Mitesh Patel

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Summary

- Over 10 years of experience in developing indoor localization, user activity/behavior modelling, endoscope localization, data mining, sensor fusion and applying machine learning algorithms including probabilistic models, classification, and regression.
- Experience in working with diverse data sources such as sensors, big data logs (user-app smartphone interaction).
- New and Media coverage (RF localization): `https://phys.org/news/2015-10-smart-smartphone.html`.
- Filed over 12 patent with novel solutions in the areas of indoor localization, user behavior modeling, and healthcare domain.
- Mentored over 7 interns with successful internship outcomes, parts of which have been tested in real world deployment.
- Organized and participated in hackathon events for summer interns.
- Recipient of Significant Achievement Award at FXPAL.
- Runner up of the **Competition Excellence Award** at the Annual Tech. Conf. held by Fuji Xerox (rated by CEO & Board of Directors).
- Indoor localization tech. developed by FXPAL got sold to for **2 million USD** (2020).
- Received 15000 USD grant under Faculty Research and Engagement Program sponsored by Yahoo Labs (2015).
- Peer reviewer at conferences such as ICRA, IROS, ISWC, UBIComp, IPIN, HRI, ACM Multimedia, IUI.
- Published over 20 papers in areas related to Robotics, Machine Learning, IoT and User Interaction.

Skills

Languages	Python, C/C++, PIG, Java
Tools	Matlab, Android, Hadoop, GIT, Labview, CodeVision, Keil, LATEX
Libraries	TensorFlow, TensorFlow Probability, Keras, Robot Operating System, OpenCV, ScikitLearn, pySpark, Bayesian Network Toolbox
Interest	Localization, Robotics, Computer Vision, Deep Learning, Applied Machine Learning, Probabilistic Modeling, Data Mining

Experience

FX Palo Alto Laboratory Inc., *CA, U.S.A*   Sr. Research Scientist / Theme Lead   *Apr 2016 - Jun 2020*

- I was responsible for leading the efforts to experiment and develop localization technologies which uses various sensors such as BLE, RGB-D/RGB images, IMU for applications in indoor localization and healthcare domain.
- Indoor localization of smart device user using BLE/WiFi-RTT infrastructure. *(Android, Python, Matlab)*
  - Spearheaded efforts to develop an indoor localization engine that utilizes RF infrastructure and smartphone sensors.
  - Developed indoor localization platform capable to fuse information from various sensors on smartphones.
  - Developed novel machine learning techniques to compensate for noisy sensor data.
  - Tested the performance through field deployment for various business applications.
  - Field deployment involved visiting client site, installing hardware and testing for various conditions and failure cases.
  - Learning from field deployment lead to further R&D efforts such as algorithmic generation of beacon placement map.
- Indoor localization using RGB images. *(Tensorflow, Python)*
  - Developed indoor localization system using deep learning framework that predicts precise location using images.
  - CNN-LSTM based deep learning framework exploited both temporal and spacial relationship between and within images.
  - Project scope include collecting representative data, hyper parameter optimization and perform testing on smart devices.
  - Tested the system within our office space in real-time both on a general purpose robot and as a smart phone app.
- Localization of endoscope using RGB images. *(Tensorflow, Matlab, OpenCV, Python)*
  - Developed endoscope localization technique that utilizes both deep learning and traditional computer vision methods.
- Uncertainty estimation & importance sampling for indoor localization using Bayesian Neural Network. *(Tensorflow Probability)*
  - Developing a Bayesian estimation framework that predicts both the state and the associated uncertainty for localization.
  - Utilizing the uncertainty as a measure to extract locations/areas where the predictions are highly uncertain.
- Activity Recognition using wallmounted RF sensor. *(Python, Scikit Learn)*
  - Developed activity recognition system for user activities perceived by RF sensor.
  - Project scope included collect application specific data, analyze data and develop model for activity recognition.

