

Education and Experience

- **Jun 2016 –Present:** Research scientist at Massachusetts Institute of Technology (**MIT**) with Principle Investigator (**PI**) status for grants, Cambridge, USA.
- **Jun 2013 - Jun 2016:** Postdoctoral associate at, Massachusetts Institute of Technology (**MIT**), Cambridge, USA.
- **Postdoctoral research areas:** computational sensing, ultra-fast imaging, novel optical materials and devices.

- **Sept. 2008 – Feb. 2013:** Dept. of ECE, University of Victoria, British Columbia, Canada.
- **Ph.D. in** Electrical and Computer Engineering (photonics) **GPA: 4.0/4.0**
- **Ph.D. research areas:** nanophotonics (nanoplasmonics and optical design of nanomaterials for THz devices).

- **Sept. 2006 – July 2008:** Dept. of ECE, Isfahan University of Technology, Isfahan, Iran.
- **M.Sc. in** Electrical and Computer Engineering **GPA:17.66/20**
- **M.Sc. thesis:** *Displaying images in transparent fluid media based on acousto-optic effect.* (18.8/20)

- **Sept. 2002 – Sept. 2006:** Dept. of ECE, Isfahan University of Technology, Isfahan, Iran.
- **B.Sc. in** Electrical and Computer Engineering **GPA:17.12/20**
- **B.Sc. project:** Self-Reconfigurable Robots; design and topology (20/20).

Awards and Honors

- Project leader and corresponding author of the paper [*Nature Communications*, [7, 12665 \(2016\)](#)] ranked **2nd** of the **807** tracked articles of a similar age in **Nature Communication** (March 2017).
- First and corresponding author of **MIT spotlight cover page** article on [16th Feb. 2016](#) .
- Awarded by president of Isfahan University as a high ranked student for four times.
- Ranked top 1 percent among 450,000 participants of national entrance exam of universities in Iran.

Journal Publications (Sorted by Impact)

1. **B. Heshmat***, G. Satat, G. M. Moseley, R. Raskar, " Photography optics at relativistic speeds" *Nature*, under review.
2. **B. Heshmat***, E. C. Camus, A. R. Sanchez, R. Raskar, "Photography optics at relativistic speeds". *Light: Science and application*, to be submitted.
3. A. R. Sanchez, **B. Heshmat***, A. Aghasi, M. Zhang, S. Naqvi, J. Romberg, R. Raskar, "Terahertz time-gated spectroscopic imaging for content extraction through layered structures", *Nature Communications*, [7, 12665 \(2016\)](#).
4. **B. Heshmat***, I. H. Lee, R. Raskar, "Optical brush: imaging through permuted probes" *NPG: Scientific Reports*, [6, 20217 \(2016\)](#),
5. G. Satat, **B. Heshmat***, C. Barsi, D. Raviv, O. Chen, M. Bawendi, R. Raskar, "Locating fluorescent lifetimes behind turbid layers non-invasively using sparse time-resolved inversion", *Nature Communications*, [6, 6796 \(2015\)](#).
6. G. Satat, **B. Heshmat**, D. Raviv, R. Raskar, "All-photon-imaging: resolving images behind thick diffusers using scattered photons", *NPG: Scientific Reports*, [6, 33946 \(2016\)](#).

