

Ming Li

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Skills

Languages Java, C++, Bash, Matlab, C, Python, R.

Techniques Digital Signal Processing, Android Programming, Machine Learning, Algorithm Design, Speech Recognition, Computer Vision, Object-Oriented Programming, ROS Robot Programming, Arduino Programming, Game Theory, Git Version Control, LaTeX Writing.

Research Interests

SECURITY AND PRIVACY IN MOBILE IOT SENSING, DIGITAL SIGNAL PROCESSING, MACHINE LEARNING, ALGORITHMIC GAME THEORY, INCENTIVE MECHANISM DESIGN, NETWORKS, CROWDSOURCING.

Education

Colorado School of Mines

GOLDEN, USA

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GOLDEN, USA

Peking University

BEIJING, CHINA

Ph.D. in Computer Science

GPA: 3.98

Aug. 2015 - Aug. 2020

M.S. in Computer Science

GPA: 3.94

Jan. 2014 - May. 2015

B.S. in Geochemistry

GPA: 3.57

Sep. 2009 - Jul. 2013

Projects

2019-2020 SpyPhone : EAVESDROPPING ON SMARTPHONE SPEAKERS WITH MOTION SENSORS

- Identified a security issue on smartphones that motion sensors (access granted to any app) can eavesdropping on speakers.
- Developed an Android app to collect motion sensor (accelerometer and gyroscope) data while playing sounds through speakers.
- Reconstructed the high frequency (16,000 Hz) sound information from low frequency (400 Hz) motion data by building K-SVD dictionaries and recognized the speech using Bi-LSTM networks.
- Utilized: Recurrent Neural Networks, Compressed Sensing, Android Programming.

2018-2019 MotionVoice : A SPOOF-PROOF VOICE AUTHENTICATION SYSTEM FOR SMARTPHONES

- Proposed a new voice authentication system that is immune to replay attacks by leveraging the self demodulation and acoustic attenuation effect when sound signals transmitted through human body.
- Designed an Android app to collect the body-borne vibration and sound data simultaneously.
- Applied signal processing techniques such as syllable separation to sound data and using sequence-to-sequence LSTM network on vibration data to identify users.
- Utilized: Machine learning, Digital Signal Processing, Android Programming.

2018 DriverDetect : USING ATMOSPHERIC PRESSURE SENSORS TO DETERMINE WHETHER THE USER IS THE DRIVER OR A PASSENGER

- Proposed a new driver detection system based on the fact that each seat in the vehicle is expected to experience differences in atmospheric pressure for each vehicle acceleration dynamic.
- Designed a circuit with Arduino to test the system.
- Utilized: Arduino programming, Digital Signal Processing.

2016-2017 QUAC : QUALITY-AWARE CONTRACT-BASED INCENTIVE MECHANISMS FOR CROWDSENSING

- Design two quality-aware contract-based incentive mechanisms for crowdsensing, named QUAC-F and QUAC-I, under full information model and incomplete information model, respectively, which differ in the level of users' information known to the system.
- Mathematically proved that both QUAC-F and QUAC-I are guaranteed to maximize the platform utility while satisfying individual rationality and incentive compatibility.
- Utilized: Algorithm Design, Contract Theory.

2016 TurtleBot : USING RTAB-MAP AND A TURTLEBOT TO CREATE A FLOOR MAP

- Used a TurtleBot to perform graph-based simultaneous localization and mapping (SLAM) by using RTAB-Map.
- Programmed speech control and voice feedback on the TurtleBot.
- Utilized: ROS Robot Programming, Computer Vision.

2015-2017 SpecWatch : SOLVING ADVERSASIAL SPECTRUM USAGE MONITORING PROBLEM WITH UNKNOWN STATISTICS IN CRNs.

- Modeled the monitoring problem as an adversarial multi-armed bandit problem with switching cost.
- Designed an asymptotically optimal online algorithm, termed SPECWATCH, and prove its normalized expected weak regret is $O(1/\sqrt[3]{T})$, which converges to 0 as time horizon T approaches to ∞ .
- Utilized: Algorithm Design, Game Theory.

2014-2015 IntelliSample : SELF-TUNING PROGRAM TO OUTPUT THE SHORTEST PATHS EFFICIENTLY ON VERY LARGE GRAPHS

- Implemented three shortest path algorithms (Bellman Ford's, Dijkstra's, and Gabow's) and two sampling methods based on Forest Fire Algorithm.
- Provided a framework which predicts the best shortest path algorithm by pre-running on the sample graph.
- Utilized: Algorithm Selection, Graph Sampling.