Yahoo Labs, *CA, U.S.A.*   Research Scientist (Ads Sciences Team)   *Sep 2014 - Apr 2016*

- I was responsible for analyzing large user-app interaction data to generate analytics, and user features that can be used to improve user-ad matching.
- App install Ad recommendation using user features extracted for app interaction behavior. *(Pig, Python, Hadoop, Pyspark)*
  - Extracted and scrapped big user data logged at different Yahoo properties to generate analytics and understand user patterns.
  - Developed App install Ad recommendation model using collaborative filtering approach using User-App dataset.

- Study smart phone consumption of users based on their household location and while watching T.V. *(Android, Matlab)*.
  - Developed Android app that logs Bluetooth Low Energy (BLE) signal along with user interaction with different apps.
  - Utilized BLE signal information to derive room based user location while using their smart phone.
- Recognize drivers based on their driving behavior. *(Android)*
  - Developed android app that logged car sensors available through the OBD outlet and smartphone sensors data
  - Conducted field test under two different conditions (controlled and collection in wild) to train and test the system.

Navisens Inc., *CA, U.S.A.*   SOFTWARE/RESEARCH ENGINEER   *Aug 2013 - Feb 2014*
- Machine learning specialist for the motionDNA technology developed by Navisens. *(Android, Matlab, C++)*
- Develop various modules such as activity recognition, distance estimation based on their interactions with smartphones.

University of Tech. Sydney, *Australia*   RESEARCH ASSISTANT   *Sep 2007 - Jun 2009*
- Assist researchers in developing solutions to predict behaviors of assistive wheelchair and walker users by utilizing different Probabilistic Models and machine learning techniques. *(Matlab, C)*
- Other research responsibility includes hardware design and sensor integration.
- Also worked on analysis of EEG and ECG signals in both time and frequency domain.

Matrix Telecom Pvt. Ltd., *India*   RESEARCH ENGINEER (PDA TEAM)   *Jul 2005 - Jul 2006*
- Provide key insights and develop product specification/features for new products.
- Developed a 30 Port GSM gateway solution for the largest Oil Corporation in India, which reduced their telecomm. cost by 45%.

Vox-N-Yare Systems Pvt. Ltd., *India*   RESEARCH ENGINEER   *Jun 2003 - Jun 2005*
- Developed system to display and update special deals on large public LED display board using SMS from smart devices. *(C/C++)*
- Developed boiler monitoring and controlling unit integrated with GSM gateway for large petrochemical company. *(C/C++)*

Education

University of Tech. Sydney, *Australia*   PH.D. IN ROBOTICS   *2009 - 2013*
 Thesis: A Probabilistic Model for Assistive Robotics Devices to Support Activities of Daily Living
Advisors: Asso. Prof. Jaime Valls Miro & Prof. Gamini Dissanayake
Specialization: Healthcare Robotics, Machine Learning, Probabilistic Models, Manipulations, Human Robot Interaction

Royal Institute of Tech., *Sweden*   VISITING RESEARCHER (ENDEAVOUR AWARD RECIPIENT)   *2012 - 2012*
 Research Topic: Probabilistic Models to infer Grasping and Manipulation Activities
Advisors: Prof. Danica Kragic, Dr. Carl Henrik Ek & Asso. Prof. Jaime Valls Miro

University of Tech. Sydney, *Australia*   M.E. COMPUTER CONTROL ENGINEERING   *2006 - 2008*
 Thesis: Brain Computer Interface to study Human Behaviour

