022
- NSERC CREATE Integrated Sensor Systems Fellowship Award, Jan 2011-May 2012
- McGill Engineering Doctoral Award, Sep 2008-May 201
- Collins Fellowship Award, Optoelectronic Centre, CU Boulder, Spring 2006
- ECE Department, CU Boulder Fellowship Award 2005-06
- EE Dep., UET Lahore Academic Scholarships in 2000-01, 1999-2000 and 1998-99
- Best Student of the Year Award, 1996-97
- Pride of Performance Award, 1996-97, 1994-95

## **Publications**

### **Journals**

*J7 to J15 are with LUMS mentees, and I am the corresponding author. Each journal name is hyperlinked to the corresponding publication.*

[J15] Zehra Abbas Naqvi and [M. Imran Cheema](#), "Polarimetric temperature sensor based on a gold-coated multimode fiber", (under preparation)

[J14] Faiza Iftikhar, Raja Ahmed, M. Imran Cheema, "Fabry-Pérot fiber cavity refractive index sensing via linewidth tracking in the broken PT-symmetric region", (Under Review), [arXiv preprint](#), August 15, 2022.

[J13] Ubaid Ullah, Zarfshan Tahir, Obaidullah Qazi, Shaper Mirza, and [M. Imran Cheema](#), "Raman Spectroscopy and Machine Learning-based Optical Sensor for Rapid Tuberculosis Diagnosis via Sputum", Tuberculosis (136), 102251, 2002.

[J12] Ubaid Ullah and [M. Imran Cheema](#), "Spatiotemporal thermal analysis of tapered fibers in optical cavity sensing applications at 633 nm and 1550 nm", [OSA Continuum](#), 4 (11), 2734-2746 (2021).

[J11] Ubaid Ullah and [M. Imran Cheema](#), "Phase shift-cavity ring down spectroscopy in linear and active fiber cavities for sensing applications at 1550 nm", [IEEE Sensors Journal](#), 21 (12), 13335-13341 (2021)

[J10] M. Daniyal Ghauri, Syed Zajif Hussain, Ubaid Ullah, R. M. Armaghan Ayaz, Rahman Shah Zaib Saleem, Alper Kiraz, and [M. Imran Cheema](#), "Detection of aflatoxin M1 by fiber cavity attenuated phase shift spectroscopy", [Optics Express](#) 29 (3), 3873-3881 (2021)

- [J9] Faiza Iftikhar, Usman Khan, and M. Imran Cheema "Digital synthesis of multistage etalons for enhancing the FSR" Vol. 37, No. 5, [Journal of the Optical Society of America B](#), 2020.
- [J8] R. Armaghan Ayaz, Yigit Uysalli, Berna Morova, Nima Bavili, Ubaid Ullah, M. Daniyal Ghauri, M. Imran Cheema, and Alper Kiraz, "Linear Cavity tapered sensor using mode tracking phase shift cavity ring down spectroscopy", Vol. 37, No. 5, [Journal of the Optical Society of America B](#), 2020. (*Joint Corresponding Author, LUMS and KOC, Turkey mentees*)
- [J7] Ubaidullah, Muhammad Yasin, Alper Kiraz, and M. Imran Cheema, "Digital Sensor Based on Multicavity Fiber Interferometers" [Journal of Optical Soc. of America B](#) 36 (9), 2587-2592, 2019.
- [J6] M. Imran Cheema and Andrew G. Kirk, "Analytical expressions for waveguide-coupled phase shift microcavity ring down spectroscopy", [Jnl. of Opt. Soc. of America B](#), 32 (2), 355-362 (2015)
- [J5] M. Imran Cheema, Ce Shi, Andrea M. Armani, and Andrew G. Kirk "Optimizing the signal to noise ratio of microcavity sensors", [IEEE Photonics Technology Letters](#) 26 (20), 2023-2026 (2014)
- [J4] M. Imran Cheema, Usman A. Khan, Andrea M. Armani, and Andrew G. Kirk, "Towards more accurate microcavity sensors: maximum likelihood estimation applied to combination of quality factor and wavelength shifts", [Optics Express](#) 21, 22817-22828 (2013)
- [J3] M. Imran Cheema, and Andrew G. Kirk. "Accurate determination of the quality factor and tunneling distance of axisymmetric resonators for biosensing applications" [Optics Express](#) 21, 8724-8735 (2013).
- [J2] M. Imran Cheema, Simin Mehrabani, Ahmad A. Hayat, Yves-Alain Peter, Andrea M. Armani and Andrew G. Kirk, "Simultaneous measurement of quality factor and wavelength shift by phase shift microcavity ring down spectroscopy", [Optics Express](#) 20, 9090-9098 (2012).
- [J1] Ashraf A. Aly, M. Imran Cheema, Ryan Laterza, Eileen Zhou, Kalani Rathnabharath and Frank S. Barnes, "Effects of 900Mhz radio frequencies on the chemotaxis of human neutrophils in vitro", [IEEE Transactions on Biomedical Engineering](#), Volume 55, Issue 2, Feb. 2008.