7. G. Garipey, N. Krstaji, R. Henderson, C. Li, R. R. Thomson, G. S. Buller, **B. Heshmat**, R. Raskar, J. Leach, and D. Faccio, "Single-photon sensitive light in flight imaging", *Nature Communications*, **6**, 6021 (2015).
8. B. Groever, **B. Heshmat***, R. Raskar, "Tyndall windows: scattering of solid-liquid mixtures" *ACS Photonics*, **3**, 930–935 (2016).
9. A. Aghasi, **B. Heshmat**, A. R. Sanchez, J. Romberg, R. Raskar. "Blind demodulation: an approach to fringe-free time-resolved THz imaging" *Optica*, **3**, 754-762 (2016).
10. **B. Heshmat**, H. Pahlevaninezhad, Y. Pang, M. Masnadi-Shirazi, R. B. Lewis, T. Tiedje, R. Gordon, T. E. Darcie, "Nanoplasmonic terahertz photoconductive switch on GaAs", *Nanoletters*, **12**, 6255–6259 (2012).
11. M. H. Kamal, **B. Heshmat**, R. Raskar, P. Vandergheynst, G. Wetzstein, "Tensor low-rank and sparse light field photography" *J. of Comp. Vis. and Im. Und.*, **145**, 172-181 (2016).
12. G. Satat, M. Tancik, O. Gupta, **B. Heshmat** and R. Raskar, "Object Classification through Scattering Media with Deep Learning on Time Resolved Measurement," *Optics Express*, **25**, 17466-17479 (2017).
13. **B. Heshmat***, G. M. Andrew, O. A. Montoya, E. C. Camus, D. Ciceri, A. Allamore, E. Shannon, M. Poitzsch, R. Raskar. 'Estimation of macro:micro porosity ratio using THz scattering' *Optics Express*, **25**, 370-385 (2017).
14. H. Ikoma, **B. Heshmat***, G Wetzstein, R Raskar, "Attenuation-corrected fluorescence spectra unmixing for spectroscopy and microscopy," *Optics Express*, **22**, 19469-19483 (2014).
15. **B. Heshmat***, M. Masnadi-Shirazi, R. B. Lewis, J. Zhang, T. Tiedje, R. Gordon, T. E. Darcie, "Enhanced terahertz bandwidth and power from GaAsBi-based sources", *Advanced Optical Materials*, **1**, 714-719 (2013).
16. **B. Heshmat***, H. Pahlevaninezhad, T. E. Darcie, "Optical efficiency enhancement methods for terahertz receiving photoconductive switches" *Opt. & Laser Tech.*, **54**, 297–302 (2013).
17. **B. Heshmat***, H. Pahlevaninezhad, and T.E. Darcie "THz detection with carbon nanotube based photoconductive switches: An assessment of capabilities and limitations", *IEEE Photonics J.*, **4**, 970-985 (2012).
18. **B. Heshmat***, T.E. Darcie, K. Taylor, H. Pahlevaninezhad, M. Omoomi, S. Sadri, "The effect of detector distance and beam width in acousto-optical beam deflection probing in air," *Opt. & Laser Tech.* **44**, 734–740 (2012).
19. **B. Heshmat***, H. Pahlevaninezhad, M. C. Beard, C. Papadopoulos and T.E. Darcie, "Single wall carbon nanotubes as base material for THz photomixing: A Theoretical study from input power to output THz emission", *Optics Express*, **19**, 15077-15089 (2011).
20. **B. Heshmat**, D. Li, T. E. Darcie, R. Gordon, "Tuning plasmonic resonances of an annular aperture in metal plate" *Optics Express*, **19**, 5912–5923 (2011).
21. H. Pahlevaninezhad, **B. Heshmat** and T. E. Darcie "Efficient THz slot line waveguides" *Optics Express*, **19**, B47-B55 (2011).
22. H. Pahlevaninezhad, **B. Heshmat**, T. E. Darcie, "Advances in THz technology", *IEEE Photonics J.*, **3**, 307-310 (2011).
23. H. Pahlevaninezhad, T.E. Darcie, **B. Heshmat**, "Two-wire waveguide for terahertz", *Optics Express*, **18**, 7415-7420 (2010).

Selected Conference Publications (Full list of conference papers is accessible on Google scholar)

1. G. Satat, **B. Heshmat**, R. Raskar, "All Photons Imaging Through Layered Scattering Materials", *COSI, CA, USA, JTU5A*, **8**, 2017.
2. G. Satat, **B. Heshmat**, T. Swedish, R. Raskar, "Computational laser speckle contrast imaging in endoscopic

system", [COSI, Heidelberg, Germany, 2016.](#)

