

Akshay Kumar

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EDUCATION

MNIT JAIPUR

BTECH IN ELECTRICAL ENGINEERING
Expected May 2017 | Jaipur, Rajasthan
Cum. GPA: **8.29/10** (Upto VI Sem)

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

UNDERGRADUATE

Control System Engineering
Modern Control Theory & Design
Techniques
Electrical Measuring Instruments
Basics Of Mechanical Engineering
Microprocessors

MOOCS

Robot Mechanics & Control, Part I & II
Seoul National University | edx.org
Introduction to Computer Science & Python
Massachusetts Institute Of Technology | edx.org

WORKSHOP

Industrial Automation & Control
PLC | HMI | Motion Control

SKILLS

HARDWARE

TI C2000 Launchpad | Arduino
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 | TINA
Code Composer Studio | MikroC
Robot Operating System(ROS)

PROJECT WORK

LOWER BODY WALKING BIPED ROBOT

August 2016 - Present | 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 (Ongoing Work)

ROBOTIC SETUP FOR POWER TRANSMISSION LINE MAINTENANCE

March - April 2015 | ZINE LAB - MNIT JAIPUR | **Mentor:** Dr. Rajesh Kumar

- DC motor powered robotic system with pulleys for gripping/ungripping mechanism and traversal on the transmission lines in mid-air
- Onboard sensors(temperature, magnetic field, IMU, cameras) for health monitoring of the lines and data transmission via internet to the control base
- Hardware in the loop based Live animation setup of the remotely functioning setup for easier controllability by the operator

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)

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

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

MAXIMUM POWER POINT TRACKING FOR WIND TURBINE SYSTEM

October - November 2016 | DEPARTMENT OF ELECTRICAL ENGINEERING -
MNIT JAIPUR | Mentor: Dr. Vijayakumar K

- Design and simulation of a user-defined Wind Energy Conversion System
- Calculation of Pitch and Yaw controls for Maximum Power Point Tracking(MPPT) for the given wind data
- Integrated with MATLAB-GUIDE based GUI for dynamic user inputs

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
- Indigenously designed and 3D printed model of a worm-gear power transmission based assistive device
- Unique 3D design compliant with optical position 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 - **Accepted** at IEEE International Conference on Inventive Systems and Control 2017 - Link
- **Akshay Kumar**, Sarthak Jain, Rajesh Kumar. A low cost setup for EMG signal extraction, data logging and partial analysis in real time - **Under Review** at IEEE International Conference on Advances in Mechanical, Industrial, Automation and Management System 2017 Link

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 Innovation Pavilion 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