Gujarat University, *India*   B.E. ELECTRONICS ENGINEERING   *1999 - 2003*

Relevant Publications

- *Check my google scholar page for complete list: google-scholar page*
- Girgensohn, A., **Patel, M.**, Biehl, J.,*"Indoor Localization Techniques for Enhancing IoT Applications in Social Contexts and Processes"*, ACM Journal of Personal and Ubiquitous Computing, 2020 (To Appear)
- Song, J., **Patel, M.**, Girgensohn, A., Kim, C., *"Combining Deep Learning with Geometric Features for Image based Localization in the Gastrointestinal Tract"*, `https://arxiv.org/abs/2005.05481`
- Biehl, J., Girgensohn, A., **Patel, M.**, *"Achieving Accurate Room-Level Indoor Location Estimation with Emerging IoT Networks"*, ACM International Conference on Internet of Things, (IoT 2019), 4, 2019
- Avrahami, D., **Patel, M.**, Yamaura, Y., Kratz, S., Cooper, M., *"Unobtrusive Activity Recognition and Position Estimation for Work Surfaces Using RF-Radar Sensing"*, ACM Transactions on Interactive Intelligent Systems (TiiS), 10 (1), 1-28
- Kim, C., Bhatt, C., **Patel, M.**, Kimber, D., *"InFo: Indoor Localization using Real-Time Context Fusion of Visual Information from Static and Dynamic Cameras"*, IEEE International Conference on Indoor Positioning and Indoor Navigation (IPIN 2019), pp. 1-8, 2019
- **Patel, M.**, Girgensohn, A., Biehl, J., *"Fusing Map Information with a Probabilistic Sensor Model for Indoor Localization using RF Beacons"*, IEEE International Conference on Indoor Positioning and Indoor Navigation (IPIN 2018), pp. 1-8, 2018
- Jadidi, M., **Patel, M.**, Valls Miro, J., Dissanayake, G., Biehl, J., Girgensohn, A., *"A Radio-Inertial Localization and Tracking System with BLE Beacons Prior Maps"*, IEEE International Conference on Indoor Positioning and Indoor Navigation (IPIN 2018), pp. 206-212, 2018
- **Patel, M.**, Emery, B., Chen, Y., *"ContextualNet: Exploiting Contextual Information using LSTMs to Improve Image-based Localization"*, IEEE International Conference on Robotics and Automation (ICRA 2018), pp. 1-7, 2018
- Falque, R., **Patel, M.**, Biehl, J., *"Optimizing Placement and Number of RF Beacons to Achieve Better Indoor Localization"*, IEEE International Conference on Robotics and Automation (ICRA 2018), pp. 2304-2315, 2018
- Avrahami, D., **Patel, M.**, Yamaura, Y., Kratz, S., *"Below the Surface: Unobtrusive Activity Recognition for Work Surfaces using RF-radar sensing"*, 23rd International Conference on Intelligent User Interfaces (IUI 2018), pp. 439-451, 2018