3. **B. Heshmat**, G. Garipey, J. Leach, R. Raskar, D. Faccio, "SPAD cameras for biomedical imaging: promise and problems", [CLEO, CA, USA, 2016.](#)
4. B. Groever, **B. Heshmat**, and R. Raskar, "Tuning into Tyndall windows" [CLEO, CA, USA, 2015.](#)
5. **B. Heshmat**, IK Lee, H Bedri, R Raskar, "Imaging through permuted optical probes" [CLEO, CA, USA, 2015.](#)
6. **B. Heshmat**, H. Ikoma, I. H. Lee, K. Rastogi, R. Raskar, "Computational hair quality categorization in lower magnifications", [Phot. West. SPIE. 9333-36, CA, USA, 2015.](#)
7. **B Heshmat**, G. Satat, C. Barsi, R. Raskar, "Single-shot ultrafast imaging using parallax-free alignment with a tilted lenslet array [CLEO, CA, USA , 2014.](#)
8. **B. Heshmat**, M. Masnadi-Shirazi, R. B. Lewis, T. Tiedje, T. E. Darcie, "Dual THz emissions of GaAsBi for THz photoconductive switching", [CLEO, CA, USA , 2013.](#)
9. **B. Heshmat**, M. Masnadi-Shirazi, R. B. Lewis, T. Tiedje, R. Gordon, T. E. Darcie, "Nanoplasmonics for THz", SPP6, Ottawa, Canada, 2013.
10. **B. Heshmat**, H. Pahlevaninezhad, T.E. Darcie, K. Taylor, " Improved interaction geometries for efficient acousto-optic beam deflection probing in air", [OSA Sensors., CA, USA, 2012.](#)
11. **B. Heshmat**, H. Pahlevaninezhad, T.E. Darcie, " Efficient low-power autocorrelation measurement with carbon nanotube photoconductors", [CLEO, CA, USA, 2012.](#)
12. **B. Heshmat**, H. Pahlevaninezhad, T.E. Darcie and C. Papadopoulos, "Evaluation of carbon nanotubes for THz photomixing", [IEEE International Radar Conf., Washington DC, USA, 2010.](#)
13. **B. Heshmat**, A. Fouladgar, and K. Rostamzadeh "Topological metrics for evaluating self-reconfigurable modules properties (Flexibility)", [IEEE ICMA, Changchun, China, 2009.](#)
14. **B. Heshmat**, K. Rostamzadeh, and A. Fouladgar "Topological metrics for evaluating self-reconfigurable modules properties (Expansion & Connectivity)" [IEEE ICMA, Tskamatsu, Japan, 2008.](#)

Patents

1. ***I.N. Patent***, **B. Heshmat**, Flexible wearable solar charger compatible with variety of portable multimedia devices, (2007).
2. ***I.N. Patent***, **B. Heshmat**, S. Sadri, M. Omoomi, Chain refractions method for designing 3D acousto-optical patterns, (2008).
3. ***US patent***, **B. Heshmat**, T. E. Darcie, R. Gordon, Plasmonic interlaced PC switch, 14/055,825, (2014)
4. ***US Patent***, **B. Heshmat**, A. Redo Sanchez, R. Raskar, Methods and apparatus for remote subwavelength imaging, 19084T, (2016).
5. ***US Patent***, **B. Heshmat**, I. H. Lee, H. Bedri, R. Raskar, Optical Brush, 17494TE, (2016).
6. ***US Patent***, **B. Heshmat**, A. Redo Sanchez, A. Aghasi, J. Romberg, R. Raskar, Batch Scanning Using Time-of-Flight, 19855TJ, (2017).
7. ***US Patent***, **B. Heshmat**, Time-folded imaging; Methods and Apparatus for Imaging Using Optical Cavity, 15682145, (2017).
8. ***US Patent***, **B. Heshmat**, On-axis augmented reality displays with waveguide backlights, 15/816,842, (2017).

9. **US Provisional Patent**, B. Groever, **B. Heshmat**, R. Raskar, Tyndall windows, 62161795, (2015).
10. **US Provisional Patent**, **B. Heshmat**, I. H. Lee, R. Raskar, Computational hair categorization at lower magnification, 17772T, (2015).
11. **US Provisional Patent**, A. Kadambi, **B. Heshmat**, A. Bhandari, T. Maeda and R. Raskar, "Temporal Beating for GHz Time of Flight Imaging", by 19963T, (2017).
12. **US Provisional Patent**, **B. Heshmat** and M. Burger, virtual airborne circuits via contoured plasma filaments, TBD (2017).
13. **US Provisional Patent**, **B. Heshmat** and A. Samaniego, Methods and apparatus for retinal scanning augmented reality display, TBD (2017).
14. **US Provisional Patent**, **B. Heshmat**, Remote-fed transparent micro-display with diffractive entrance pupil, TBD (2017).

