Akshay Kumar

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EDUCATION

WORCESTER POLYTECHNIC INSTITUTE
MS IN ROBOTICS ENGINEERING
Expected May 2019 | Worcester, MA

MNIT JAIPUR
B TECH. IN ELECTRICAL ENGINEERING
May 2017 | Jaipur, Rajasthan
Cum. GPA: 8.25/10

BALDWIN ACADEMY
Intermediate | CBSE
April 2013 | Patna, India
Percentage Aggregate: 93%

CHRIST CHURCH HIGH SCHOOL
Matriculation | ICSE
April 2011 | Patna, India
Percentage Aggregate: 95%

RELEVANT COURSES

GRADUATE
Synergy of Humans and Robot
Deep Reinforcement Learning
Foundations of Robotics

UNDERGRADUATE
Control System Engineering
Modern Control Theory & Design Techniques
Computer Architecture and Organisation
Basics Of Mechanical Engineering
Microprocessors

SKILLS

HARDWARE
Intel Galileo | Sensors | AVR Atmega Micro-controllers

PROGRAMMING
Proficient:
C | Python | MATLAB
SolidWorks | Proteus | Processing
Arduino IDE | Simulink
Familiar:
Atmel Studio | Assembly Language 8085-86 | MikroC
Robot Operating System(ROS)

PROJECT WORK

LOWER BODY WALKING BIPED ROBOT
August 2016 - April 2017| ZINE LAB - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar
- Designed and manufactured a 12-DOF(6 DOF in each limb) low cost servo actuated biped robot with custom-designed 3D printed parts
- IMU sensor based joint angle prediction and estimation of the biped's orientation (Sensor Data Fusion using Kalman Filter, Extended Kalman Filter)
- Cubic Spline Interpolation based trajectory planning for the foot, knee and hip motion

SMART ANIMATRONIC HUMAN FACE
Jan - May 2017 | DEPARTMENT OF ELECTRICAL ENGINEERING - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar
- Designed fabricated complete mechanism with movable parts of the human face like lips, jaw, neck and eyes
- Interactive control of the face through computer vision and speech inputs
- Project Website

ROBOTIC SETUP FOR POWER TRANSMISSION LINE MAINTENANCE
March – April 2015 | ZINE LAB - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar
- Hardware in the loop based simulation and Live animation setup of the remotely functioning setup for easier controllability by the operator
- Designed DC motor powered robotic system with pulleys for gripping/ungripping mechanism and traversal on the transmission lines in mid-air
- Used Onboard sensors(temperature, magnetic field, IMU, cameras) for health monitoring of the lines and data transmission via internet to the control base

COST EFFECTIVE EMG SIGNAL EXTRACTION SETUP
January- July 2015 | ZINE LAB - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar
- Developed a low cost 4 channel Electromyography hardware with partial onboard noise attenuation and filtering
- Built an indigenous GUI in Processing IDE, for data logging and its analysis in real time from the hardware

GEO-FENCING BASED RAIL ALERT SYSTEM
September - October 2015 | ZINE LAB - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar
- Built a system capable of establishing a multiple-level virtual perimeter-geofence around unmanned rail-road crossovers to prevent mishaps
- On-board GPS based location tracking and Multi-level warning issue system for vehicles approaching crossovers

15 DOF WIRE-STEERED MOTION MIMICKING ANTHROPOMORPHIC ROBOTIC ARM
February - March 2014 | ZINE LAB - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar
- Designed and manufactured a robotic arm capable of replicating the motion of human arm using a sensor powered pair of gloves
- Accurate motion by human hand's and model's proper position mapping (Using flex sensors and two-level closed loop servo motor control)

INTERESTS

Control Systems | Manipulation
Sensing | Mechanical Designing
Embedded Systems

CO-CURRICULARS

Senior Member of ZINE - College's Robotics & Research Group

Delivered lectures on Sensors, ICs & MCUs, Ethical Hacking, Processing and MATLAB in Robotics Workshops for the fresher batch of 2014, 15 & 16

Working as Technical Secretary for the Electrical Engineering Society(EES) in the college

DEVELOPMENT OF CONTROL SYSTEM FOR UNMANNED GROUND VEHICLE(UGV)

April - May 2016 | DEPARTMENT OF ELECTRICAL ENGINEERING - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar

- Designed & simulated the control system of a differential drive robot on MATLAB-Simulink to accomplish motion on pre-planned path
- Derivation of transfer functions via intrinsic features of the DC motor powering the rear wheels of the UGV

ELBOW JOINT REHABILITATION DEVICE

July – August 2015 | ZINE LAB - MNIT JAIPUR | Mentor: Dr. Rajesh Kumar

- Elbow actuation assistive device for externally powered motion of the elbow joint of the human body
- Indigneously designed and 3D printed model of a worm-gear power transmission based assistive device
- Unique 3D design compliant with optical postion encoders for real time closed loop control of the actuators

INTERNSHIP | SWAAYATT ROBOTS PVT. LTD

May-July 2016 | Bhopal, India | Mentor: Sanjeev Sharma (Founder)

Development of a mobile robotic research platform

- Development of a mobile robot with multiple sensors and a 6-DOF robotic manipulator arm with the ability to learn through kinesthetic teaching
- Facilitated by two level joint angle tracking using inertial sensors feed as well as actuator(servo motor) internal position feedback

Automation of controls in a Self Driving Vehicles

- Designed the mechanical setups and control system for automation of Accelerator, Clutch, Gear and Brakes of an existing SUV

ACHIEVEMENTS

PUBLICATIONS

- Akshay Kumar, Anshul Mittal, Rajat Arya, Akash Garg, Sharad Garg, Rajesh Kumar. **Hardware In The Loop based simulation of a Mechatronics System for real time control and animation of working model** - **In Press: Presented** at IEEE International Conference on Inventive Systems and Control 2017 - Link

- Akshay Kumar, Rahul Ravichandran, Rajesh Kumar. **Joint angle measurement for biped robot orientation estimation using MEMs based inertial sensors** - **Under Review** at Elsevier Journal: Robotics and Autonomous Systems

PATENTS

- Robotic Technology for Transmission Line Inspection in Live Condition – Published Link
- Rail Alert Systems- Published Link
- Comprehensive System for Osteoarthritis detection, analysis and rehabilitation based on efficient SEMG signals – Published Link

SCHOLASTIC ACHIEVEMENTS

- **Winner** at Student Innvoation Pavallion in Gridtech 2015 - by PGCIL, Govt. Of India
- **Runners Up** at Tech Expo, Blitzschalg'14, the Annual Techno-Cultural fest of MNIT Jaipur
- **Winner** of Cosmology & Physics Quiz Contest 2014 at MNIT Jaipur
- **Finalists** in Texas instruments India Analog Maker College Level Competition 2015
- Obtained positions of **1/100** and **3/400** in the class X-ICSE and class XII-CBSE board examinations respectively