# R Surya Narayan

Hyderabad, India | suryanarayannitt@gmail.com | LinkedIn

## EDUCATION

**National Institute of Technology, Trichy** — **Tiruchirappalli, India**
Bachelor of Technology (Hons.), Mechanical Engineering, **CGPA: 9.85/10** — *(2018-2022)*
**DDMS (AMS) P.Obul Reddy Public School, Jubilee Hills | CBSE** — **Hyderabad, India**
Senior Secondary School |Minor in Computer Science, **Total: 96.4% | Total (Only sciences): 97.25% | Top 0.1% in Physics, Math** — *(2016-2018)*

## SCHOLASTIC ACHIEVEMENTS AND ACADEMIC BACKGROUND

- Department **Rank 1 of 124 students in Mechanical Engineering** *(To date)*
- Recipient of the **SPARK IIT Roorkee Summer Fellowship – 1 in 50 of 10000+ applications** each year *(May,2020)*
- Recipient of the **Summer Research Fellowship Programme, Indian Academy of Sciences (IAS-SRFP) - 1 in 5000+ applicants** *(May, 2021)*
- **4 time nominee** and **finalist** of **O.P. Jindal Engineering and Management Scholarship (OPJEMS)** amongst **100+ applicants** *(Aug, 2020)*
- **Awarded Sri.P L N Murthy Toppers award** and **Bhattacharya Memorial Award** for **securing Rank 1** in **Science Stream of class XII** *(Jun, 2019)*

## RESEARCH INTERNSHIPS

- **UNIVERSITY OF MINNESOTA, TWIN CITIES (UMN-TC), MINNEAPOLIS, USA| VISITING RESEARCH STUDENT (REMOTE)**
  *Guide: Prof. Suo Yang, Richard and Barbara Nelson Assistant Professor, Mechanical Engineering*
  **DNS OF SUPERCRITICAL TURBULENT COMBUSTION WITH DETAILED CHEMISTRY FOR FUELS WITH LTC** *(JULY, 2021 |Present)*
  - **First of its kind Direct Numerical Simulations** of **DME-Air temporal mixing layers** under **supercritical pressures** using ***AMReX-Combustion PeleC***
  - Analysing **cool/warm flames** under **supercritical conditions** for **complex fuels** that exhibit **Low-temperature chemistry (LTC)**
  - Developing extensive **combustion diagnostic tools** to understand high-pressure turbulence-chemistry coupling and local extinction/re-ignition
- **INDIAN INSTITUTE OF SCIENCE (IISC, BANGALORE) | REMOTE SUMMER INTERNSHIP' 20**
  *Guide: Prof.Konduri Aditya, Department of Computational and Data Sciences*
  **MASSIVELY PARALLEL DNS OF CHEMICALLY-REACTING FLOWS** *(OCT, 2020 |Present)*
  - **Spearheaded development of AMR-capabilities** in the lab by mastering the use of ***AMReX-Combustion PeleC*** *and* ***PeleLM*** software
  - Performed numerous benchmark cases (supersonic/subsonic, reacting/non-reacting, laminar and turbulent) to demonstrate capability
  - Instrumental in securing a **grant from Royal Dutch Shell** for performing reacting-flow simulations in porous media/foam
  - On-going research on **dual-mode ramjet combustors** by performing **massively parallel computations** for a digital twin of the **University of Michigan experimental supersonic combustion facility**
- **INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY (IIST, THIRUVANANTHAPURAM) | REMOTE SUMMER INTERNSHIP' 20**
  *Guide: Prof.Satheesh, Department of Aerospace Engineering,*
  **OPEN-SOURCE JULIA MODULES FOR 1-D RAREFIED GAS DYNAMICS** *(APR, 2020 | OCT, 2020)*
  - Developed **1-D gas-dynamics solvers in Julia** for high-temperature/rarefied gas flows
  - Benchmarked them using **flows through a rocket nozzle, Prandtl-Meyer Expansion and the reacting shock tube**
  - **Validated the accuracy** using the **NASA CEA solver** obtaining **98% match**.
  - Developed a **characteristics based solution** framework for **supersonic reacting PDEs.**
- **SPARK, INDIAN INSTITUTE OF TECHNOLOGY (IIT), ROORKEE | REMOTE SUMMER INTERNSHIP' 20**
  *Guide: Prof. Dr.Abinash Kumar Swain, Department of Mechanical and Industrial Engineering, IIT Roorkee*
  **HIGH-SPEED SOIL PENETRATION MECHANICS** *(MAY, 2020 | JULY, 2020)*
  - Conducted numerical simulations using **ANSYS Explicit Dynamics (AUTODYN)** and **ABAQUS Explicit**
  - Identified analytical, numerical and semi-empirical models for high-speed penetration mechanics
  - Developed a generalized soil-penetration solver-cum-analysis tool using MATLAB
- **EXXONMOBIL UPSTREAM RESEARCH AND DEVELOPMENT | REMOTE SUMMER INTERNSHIP' 21** *(MAY, 2021 | JULY, 2021)*
  *Guide: Dr.Kaustubh Shankar Kulkarni, Completions and Well management Team, Bangalore Technology Centre, India*
  **DATA ANALYTICS FOR INSIGHTS ON ROD-PUMP PERFORMANCE**
  - **Finished a 6 week project in 4 weeks.**
  - Obtained incisive insights on **pump-performance** using **RCFA** bringing **38% improvement in pump-life** and identified critical failure components
  - Formulated a methodology to **correlate well-failure and chemical treatments** in the other 2 weeks

