Pratik Agarwal

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EDUCATION

University of Michigan, Ann Arbor - M.S.E in Computer Science & Engineering CGPA: 7.21/9.0 (3.74/4.0)   **April 2012**
Courses: Mobile Robotics, Computer Vision, Machine Learning, Design and Analysis of Algorithms, Intro to Artificial Intelligence, Advanced Compilers, Probability and Random Process, Parallel Computing and Advanced Artificial Intelligence

Manipal University, India - Bachelor of Engineering (B.E.) in Computer Science & Engineering CGPA: 9.15/10   **July 2010**
Courses: Programming and Data Structure in C/C++, Computer Architecture, Graphics, Web programming, Networking, Database Management, Data Mining, Logic Design, Microprocessors, Distributed Systems, Software Engineering.

INTERNSHIPS

Microsoft Corporation, Seattle, US   **May-July 2011**
SDE Intern in Bing Mobile Team, built a Windows Phone 7 map application. Could perform grid based clustering of high density data and display the result as a heat map. Efficient way to view and display local search result.

Control and Coordination of Multiple Robots for RoboCup, Robotics Research Center, IIIT Hyderabad, India   **Jan-June 2010**
Planning and Control algorithms for five non-holonomous robots. Task included building the robots and a simulator for testing the algorithms. The project contributed towards Undergraduate Thesis.

Telepresence System using RBNB Data Turbine, Material Research and Testing (BAM), Berlin, Germany   **June-July 2009**
Aim was to set up a Telepresence system so that people across the globe could view the experiments at BAM in real time. The project was completed and is currently being used at BAM.

Simulating modules using Aardvark I2C/SPI Embedded System, R&D Division Stesalit Limited, Kolkata   **Dec 2008-Jan 2009**
Applications were developed on Visual C++ which communicated with hardware through Aardvark APIs. The modules were engine controller parts and the simulation enabled testing components individually.

COMPUTER SKILLS

Programming Languages: C/C++, Java, QT, C#, Visual C++, MPI, Visual Basic, Bascom Avr
Web Based Technology : HTML, Javascript, PHP and ASP;
Database : SQL (Oracle, Access); Unix network programming in C and Java
Assembly language (intel 8085/8086); Operating System Windows, Linux, MS-DOS
Others : MATLAB, LaTex, SSE and ARM NEON based SIMD programming, Solidworks, WP7 and Android development, llvm
Hardware Experience: Pioneer P3DX, SICK Lidars, Hokuyu 30LX and 04LX, Velodyne 32LDE, Versa Laser cutter, UPrint 3D Printer

PUBLICATIONS

Robotics Science and Systems 2012 - co-author (submitted) **–** title omitted due to double blind submission norms   **Jan 2012**
RoboCup SSL Team Description - SIGAI Workshop on Emerging Research Trends in AI, India   **April 2010**

ROBOTICS RESEARCH AND PROJECTS

Graduate Student Research Assistant, at the APRIL lab under Dr. E.Olson, U of M   **Nov 2011 - current**

Implementation of the Bayes Tree algorithm for sparse nonlinear incremental optimization, final project Advanced Artificial Intelligence. The algorithm will be used towards fast robot SLAM solutions.   **Jan 2012 - current**

Auto-Vectorization with LLVM for the ARM Cortex – A9, final project, Advanced Compilers   **Sept-Dec 2011**

Uncertainty Estimation using Correlative Scan Matcher, directed study, Dr. E.Olson, April Lab, U of M   **Jan-April 2011**
The directed study comprised of modeling exact error metrics using the correlative scan matcher as well as extracting multiple data-associating. Correlative Scan-Matching evaluates the best rigid body alignment between two given lidar scans by evaluating a 3D window. Each matched scan was modeled as a Gaussian mixture model and an Expectation Maximization algorithm was implemented to recover multi hypothesis data association.

Multi Robot Path Planning, final project Machine Learning Course   **Jan-April 2011**

Reinforcement Learning based probabilistic multi agent path planner, capable of maximizing information gained as well as keeping a team of robots well localized.

Correlative Scan Matching and Pose Graph SLAM, final project Mobile Robotics Course   **Aug-Dec 2010**
Matlab implementation of Correlative scan matching and Exactly Sparse Delayed State Filters pose graph slam. The framework generated constraints using laser odometry only.

Navigation Team, Michigan Autonomous Aeronautical Vehicles   **Aug 2010-current**
I am working towards implementing a 6dof SLAM and autonomous planner for International Aerial Robotics Competetion(IARC) Mission 6. Previously I had implemented a scan matcher and 3dof SLAM for the quadrotor using APRIL robotics toolkit. A simulator was built to test the algorithms as well as generate testing datasets.

Pattern recognition and 6-Dof localization for a UAV, term project Computer Vision Course   **Aug-Dec 2010**
Sift based template matcher was implemented and a visual localizer capable of recovering 6-dof pose constraints.

Autonomous Robotics, Manipal India Oct 2009
Developed an autonomous line following robot which could park itself in a randomly selected parking space

Grip Bot, IIT Chennai India Oct 2007
Manually controlled wired robot that moved on rails transferred boxes from one point to another

Under-Water Robot, IIT Bombay Sep 2008
Manually controlled under water robot

AWARDS
1st at the Autonomous Robotics Event at Kurukshetra at Techtatva '09. National level Technical Festival, Manipal India
1st runner up at the Manual Robotics Event and received Best Design Kurukshetra at Techtatva '09
1st at the Manual Robotics Event Kurukshetra at Techtatva '06

PRESENTATIONS AND SEMINARS
Telepresence - Setup and use Real Time Data Viewer at BAM Germany   **July 2009**
RoboCup SSL Team Description - SIGAI Workshop on Emerging Research Trends in AI, India   **April 2010**
Correlative Scan Matching and Pose Graph SLAM, term project Mobile Robotics course   **Dec 2010**
Multi Robot Paticle Filer Slam by Howard et all, PeRL Lab paper reading session   **Dec 2011**
Pattern recognition and 6-Dof localization for a UAV, term project Computer Vision Course   **Dec 2010**
iSAM2: Incremental Smoothing and Mapping with Fluid Relinearization and Incremental Variable Reordering, Kaess et all, PeRL Lab paper reading session   **Feb 2011**
Multi Robot Path Planning, final project Machine Learning Course   **April 2011**
Bing Layers, local map based application, Seattle, Microsoft Corporation   **July 2011**

POSITION OF RESPONSIBILITY
Lead Navigation Team, Michigan Autonomous Aeronautical Vehicles   **Aug 2010-current**
Responsible for Scan Matching, state estimation and autonomous planner for the in house quadrotor for IARC mission 6.

Technical Head of IEEE, Student Chapter, Manipal**.**   **2008-2009**
Organized and taught in various C++ basic and advanced workshops. Taught data structures to freshmen and sophomores, conducted IQ based competetions, Programming contests, Tech Talks on search Engines.

Core Member, Management Committee, Red-X –Social-Adventure Club, MIT, Manipal Univers   **2006-2008**
As a member of REDX, organized treks and trips for more than 200 people, taught basic computers to underprivileged school children.

Member of inter and intra school and college sports team in cricket, football, field hockey, rugby, swimming and athletics