Selected Invited Talks

- **NASA**, "Intracity airborne transportations", Houston Space center, Nov. 2017.
- **NASA**, "Principles of engineering outside the box", Houston Space center, Sep. 2016.
- **Stanford**, "Computational imaging for single photon counting applications", Aug 2016.
- **Tokyo University**, "New methods and applications of ultrafast imaging", Aug 2016.
- **UC Berkeley** "New methods and applications of ultrafast imaging", June 2016.
- **Washington University in St. Louis** "Imaging at relativistic speeds", Feb 2017.
- **UCLA**, "Computational Terahertz imaging for batch scanning" Sep. 2015.
- **TED^xLA** Dec. 2016 ([video here](#)).
- **TED^xKansasCity**, (3000 live audience) Aug. 2015 ([video here](#)).
- **TED^xKish**, Apr. 2015 ([video here](#)).
- **TED^xBeaconStreet** "Future of imaging" on future of imaging, Nov. 2014 ([video here](#)).
- **TED^xUVIc** talk "The business of invisibles" on future of THz, Mar. 2012 ([video here](#)).

News and Press

- **Reading through closed books**, **BBC, CBS, TechCrunch, Fox News, PBS, Engadget, Business insider, MIT news, Gizmodo, Boston magazine, Telegraph, Futurism, live science**, and other media outlets.
- **All photon imaging**, **MIT News, Yahoo News, Phys.org, Digital trends**, and other media outlets.
- **Tyndall windows**, **Science daily, MIT news, Phys.org**, and other media outlets.
- **Optical brush**, **MIT news, Science daily, chronicle, Engineering.com, MIT spotlight**, and other outlets.

Teaching and Mentorship Experience

- **Postdoctoral mentorship at MIT:** Albert Redo-Sanchez (2015-2016), Alireza Aghasi (2016).
- **Grad student mentorship at MIT:** Guy Satat (ultrafast imaging, Ph.D. 2017), Ayush Bhandari (mathematical methods in THz imaging, Ph.D. 2015). Benedikt Groever (solid-liquid optical materials, M.Sc. 2014), Genevieve Gariepy (imaging with SPAD arrays, visiting Ph.D. 2014), Hayato Ikoma (Fluorescence unmixing M.Sc. 2013)
- **Course instructor for:**
 - **Mathematical Methods in Imaging**, MAS 532/132, MIT, Spring 2014.
 - **Advances in Imaging**, CEUs 2.4, MIT, Summer 2014.
- **Lab instructor in CAD, Microwaves and Video processing courses for 5 semester** (details at: <http://web.media.mit.edu/~barmak/Academics.html>)
- **Undergrad student supervision:** K. Taylor (UVic-Acousto-optics 2009) and R. Gruger (UVic-THz devices 2011), G. M. Andrew (MIT-THz subwavelength imaging 2016).

Academia and Industry Experience

- Reviewer of: **IEEE, OSA, NPG, ACS.**
- Academic grant writing experience: **NSF, DARPA, Intuitive surgical, TATA**
- Initiated and wrote National Science Foundation (**NSF**) grant on "Contoured Optical Filaments: Toward Virtual Airborne Circuits" (2017).
- Engaged in National Science foundation (**NSF**) grant on 'Time resolved imaging' (2016-present).
- Engaged in **Lincoln lab** 'New directions in computational imaging' grant (2015-2016).
- Engaged in National Science foundation (**NSF**) grant on 'Inverse light transport' (2013-2015).
- Industrial grant writing and collaboration: **Natura, Olympus, Aramco, Toppan.**
- Technical Consultation for: **Olympus, Toyota, NHK, Keyocera, NEC, Meta Augmented Reality.**
- Optics experiences design and operation of: Photophysics measurement setups such as pump and probe and interferometry setups, wide range of spectroscopy setups (THz, Raman, optical), Acousto-optic beam bending setups, Time-of-flight and ultrafast-imaging setups, computational imaging setups.
- Clean room and nanofabrication experience: Photolithography, ebeam lithography, SEM and FIB.

List of Referees

- *Prof. Federico Capasso* (Harvard, EE/App. Phys. background, pioneer in device physics)
- *Prof. Ramesh Raskar* (MIT, EE/CS background, pioneer in imaging systems)
- *Prof. Mounji Bawendi* (MIT, Chem. background, pioneer in light-matter interactions)
- *Prof. Justin Romberg* (Georgia Tech., ECE/Math. background, pioneer in signal processing)
- *Prof. Daniele Faccio* (Heriot-Watt Univ., EE/App. Phys. background, device physics)
- *Prof. Thomas Edward Darcie* (Univ. of Victoria, EE background, pioneer in optical systems).