Mohammadreza **Mousaei**

Robotics Researcher · Carnegie Mellon University

2715 Murray Ave Apt 911, Pittsburgh, PA, 15217

(+1) 312 478 6934 | mmousaei@andrew.cmu.edu | frc.ri.cmu.edu/ mmousaei/ | mmousaei | mmousaei | mmousaei

Research Experience

Carnegie Mellon University — *Pittsburgh, PA*

Research Associate at Field Robotics Center — *Nov. 2017 - present*

- **Developing Planning Software for DARPA Subterranean Challenge:**

  Adviser: Dr. Sebastian Scherer
  - Developing custom DJI M-100 simulation with a rotary lidar in gazebo environment and implementing Global Trajectory Planner using OMPL libraries and Developing Local Trajectory Planner using custom trajectory libraries in ROS.
- **Developing Autonomy Software for Pipe Crawler robot:**

  Adviser: Prof. William (Red) L. Whittaker
  - Developing 3D Perception software for pipe crawler robot using ToF Lidar and constructing 3D map of the environment using ICP.
  - Developing online robot localization software using EKF and post processing localization using Factograph optimization (with GTSAM package).
- **Developing Software/Hardware for Moon Rover Robot:**

  Adviser: Prof. William (Red) L. Whittaker
  - Developing Hardware of a custom designed light weighted LiDar
  - Developing Software for our custom built Lidar to construct a 3D point cloud

University of Illinois at Chicago — *Chicago, IL*

Research Assistant — *Jun. 2016 - Nov 2017*

- **Designing a fully integrated radar and communication system – named ComSens**

  Adviser: Dr. Sebastian Scherer
  - Proposing the novel idea of integrating radar and communication systems using pilot symbols
  - Formulating the optimization problem to design training signals
  - Solving the optimization problem using Convex Optimization methods
  - Published our results as a paper at Military Conference on Communication (IEEE MILCOM 2017)
- **Optimizing Pilot Overhead for Ultra-Reliable Short-Packet Transmission**

  Adviser: Dr. Sebastian Scherer
  - Channel estimation for short-packet communication
  - Formulating the optimization problem for finite-length packet transmission
  - Analytically solving the optimization problem and finding the optimal training signal
  - Published our results as a paper at International Conference on Communication (IEEE ICC 2017)

Sharif University Of Technology — *Tehran, Iran*

Research Assistant at Computer Vision Lab — *Nov. 2014 - Feb. 2015*

- **Designing and Implementing an @Home robot for participating in AUT-CUP competitions**

  Adviser: Dr. Sebastian Scherer
  - Designing the platform (Differential Derive Robot with 4DOF Lynx Robotic Arm on top)
  - Controlling the robotic arm using inverse kinematic (analytical approach)
  - Motion planning of the robot (using Artificial Potential Field)
  - Our robot ranked 2nd in AUTCUP international Robotics competition (Artificial Intelligence League)

Tehran Polytechnic University — *Tehran, Iran*

Research Assistant at Computer Vision Lab — *Jan. 2015 - Jul. 2015*

- **Completing and debugging an @Home Robot for ROBOCUP 2015 (Joao Pessoa, Brazil)**, Advisor: Dr. Shiri.

  Adviser: Dr. Sebastian Scherer
  - Designing a digital circuit for gathering sensors data (Ultrasound, IR, Gyroscope, …) and IMUs over I2C BUS
  - Implementing Hough transform based algorithm for Robot Vision (using OpenCV)
  - Our robot participated in ROBOCUP 2015 in Joao Pessoa, Brazil

Skills

Programming	C/C++, C#, Phyton, MATLAB, JAVA, VHDL, Verilog, LaTeX, ROS (Robot Operating System)
Smart Phone Programming	iOS (Swift), Android (JAVA)
Web	HTML, CSS, JS, php
Controllers	AVR, ARM, FPGA, PLC
PCB Layout	Altium Designer
Languages	Persian (native), English (fluent), Arabic(Intermediate)

Education

University of Illinois at Chicago — *Chicago, IL*

M.Sc. in Electrical and Computer Engineering — *Aug. 2015 - PRESENT*

- **GPA:** 3.48/4

Shahid Beheshti University (former National University of Iran) — *Tehran, Iran*

B.S. in Electrical and Computer Engineering — *Sep. 2010 - Jan 2015*

- **GPA:** 17.09/20 (3.72/4)

Honors & Awards

2014	**2nd Place**, AUT-CUP Robotic International Competition, Artificial Intelligence league	*Amirkabir U. of Tech*
2012	**2nd Place**, ACM ICPC Qualiffication Programing Contest	*S. Beheshti Univ.*
2012	**19th Place**, ACM ICPC West Asia Regional Programing Contest	*Sharif U. of Tech*
2011	**5th Place**, ACM ICPC Qualiffication Programing Contest	*S. Beheshti Univ.*
2010	**Ranked Top 1%**, Mathematics and Physics among more than 178,000 students in Iranian nationwide university entrance examination (Konkoor).	*Tehran, Iran*
2008	**Accepted**, Iranian National Olympiad Competition in Mathematics	*Tehran, Iran*
2007	**Accepted**, Iranian National Olympiad Competition in Computer Science	*Tehran, Iran*

