Gowtham Kuntumalla

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Technical & Management Skills

- **Software:** MATLAB, SolidWorks, ANSYS Mechanical, AutoCAD, MS Office, 3D Printing, PhotoLithography
- **Programming :** *Python (+ Machine Learning)*, C++, HTML, Linux Shell, LaTeX
- **Misc.:** *Project Management*, Prototype Fabrication, Manufacturing Techniques, Financial Investing

Projects

- **Metal Polymer Hybrid Heat Exchanger System** **Aug, 2018 – Current**
  Mentors: Prof.Placid Ferreira & Prof.Sanjiv Sinha, UIUC - **Design and Manufacturing**
  - Conceptualised the design stage and spearheading the execution of manufacturing plan of action
  - Created CAD models and currently fabricating a custom manufacturing setup for production
  - Performing Thermo-Mechanical characterisation of specimens made of Copper-Kapton under a variety of test conditions
  - Weight, cost savings of minimum of 50% are achievable with the current design compared to existing systems

- **Wearable and Non-Invasive Glucometer** **Jan – May 2018**
  Product Oriented Project guided by Prof.B Ravi, IIT Bombay - **Led a team of 4**
  - Developed a compact prototype that measures epi-skin glucose painlessly via Diffuse Reflectance Infrared Spectroscopy
  - Delivered Proof of Concept (PoC) with good correlations to commercially available pricking based glucometers
  - Received critical acclaim and accolades from the top doctors of Mumbai in a medical device expo

- **Computational Analysis of Potential Rocket Propellants** **Nov – Nov 2017**
  Chemical Reactions Simulation, Guide: Prof.Neeraj Kumbhakarna, IIT Bombay - **Computer Simulations**
  - Modelled High Nitrogen content Bis-Homo Cubane (BHC) compounds using *ab initio* level quantum mechanics based methods in computational chemistry
  - Computed various parameters such as heat of formation, specific impulse, density determining the utility of potential propellants using *Gaussian 09* and *NASA Chemical Equilibrium with Applications(CEA)*
  - Modelled combustion reactions predicting their kinetics and thermochemical properties
  - Worked on the combustion kinetics of reaction between Teflon & Aluminium and effects of solvent on the characteristics

- **Particle Image Velocimetry (PIV)** **April – June 2016**
  Programming Project, Guide: Prof.Amit Agrawal, IIT Bombay - **Scientific Computing**
  - Implemented a computer code on C++ which is $\approx 100\%$ faster than similar software on MATLAB. It performs the 2D digital evaluation of flow velocity using FFT routine of Cross Correlation

- **Condenser Heat Recovery based Desalination System** **Dec 2015**
  HDH Water Desalination, Guide: Prof.Milind Rane, IIT Bombay - **Energy Analysis**
  - Studied different types of heat recovery desalination systems
  - Identified faulty electrical connection in *Pressure Monitor* and switch unit and suggested the change required to make the system function properly
  - *Performed water irrigation experiment* on checkered glass surface and decided the number of sources required on top to ensure uniform spread of water

Professional Experience

- **Washington University in St.Louis** **St.Louis, USA**
  Summer Research Intern, Department of Energy and Chemical Engineering - **Scientific Computing** *May – July 2017*
  - Undertook comprehensive literature review on fractals, aggregation processes and wrote a protocol for conducting computer simulations on high performance computing (HPC) cluster
  - Analysed effects of change in defining parameters like volume fraction on kinetics of the sol to gel transition

- **Techno-Managerial Role** **Mumbai, India**
  Technical Councillor, Student Council of Hostel 4, IITB - **Led a team of 4** *April 2016 – Mar 2017*

- Awarded Color and Special mention for significant contribution to the development of hostel culture
- Played an Instrumental lead role in achieving the coveted **1st**/16 position in Intra-college annual general championship
- Instrumental in renovation of hostels 'Tech-Room' and supplying it with requisite equipment
- Conducted workshops, group discussions on working of common electronics such as calculator, keyboard, Gameboy. Undertook initiatives such as 'Tech-Quiz' to encourage critical thinking

- **Team Member, PRATHAM** **Mumbai, India**
  Student Satellite Team, IIT Bombay - **Nano-Satellite Mechanical Analysis** *Jan – Oct 2016*
  - The satellite is completely designed and manufactured by a team of students, under the mentorship of *Indian Space Research Organization (ISRO)*
  - Analyzed and verified (modal,static structural) integrity of satellite components under various dynamic which the satellite may experience during operation in orbit
  - Lectured groups of students about satellite in an interactive exhibition at Nehru science centre

Course Projects

- **Pressure Sensor Fabrication** **Aug – Oct 2018**
  ME 487- MEMS, NEMS Theory & Fabrication - Guide: Dr. Glennys Mensing, UIUC
  - Trained in basic photolithography techniques, metal sputtering, etching & packaging procedures

- **Stability Monitoring of Products in Milling, Caterpillar, machine learning project** **Nov – Dec 2018**
  ME 498- Manufacturing data & Quality systems - Guide: Prof. Chenhui Shao, UIUC
  - Performed statistical data processing on a data set consisting of excavator stick made by Caterpillar
  - Conclusions and recommendations were made based on results from control charts & Decision Tree algorithm