## Book Chapters

*B2 with LUMS mentee.*

- [B2] Faiza Iftikhar and M. Imran Cheema, "Evanescent-field label-free methods in photonic biosensors", in *Biophotonics and Biosensing: from fundamental research to clinical trials through advances of signal and image processing*, SPIE Elsevier, 2023. (Submitted)
- [B1] Rana M. Armaghan Ayaz, Yigit Uysalli, Nima Bavili, Berna Morova, M. Imran Cheema, and Alper Kiraz, "Refractive Index Sensing by Phase Shift Cavity Ringdown Spectroscopy" in [Light-Matter Interactions Towards the Nanoscale NATO Science for Peace and Security Series B: Physics and Biophysics](#). Springer, Dordrecht, pp 239–241 (2022)

## Conferences

*C7 to C14 are with LUMS mentees, and I am the corresponding author. Each conference name is hyperlinked to the corresponding publication.*

- [C15] Ubaid Ullah, Daniyal Ghauri, Falak Sher, M. Imran Cheema, "Arsenic Detection in Drinking water using Evanescent Fiber Cavity Ring Down Spectroscopy," SPIE Photonics West BIOS, San Francisco, USA, Jan 2023.
- [C14] M. Imran Cheema, Daniyal Ghauri, and Ubaid Ullah, "Detecting aflatoxin M1 using wavelength-scanned fiber cavity attenuated phase shift spectroscopy," [SPIE Photonics West BIOS](#), San Francisco, USA, Jan 2022. (*Invited*)