- Jadidi, M., **Patel, M.**, Valls Miro, J., *"Gaussian process online observation classification for RSSI-based low-cost indoor positioning systems"*, IEEE International Conference on Robotics and Automation (ICRA 2017), pp. 6269-6275, 2017
- Zhang, C., **Patel, M.**, Buthpitiya, S., Lyons, K., Harrison, B., Abowd, G., *"Driver Classification Based on Driving Behaviors"*, 21st International Conference on Intelligent User Interfaces (IUI2016), 80-84, 2016
- Holz, C., Bentley, F., Church, K., and **Patel, M.**, *"I'm Just on my phone and they're watching TV": Quantifying mobile device use while watching television"*, ACM Conference on Interactive Experiences for TV, pp. 93-102, 2015
- **Patel, M.**, Valls Miro, J., Kragic, D., Ek, C. H., Dissanayake, G., *"Learning Object, Grasping and Manipulation Activities using Hierarchical HMMs"*, Journal of Autonomous Robots (Issue on Beyond Grasping: Modern Approaches for Dexterous Manipulation), pp. 1-15, 2014
- **Patel, M.**, Valls Miro, J., Dissanayake, G., *"A Probabilistic Approach to Learn Activities of Daily Living of a Mobility Aid Device User"*, IEEE International Conference on Intelligent Robots and Systems (IROS 2014), pp. 969 -974, 2014
- **Patel, M.**, Ek, C. H., Kyriazis, N., Argyros, A., Valls Miro, J., Kragic, D., *"Language for Learning Complex Human-Object Interactions"*, IEEE International Conference on Robotics and Automation (ICRA 2013), pp. 4982-4987, 2013
- **Patel, M.**, Valls Miro, J., Dissanayake, G., *"A Hierarchical Hidden Markov Model for Inferring Activities of Daily Living with an Assistive Robotic Walker"*, Proceedings of the IEEE International Conference on Biomedical and Biomechatronics, pp. 1071-1076, 2012
- **Patel, M.**, Valls Miro, J., Dissanayake, G., *"Probabilistic Activity Models to Support Activities of Daily Living for Wheelchair users"*, Proc. of workshop on Progress, Challenges and Future Perspectives in Navigation and Manipulation Assistance for Robotic Wheelchairs, IEEE International Conference on Intelligent Robots and Systems (IROS2012), pp. 6, 2012
- **Patel, M.**, Valls Miro, J., Dissanayake, G., *"Activity Recognition from the Interactions between an Assistive Robotic Walker and Human Users"*, Proceedings of 6th ACM/IEEE International conference on Human-Robot Interaction (HRI 2011), pp. 221-222, 2011
- **Patel, M.**, Lal, S., Kavanagh, D., Rossiter, P., *"Applying Neural network Analysis on Heart Rate variability Data to Assess Driver Fatigue"*, Expert Systems with Applications, Vol. 38, No.6, pp. 7235-7242, 2011
- **Patel, M.**, Valls Miro, J., Dissanayake G., *"Dynamic Bayesian Network for Learning Interactions Between Assistive Robotic Walker and Human Users"*, Annual German Conference on Artificial Intelligence (KI 2010), pp. 333-340, 2010
- **Patel, M.**, Khushaba, R., Valls Miro, J., Dissanayake, G., *"Probabilistic Models versus Discriminate Classifiers for Human Activity Recognition with an Instrumented Mobility-Assistance Aid"*, Australisian Conference on Robotics and Automation (ACRA 2010), pages 7, 2010
- Valls Miro, J., Osswald, V., **Patel, M.**, Dissanayake, G., *"Robotic Assistance with Attitude: A Mobility Agent for Motor Function Rehabilitation and Ambulation Support"*, Proceedings of the IEEE 11th International Conference on Rehabilitation Robotics, pp. 529-534, 2009

Patents

- Falque, R., **Patel, M.**, Biehl, J., "System and method for optimizing placement and number of radio-frequency beacons to achieve better indoor localization", 2020, US Patent 10,771,983
- **Patel, M.**, Jadidi, M., Biehl, J., Girgensohn, A.,"System and method for automating beacon location map generation using sensor fusion and simultaneous localization and mapping", 2020, US Patent 10,677,883
- Holz, C., **Patel, M.**, Buthpitiya, S., "Computerized system and method for determining authenticity of users via facial recognition", 2018, US Patent 10,049,287
- Song, J., **Patel, M.**, Girgensohn, A., kim, C., "Fusing Deep Learning and Geometric Constraint for image based localization", 2019, US Patent App. xxxxxx
- Kim, C., Bhatt, C., **Patel, M.**, Kimber, D., "Indoor Localization using real-time context fusion of visual information from static and dynamic cameras", 2019, US Patent App. xxxxxx
- **Patel, M.**, Biehl, J., Girgensohn, A., "Radio frequency based virtual motion model for localization using particle filter", 2019, US Patent App. xxxxxx
- Klug. N., **Patel, M.**, Shamma, D., Zhang, X., "Understanding normality of environment using semantic information from images", 2019, US patent App. xxxxxx
- Port, A., Cavdir, D., Kim, C., **Patel, M.**, Kimber, D., Liu, Q., "Transmodal trnslation of feature vectors to audio from assistive devices", 2019, US patent App. xxxxxx
- Kratz, S., **Patel, M.**, Yamaura, Y., Avrahami, D.,"User activity recognition through work surfaces using radio-frequency sensors", 2018, US Patent App. 15/594,528
- **Patel, M.**, Biehl, J., Girgensohn, A., "Systems and methods for utilizing graph based map information as priors for localization using particle filter", 2018, US Patent App. 15/726,371
- Jadidi, M., **Patel, M.**, Biehl, J., Girgensohn, A.,"System and method for calibration-lessly compensating bias of sensors for localization and tracking", 2018, US Patent App. 15/595,931