- **Assembly Line Automation** **Mar – April 2018**
  ME 637- Manufacturing Automation - Guide: Prof. K.P Karunakaran, IIT Bombay
  - Visited manufacturing facilities of plastic injection molding and corrugated cardboard packaging industries in Mumbai
  - Introduced an innovative solution to automate the process of part retrieval & orientation, excess removal (deflashing) & stacking in an injection molding process of plastic flange end caps
  - Conceptually designed Vibratory Bowl Feeder, Feed Tracks and Pick & Place mechanisms
  - Financial analysis predicted a payback period of less than 7 months for the proposed solution

- **Unmanned Army Rover** **Jul – Nov 2017**
  ME 423- Machine Design - Guide: Prof. Shantanu Tripathi, IIT Bombay
  - Designed the rover in a team of 5. Involved in team planning and budget optimization
  - Added night-vision camera feature and remote transmission of live camera feed
  - Theoretically designed automatic triggering of gun using servo mechanism. Coordinated with vendors for manufacturing of individual components

- **Electrical Circuit Analogy of Stirling Type Pulse Tube Cryocooler — Seminar** **Jan – Mar 2017**
  ME 420- Cryogenic Engineering 1 - Guide: Dr. Milind Atrey, IIT Bombay
  - Used MATLAB for simulating these electrical analogies & verified results of a research paper
  - Analytically studied the effect of phase between Pressure, Volume flow rate and how the acoustic power is affected by these parameters

- **Product Service System Model & Six Sigma Management** **Jan – Mar 2017**
  ME 308- Industrial Engineering and Operations Research, IIT Bombay
  - Formulated an elaborate plan for establishing a company on waste management and treatment
  - Ideated a detailed plan for establishing and running a company on manufacturing solar panels based on six sigma principles (6σ)

- **Chatter Characterization of Micro-machined Ti6Al4V Surface** **Oct – Nov 2016**
  ME 338- Manufacturing Processes 2 - Guide: Dr.Ramesh K. Singh, IIT Bombay
  - Studied about Micro-milling process and designed an experiment to estimate chatter on Ti6Al4V plane job surface after Micro-milling

- Performed experiments on high speed micro-milling center and obtained actual depths of cut data using the sophisticated *Focus Variation Microscope (FVM)*
- Analyzed the data and predicted the safe operational spindle speeds, tool feed, ideal depth of cut range for Ti6Al4V material which is a widely used Titanium alloy

- **Detection of Adulterants in Oils** **Mar 2016**
ME 226 - Mechanical Measurements, IIT Bombay
  - Analyzed presence of different known adulterants in edible vegetable oils
  - Proposed scientific methods for detection of these adulterants using physical measurements of viscosity and density. Specified methods involving *Andrade Equation*, falling ball viscometer

- **Traffic Light Simulator for Pedestrians** **Oct 2015**
EE 221- Digital Electronics , IIT Bombay
  - Designed a traffic lights physical circuit model including *time constraints* for pedestrian passage across a two way road using Integrated Circuits, LEDs, resistors, capacitors
  - Obtained different time intervals by varying time constants in specific regions of circuit
  - This model can be extended to use it as a *low cost* alternative to traffic lights in quiet roads

- **Sudoku Autosolver** **Nov 2014**
CS 101- Computer Programming and Utilization , IIT Bombay
  - Coded and debugged an automatic Sudoku solver in C++
  - Developed graphical interface using *SimpleCpp* graphics package
  - Designed the code as a part of the course using *Recursive Backtracking* algorithm

Teaching Experience

- Teaching Assistant for the courses "Introduction to Statics", "Engineering Mechanics" and "Differential Equations"
- Responsible for mentoring, conducting tutorial sessions, office hours & grading papers for 60 students, Spring 2017 – Fall 2018

Education

- **University of Illinois at Urbana-Champaign** **Champaign, USA**
Master of Science in Mechanical Engineering; *August 2018 – Present*
  - **Coursework (in progress):** MEMS-NEMS Theory & Fabrication, Mfg. Data and Quality Systems

- **Indian Institute of Technology-Bombay** **Mumbai, India**
Bachelor of Technology. Major in Mechanical Engineering, with Minor in Computer Science *Aug 2014 – July 2018*
  - **Coursework: Machine Learning, Data Structure and Algo, Non Linear Dynamics & Chaos Theory**, Collaborative Eng., Heat Transfer, Cryogenic Engineering, Manufacturing Automation, Mechanical Measurements,Industrial Engineering & Operations Research, Manufacturing Processes & more. **CPI: 9.32/10.0**

Honors and Awards

- Awarded Kishore Vigyan Protsahan Yojana(KVPY) scholarship by Department of Science and Technology, India 2014
- Ranked among top 10 in the Mechanical Engineering undergraduate class of 2018
- Secured 1^{st} position for design and construction of a Rube Goldberg machine with 15 successive contraptions in the Padarth, Annual MEMS department festival 2016 (IIT Bombay)

Scholastic Achievements

- Earned a perfect 10 GPA. Achieved by 10 out of 1000 in a semester - Spring 2018
- **Only** person in batch of 156 student to get grade point 10 in Engineering Metallurgy. -Autumn 2015
- All India Rank 320, IIT-JEE among *150,000* overall participants for entrance to the IITs. Arguably the toughest Engineering entrance exam in India.
- Secured 99.97 percentile in JEE-Mains among more than *1.3 million* candidates
- Secured 117th rank in AP-EAMCET, among *200,000* candidates
- Awarded **Amateur Mathematician** title and certificate of merit by **IAAMS (Integral Association of Amateur Mathematicians and Scientists)**
- Secured position among **top 1%** at National level in National Standard Exam in Astronomy
- Secured **1st rank** at District level in **SLSTSE** olympiad conducted by Unified Council