- [C13] Ubaid Ullah, Zarfshan Tahir, Obaidullah Qazi, Shaper Mirza, and M. Imran Cheema, "Tuberculosis diagnosis from sputum using Raman spectroscopy," [SPIE Photonics West BIOS](#), San Francisco, USA, Jan 2022.
- [C12] Rabeeya Hamid and M. Imran Cheema, "Use of machine learning in a speckle-based optical fiber sensor for temperature detection," [SPIE Photonics West OPTO](#), San Francisco, USA, Jan 2022.
- [C11] Faiza Iftikhar and M. Imran Cheema, "Bandpass Filter with Flat-Top Transmission Using Multistage Fabry-Perot with Unequal Cavity Lengths", [SPIE Photonics West OPTO](#), USA, Mar 2021.
- [C10] Ubaid Ullah, Murtaza Haider Syed, Daniyal Ghauri, Falak Sher, and M. Imran Cheema, "Fluoride Detection in Drinking water using Evanescent Fiber Cavity Ring Down Spectroscopy", [SPIE Photonics West BIOS](#), USA, Mar 2021.
- [C9] Ubaid Ullah and M. Imran Cheema, "Fabry-Perot Etalon with Three Fiber Bragg Gratings as a Digital Sensor", [SPIE Photonics West BIOS](#), San Francisco, USA, 2020.
- [C8] M. Imran Cheema, Ubaidullah, M. Daniyal Ghauri, R. M. Armaghan Ayaz, Yigit Uysalli, Berna Morova, Alper Kiraz, "Amplified Phase Shift – Fiber Cavity Ring Down Spectroscopy for Biosensing Applications at 1550nm", [SPIE Photonics West BIOS](#), San Francisco, USA, 2020.
- [C7] Faiza Iftikhar, Usman A. Khan, and M. Imran Cheema, "FSR enhancement based on digital design of multi-etalons with asymmetric lengths of cavities", [IEEE Phot. Conference](#), USA, 2019
- [C6] Andrew G. Kirk, and M. Imran Cheema, "Optimally combining wavelength and quality factor information for sensing in whispering gallery mode optical microcavities", [Photonics North](#), Montreal, Canada, May 2014 (**Invited**)
- [C5] M. Imran Cheema, Usman A. Khan, Andrea M. Armani, and Andrew G. Kirk, "Application of phase shift ring down spectroscopy to microcavities for biosensing", [SPIE BIOS](#), San Francisco, Feb 2013. (**Keynote Paper**)
- [C4] M. Imran Cheema, Andrew G. Kirk, Simin Mehrabani, Andrea M. Armani, Ahmad A. Hayat, Francis Vanier, Yves-Alain Peter. "Experimental demonstration of application of ring-down measurement approach to microcavities for biosensing", [SPIE BIOS](#), San Francisco, Jan 2012.
- [C3] M. Imran Cheema, and Andrew G. Kirk. "Application of ring down measurement approach to micro-cavities for bio-sensing applications", [SPIE BIOS](#), San Francisco, Jan 2011.
- [C2] M. Imran Cheema, and Andrew G. Kirk. "Implementation of the perfectly matched layer to determine the quality factor of axisymmetric resonators in COMSOL", [COMSOL conference](#), Boston, Oct 2010.
- [C1] U. A. Khan, M. I. Cheema, and N. M. Sheikh, "Adaptive video encoder based on skin tone region detection," in [IEEE International Students Conference](#), pp. 129-134, vol 1, ISCON, Lahore, Pakistan, Aug. 2002,

## **Research Grants**

### **Funded Research Grants as the PI (External: Rs 61.3 million, Internal: Rs 7.5 million)**

*E- External, I-Internal. All internal grants are peer-reviewed except G1*

- [G12]<sup>I</sup> Towards developing a point-of-care sensor for detecting major depression, Faculty Initiative Fund, LUMS, May 2022 ( **Rs 1 million**) (Co-PI: Dr. Shaper Mirza (Bio), Dr. Basit Yameen (Chem))
- [G11]<sup>E</sup> A portable optical fiber sensor for detecting aflatoxin M1 and antibiotics residues in fresh milk, HEC-NRPU, 2021 (**Rs 17.37 million**) (Co-PI: Dr. Basit Yameen (CHE))
- [G10]<sup>E</sup> Towards Developing Rapid, Portable Tuberculosis Detector using Optical Fiber Cavities, CureMD Inc., 2021 (**Rs1.65 million**) (Co-PI:Dr.Basit Yameen(CHE))(**4 selected in 100+ submissions**)

[G9]<sup>I</sup> Towards Optical Fiber Sensing Platform for Rapid Detection of Pulmonary Tuberculosis, Faculty Initiative Fund, LUMS, June 2021 **(Rs 1 million)** Co-PI: Dr. Basit Yameen (CHE) **(Completed)**

[G8]<sup>I</sup> Towards developing Portable Optical Sensor for Rapid and Non-Invasive Diagnosis of Pneumonia, FIF, LUMS, Aug. 2019 **(Rs 1 million)** (Co-PI: Dr. Shaper Mirza, (BIO)) **(Completed)**