Research Interest

• Robotics • Wireless Communication

Teaching Experience

2017	**Wireless Communications**, Teaching Assistant	*UIC*
2016	**Digital Communications**, Teaching Assistant	*UIC*
2016	**Solid State Device Theory**, Teaching Assistant	*UIC*
2016	**Logic Design**, Teaching Assistant	*UIC*
2015	**Computer Communication Networks I**, Teaching Assistant	*UIC*
2015	**Probability and Random Processes**, Teaching Assistant	*UIC*
2012-13	**Digital Logic Design**, Teaching Assistant	*S. Beheshti Univ.*
2012-13	**Robotics Workshop**, Instructor	*Mofid I Highschool*
2012-13	**Robotics Workshop**, Instructor	*Mofid III Highschool*
2012-13	**Robotics Workshop**, Instructor	*Danesh Highschool*
2012	**Mathematics and Physics**, Instructor	*Allame Highschool*
2012	**Mathematics and Physics**, Instructor	*Salam Highschool*
2012	**Mathematics and Physics**, Instructor	*Talash Highschool*

Work Experience

PLTW Illinois — *Chicago, IL*

IT Expert — *Jun. 2016 - Sep. 2016*

- Debug and Troubleshoot Network technical problems
  - Analyzing performance using Linux
  - Finding bottleneck of the network (NIC, Soft interrupt, Kernel buffer, Network layer, etc)
  - Tuning the bottleneck (using tuned on Ubuntu)

Hooshmand Afzar CO (Pish Robot) *Tehran, Iran*

Digital Designer *Jan. 2012 - Jun. 2012*

- Designing and Implementing a mobile robot
  - Designing the platform (Differential Derive Robot)
  - Designing Control System (PID Hybrid Control system with Go-to-Goal and Obstacle-Avoidance states)
  - Implementing the Control system (with C++ on ROS Indigo installed on a Raspberry Pi 2 B+)

Rahjuyan Sanat Taban CO (RST) *Tehran, Iran*

Digital Designer *Jun. 2012 - Dec. 2012*

- Design and Implementing digitally controlled current source
  - Analog design of a buck current source (with a digital controller on MOSFET gate)
  - Closing the feedback loop using Hall current sensor
  - Designing the closed loop digital control system using PID controller
  - Implementing the designed control system using C++ on ARM Cortex-M3 (LPC1768) Microcontroller

Projects

2017	**Computer Vision**, Implementing different CV algorithms on OpenCV	*Udacity*
2017	**Machine Learning**, Implementing different ML algorithms on MATLAB	*Coursera*
2017	**Image and Video Processing**, Implementing Image and Video processing methods on OpenCV	*Coursera*
2016	**Wireless Communication**, Simulating LTE system on MATLAB	*UIC*
2016	**Information Theory**, Survey paper on Rate in Finite Blocklength	*UIC*
2015	**Digital Control**, Implementing a current source controlling with PID using ARM	*S. Beheshti Univ.*
2015	**Image Processing**, Implementing Different kinds of Visual Cryptography using both MATLAB and C#	*S. Beheshti Univ.*
2014	**Communication Circuits**, Simulating a Low Noise Amplifier (LNA) with ADS	*S. Beheshti Univ.*
2014	**Digital Signal Processing(DSP)**, Simulating Different kinds of filters (butterworth, chebishev etc) with MATLAB	*S. Beheshti Univ.*
2013	**Industrial Electronics**, Simulating different kinds of convertes(buck, boost, buck- boost) with MATLAB	*S. Beheshti Univ.*
2012	**Electronics II**, Designing, Simulating and Implementing a High gain Amplifier with low noise	*S. Beheshti Univ.*

Publications

- **M. Mousaei**, S. Vahidian, B. Smida, ”Training Signal Optimization for Communication in Finite-Blocklength: An Analytical Approach”, **IEEE Communications Letters**, *Under Preparation*.
- **M. Mousaei**, M. Soltanalian, B. Smida, ”ComSens: Exploiting Pilot Diversity for Pervasive Integration of Communication and Sensing”, **IEEE Military Conference on Communication**, Oct 2017.
- **M. Mousaei**, B. Smida, ”Optimizing Pilot Overhead for Ultra-Reliable Short-Packet Transmission”, *IEEE International Confesrence on Communication*, May 2017.
- A. Sheikhjafari, S. Gharghabi, K. Sartipi, **M. Mousaei**, A. Sheikhjafari, E. Babaians and S. Shiry Ghidary, ”Amirkabir University of Technology (AUT) @Home 2014 Team Description Paper”, **Robocup 2014, Joao Pessoa, Brazil**, Jul. 2014.
- **M. Mousaei**, A. Keipour, E. Babaians, ”Automated High-Speed Traffic Monitoring and Violation Detection Using RFID Technology”, **IEEE Iranian Conference on Electrical Engineerin**, May 2014.
- A. Keipour, K. Sartipi,**M. Mousaei**, S. Mohammadzadeh, M. Jamzad, ”Team Description Paper for Sharif University of Technology (SUT) Team”, **AUTCUP Robotics competitions**, Oct. 2013.

Test Scores

TOEFL *ETS*

Score: 105 *Dec. 2014*

- Reading (29/30), Listening (29/30), Speaking (22/30), Writing (25/30)

GRE *ETS*

Score: 313 *Nov. 2014*

- Analytical (3.5/6.0), Quantitative (167/170), Verbal (146/170)

References

References available upon request