2014 PaperSelect : PROGRAM TO AUTOMATICALLY SELECT ACADEMIC PAPERS FOR RESEARCHERS

- Provided two greedy approaches to solve the problem, one is heuristic and the other is $(1-1/e)$ -approximate.
- Utilized: Algorithm Design.

Publications

- Yuhui Zhang, **Ming Li**, Dejun Yang, Jian Tang, Guoliang Xue, and Jia Xu. Trade-off Between Location Quality and Privacy in Crowdsensing: An Optimization Perspective. *IEEE Internet of Things Journal*, 7(4): 3535-3544, 2020.
- Yuhui Zhang, **Ming Li**, Dejun Yang, Guoliang Xue. A Budget Feasible Mechanism for k-Topic Influence Maximization in Social Networks. *IEEE Global Communications Conference (GLOBECOM)*, 2019.
- Yuhui Zhang, **Ming Li**, Dejun Yang, Jian Tang, and Guoliang Xue. Optimizing Location Quality in Privacy Preserving Crowdsensing. *IEEE Global Communications Conference (GLOBECOM)*, 2019.
- Jian Lin, Dejun Yang, **Ming Li**, Jia Xu, and Guoliang Xue. Frameworks for Privacy-Preserving Mobile Crowdsensing Incentive Mechanisms. *IEEE Transactions on Mobile Computing (TMC)*, 17(8): 1851-1864, 2018.
- **Ming Li**, Dejun Yang, Jian Lin, Ming Li, and Jian Tang. SpecWatch: A Framework For Adversarial Spectrum Monitoring With Unknown Statistics. *Computer Networks (COMNET)*, 143: 176-190, 2018.
- Jian Lin, **Ming Li**, Dejun Yang, and Guoliang Xue. Sybil-Proof Online Incentive Mechanisms for Crowdsensing. *IEEE International Conference on Computer Communications (INFOCOM)*, 2438-2446, 2018.
- **Ming Li**, Jian Lin, Dejun Yang, Guoliang Xue, and Jian Tang. QUAC: Quality-Aware Contract-Based Incentive Mechanisms for Crowdsensing. *IEEE International Conference on Mobile Ad Hoc and Sensor System (MASS)*, 72-80, 2017.
- Jian Lin, **Ming Li**, Dejun Yang, Guoliang Xue, and Jian Tang. Sybil-Proof Incentive Mechanisms for Crowdsensing. *IEEE International Conference on Computer Communications (INFOCOM)*, 2017.
- Michael Brown, Colin Marshall, Dejun Yang, **Ming Li**, Jian Lin, Guoliang Xue. Maximizing Capacity in Cognitive Radio Networks Under Physical Interference Model. *IEEE/ACM Transactions on Networking (TON)*, 25(5): 3003-3015, 2017.
- Yuhui Zhang, Dejun Yang, Jian Lin, **Ming Li**, Guoliang Xue, Jian Tang, and Lei Xie. Spectrum Auctions Under Physical Interference Model. *IEEE Transactions on Cognitive Communications and Networking (TCCN)*, 3(4): 719-728, 2017.
- **Ming Li**, Dejun Yang, Jian Lin, Ming Li, and Jian Tang. SpecWatch: Adversarial Spectrum Usage Monitoring in CRNs with Unknown Statistics. *IEEE International Conference on Computer Communications (INFOCOM)*, 2016
- Jian Lin, Dejun Yang, **Ming Li**, Jia Xu, and Guoliang Xue. BidGuard: A Framework for Privacy-Preserving Crowdsensing Incentive Mechanisms. *IEEE Conference on Communications and Network Security (CNS)*, 145-153, 2016.

Experience

Course Instructor

CSCI 358: DISCRETE MATH

Colorado School of Mines

Fall 2019 Semester

Course Instructor

CSCI 561: THEORY TO COMPUTATION

Colorado School of Mines

Fall 2016 Semester

Research Assistant

NEMOS LAB

Colorado School of Mines

Fall 2015 - now

Presentations

The 35th Annual IEEE International Conference on Computer Communications

Presenter for "SpecWatch: A framework for adversarial spectrum monitoring with unknown statistics."

San Francisco, USA

Apr. 2016

The 14th IEEE International Conference on Mobile Ad hoc and Sensor Systems

Presenter for "QUAC: quality-aware contract-based incentive mechanisms for crowdsensing."

Orlando, USA

Oct. 2017