[G7]<sup>I</sup> Free Space Optical Cavities for Detecting Milk Contamination, Faculty Initiative Fund, LUMS, Feb 2018 **(Rs 1 million)** **(Completed)**

[G6]<sup>E</sup> Portable Optical Sensor for Rapid, Non-Invasive, and On-Site Diagnosis of Tuberculosis (TB), ICT R&D fund, May 2017. **(Rs 32 million)** (Co-PI: Dr. Zarfishan Tahir, IPH Lhr., Dr. Shaper Mirza (BIO))

[G5]<sup>E</sup> A rapid and portable optical sensor array for detection of salinity, fluoride, and arsenic in water, HEC NRP, May 2017. **(Rs 6.3 million)** (Co-PI: Dr. Falak Sher (CHE)) **(Completed)**

[G4]<sup>E</sup> Milk Contamination Detector Based on Optical Fiber Cavity Ring Down Spectroscopy, Pakistan Science Foundation, May 2017. **(Rs 4 million)** (Co-PI: Dr. Alper Kiraz, KOC Turkey) **(Only 5 selected from joint Pakistan and Turkey)** **(Completed)**

[G3]<sup>I</sup> Optical biosensors for point of care settings using Raman spectroscopy, Faculty Initiative Fund, LUMS, Oct 2016 **(Rs 1 million)** **(Completed)**

[G2]<sup>I</sup> Towards a Rapid and Portable Optical Sensor Array for Simultaneous Detection of Salinity and Fluoride in Water, WIT, LUMS, July 2016 **(Rs 0.5 million)** **(Completed)**

[G1]<sup>I</sup> LUMS startup Grant, 2016. **(Rs 2 million)**

## List of Taught Courses

### Vice Chancellor's Award for Teaching Excellence, 2022

Mean Instructor Eval.: 4.4/5, Mean Course Eval.: 4.2/5, Mean Process Eval.: 4.3/5

EE330/Phy305 Electromagnetic Fields and Waves			
	Instructor Evaluation Score	Course Evaluation Score	Process Evaluation Score
Fall 2022	4.58	4.43	4.41
Fall 2021	4.52	4.33	4.35
Fall 2020	4.57	4.55	4.36
Fall 2019	4.13	3.99	4.25
Fall 2018	4.26	4.27	4.37
Fall 2017	4.19	4.01	4.27
Fall 2016	3.88	3.53	3.57
Spring 2016	4.23	4.05	4.17
EE532/Phy516 Optoelectronic Devices			
Spring 2021	3.9	3.9	3.94
Spring 2019	4.7	4.43	4.6
Spring 2018	4.56	4.54	4.52
Spring 2017	4.13	3.55	4.05
EE5313/EE434/Phy416 Principles of Optics			
Spring 2022	4.6	4.44	4.23
Spring 2021	4.85	4.8	4.56

Spring 2020	4.62	4.58	4.25
Fall 2018	4.68	4.53	4.56
Fall 2016	4.21	3.08	4.25
<b>ENGG502/SCI502: From Mind to the Pen: Clarity in Technical Writing</b>			
Spring 2022	4.83	4.73	4.14

## **List of Students/Staff Mentored**

The parent department is indicated under each student's name.

No.	Student Name	Timeline & Current Status	Current Position	Student's Accomplishments
<b>Ph.D. Students</b>				
P1	Ubaidullah (EE)	Sep 2016-Feb 2021 Graduated	Postdoc EE LUMS	<a href="#">[J7,J8,J10,J11,J12,J13]</a> , <a href="#">[C8,C9,C10,C13]</a>
P2	Faiza Iftikhar (EE)	Sep 2017-June 2022 Graduated	Lecturer, Lahore College for Women University, Lahore, Pakistan	Syed Baber Ali Research Award, SPIE Women in Optics Planner 2023, <a href="#">[J9,J14]</a> , <a href="#">[C7,C11]</a>
P3	Jawaria Maqbool (EE)	Jan 2021-Passed Qualifiers	Graduate student	Passed qualifiers after first semester, Pioneering student to work on physics informed machine learning and optics
<b>MS students</b>				
M1	Daniyal Ghauri (EE)	Sep 2017-June 2019 Graduated	Ph.D. photonics at Tyndall National Institute, Ireland	<a href="#">[J10]</a> , <a href="#">[C8,C10,C14]</a>
M2	Ahsan Javed (PHY)	Sep 2017-June 2019 Graduated	High school physics teacher at a government school, Pakpattan, Pakistan and Ph.D. physics program at COMSATS Univ., Islamabad, Pakistan	Pioneering student for studying polarization changes on interaction with fruits: groundwork for Zehra's polarimetry work
M3	Murtaza Syed (BIO)	Sep 2017-June 2019 Graduated	Ph.D. chemical engineering program at Universiti Malaysia Pahang	<a href="#">[C10]</a> (Co-supervised with Dr. Shaper)
M4	Rizwana Kausar (EE)	Sep 2018-June 2020 Graduated	Lecturer, College of Aeronautical Engineering, NUST, Islamabad, Pakistan	Gold Medal in MS: Best graduating MS student in EE

M5	Hadia Fatima (EE)	Sep 2018-June 2020 Graduated	STEM teacher, SOAR STEM School, Lahore, Pakistan	Pioneering student for studying and conducting preliminary measurements with broadband source and fiber cavity ring down system
M6	Asra Maqsood (PHY)	Sep 2020-June 2022 Graduated	Recently graduated, looking for a job.	Contributed to the setup of using SLM for studying multimode fiber as a random medium
M7	Saqlain Sahi (EE)	Sep 2020-Dec 2022 (expected)	Graduate student	Contributing toward gas phase fiber cavity work, novel ways of fabricating robust tapered fibers
<b>BS Students</b>				
U1	Ramish Ashraf (EE)	June 2016-June 2017 Graduated	Medical Physics Resident at Stanford University	Finished Ph.D. Medical Physics, from Dartmouth College, USA (2021)
U2	Lala Rukh (EE)	June 2016-June 2017 Graduated	Ph.D. photonics program at University of New Mexico, USA (Fall 2017-)	Pioneering student in developing fiber tapering setup during SPROJ
U3	Rabeeya Hamid (EE)	Jan 2020-June 2021 Graduated	Ph.D. photonics program at Univ. of Wisconsin Madison, USA (Fall 2021-)	Best SPROJ report in the EE department, Finalist SPROJ report in the school, <a href="#">[C12]</a>
U4	Abdullah Afzal (EE)	June 2021-June 2022 Graduated	Preparing for CSS exam	Among the finalists for the best SPROJ
U5	Zehra Naqvi (EE)	Jan 2020-June 2022 Graduated	Ph.D. photonics program at the Univ. of Chicago, USA (Fall 2022-)	Best SPROJ in the EE department (Co-Supervised with Dr. Ata) , <a href="#">[J15]</a>
U6	Usman Akram (EE)	Feb 2018-July 2018	Ph.D. EE program at UT Austin, USA	Contributed toward fiber polarimetry: groundwork for Zehra's project
U7	Fatima Zahid (PHY)	Feb 2018-July 2018	Analyst at Power Tech. Research, Pakistan	Contributed toward fiber polarimetry: groundwork for Zehra's project
<b>Professional Research Assistants</b>				
R1	Sabeeh Irfan (EE)	July 2016-June 2017	Ph.D. photonics program at the University of North Carolina Charlotte (Fall 2017-)	Pioneer in setting up Raman Setup: Basis for the TB project
R2	Taha Sajjad (EE)	Oct 2016-July 2018	Ph.D. EE, York University, Canada (Fall 2018- )	Contributed toward formulating milk contamination problem and proposals
R3	Farhat Abbas (PHY)	June 2017-Dec 2017	Ph.D. photonics program at the University of Texas Dallas, USA (Spring 2018-)	Contributed toward Fabry-Perot multicavity modeling

R4	Muhammad Yasin (PHY)	Jan 2018-Jan 2019	Last update: MS student at PIEAS toward getting commission in Atomic Energy department	<a href="#">[J7]</a>
R5	Javeria Ejaz (EE)	Jan 2018-July 2020	Self Employed	Contributed toward developing Raman spectroscopy setup
R6	Dr. Zeeshan Rashid (PHY)	Oct 2018-Dec 2018	Asst. Prof. Islamia University Bahawalpur	Contributed toward developing Raman spectroscopy setup
R7	Bakhtawar (CHE)	June 2021-Sep 2022	Research Assistant, Co-Supervised with Dr. Basit Yameen	Pioneer in developing surface chemistry protocol for TB fiber sensor, 1 journal paper data collection stage
R8	Asma Iqbal, (Biomedical Engineering)	Aug 2022-Jan 2023	Ph.D. Biomedical Engineering Program, Australia	Pioneer in developing an optical sensing platform for detecting car fuel contamination



## **List of Service**

### **EE Department & Syed Babar Ali School of Science and Engineering**

- Member EE Undergraduate curriculum committee, Jan 2016 to date
- Convener, EE Monthly Seminar Organizing Committee, Sep 2021 to date
- Reviewer, Syed Babar Ali Research Award applications, 2021-date
- Member, EE Staff search Committee, June 2022
- Member, Task force for proposal of an MS programme in Optical Systems, 2021-2022
- Member of evaluation committees of many SPROJ and MS theses, 2016-2022
- Designing of graduate admission test questions for electromagnetics area, 2016-2022
- Designing of Ph.D. qualifier papers and oral exams for electromagnetics area, 2016-2022
- Organized a workshop by Prof. Abidi on "How to Write Good Science Papers", Dec 2021
- Organized/co-hosted the graduate admission advising sessions for our EE students, 2021
- Organized/co-hosted the EE job opportunities advising sessions for our EE students, 2020

### **University**

- Reviewer, FIF proposals, 2019 to date

### **Students**

- Provided numerous recommendation letters to students for graduate admissions.
- Provided career advice to several students

### **Professional**

- Journal Papers Reviewer: Photonics Research, ACS photonics, Optics Express, Biomedical Optics Express, Optics Letters, Applied Optics, IEEE Trans. on Microwave Theory & Techniques, IEEE Jnl. of Photonics, IEEE Journal of Light Wave Technology, MDPI Sensors, OSA Continuum.
- Convener, Publicity Committee, COMPEL 2024 at LUMS, 2022 to date
- Member, Organizing Committee, COMPEL 2024 at LUMS, 2022 to date
- Member, Postgraduate research committee, EE Dept. UET Lahore. 2022 to date
- TPC member, Frontiers in Biological Detection: From Nanosensors to Systems XIV, SPIE Photonics West, 2020 to date
- Chair, Biosensing session, Photonics Online Meetup, Jan 2021.
- TPC member, Biosensing session, Photonics Online Meetup, June 2020
- Grant Reviewer Panels: Pakistan Science Foundation
- PEC program evaluation committee member, GIKI BS photonics program, 2019
- Ph.D. supervisory/final defense committee of Armaghan Ayaz, KOC Univ., 2017-2020

### **Community**

- Made all [26 classes of EE330 Electromagnetics fields](#) and waves course public on Youtube in Feb 2021. As of June 2022, cumulative views of 26 classes are 5600+
- Talk on "Is Photonics the Next Future?" to high school students in the [National STEM School](#), Pakistan, Jan 2017