## TECHNICAL SKILLS

- **PROGRAMMING LANGUAGES:** *C++, C, Python, Julia, MATLAB, Linux shell, Git, LaTeX, basic FORTRAN, AMReX*
- **COMBUSTION SOFTWARE/SCIENTIFIC CODES:** *Cantera, AMReX-Combustion PeleC, PeleLM, AMReX, Sandia 3D (S3D)*
- **POST-PROCESSING SOFTWARE:** *Paraview, Visit, YT, Amrvis, Matplotlib, Julia Plots*
- **ENGINEERING SOFTWARE:** *Dassault SOLIDWORKS(CSWA), ANSYS Fluent, Structural, Autodyn, CATIAv5, ABAQUS Explicit, XFLR5/XFOIL, FreeCAD*

## PROJECT EXPERIENCES

- **COMPUTATIONAL FLUID DYNAMICS SOLVER DEVELOPMENT |OPEN SOURCE MATLAB CODES FOR BASIC PROBLEMS** *(MAR'20 | APR'20)*
  - Developed a solver that solves the 2-D incompressible Navier-stokes equations in MATLAB.
  - Achieved **1000+ downloads in MATLAB Central File Exchange over 6 months**
  - Validated results with **ANSYS FLUENT**.
- **DESIGN OF A MICRO-CLASS BLDC-POWERED AIRCRAFT | SAE AERODESIGN'20** *(SEP'19|OCT'19)*
  - Lead the design and analysis of a fixed-wing BLDC powered micro-class aircraft used for carrying payloads of 0.5-1 kg
  - Analysed structural, aerodynamic and stability aspects of the aircraft and documented a report for the same.
  - **Secured the second place in the best design report category.**

➢ **BLADELESS AQUATIC TURBINE | FLUID-STRUCTURE INTERACTION** *(DEC'19|FEB'20)*

- Designed a bladeless aquatic turbine using principles of Fluid-Structure Interactions (Vortex-Induced-Vibration).
- **Qualified 3 rounds of screening** in Sangam, **the annual Intra-Collegiate technical competition of NIT Trichy**

➢ **OPEN SOURCE CONTRIBUTOR - ARRHENIUS.JL | MASSACHUSETTS INSTITUTE OF TECHNOLOGY** *(APR'21 |PRESENT)*

- Developed API documentation for the combustion solver of DENG-MIT Lab.

## RELEVANT COURSEWORK

- Numerical Techniques
- Transforms and Partial Differential Equations
- Fluid Mechanics
- Computational Fluid Dynamics
- Advanced Internal Combustion Engines
- Compressible Flow and Jet Propulsion
- Engineering Thermodynamics
- Heat and Mass Transfer
- Design and Optimization of Thermal Systems
- Biofuels
- Cryogenic Engineering

## OTHER MOOCS

- MATLAB Computational Mathematics- MathWorks
- An Introduction to CFD- Udemy, taught by Dr.Spall, HOD of Utah State University.
- Statistical Thermodynamics specialization -Coursera, University of Colorado Boulder
- Sports and Building Aerodynamics-Coursera, TU Eindhoven
- Fundamentals of Fluid Structure Interaction - Coursera, Ecolẻ Polytechnique
- Data Analysis with Python – Takenmind Inc.

## TECHNICAL CLUBS

➢ **DESIGN AND ANALYSIS TEAM |THE THIRD-DIMENSION AEROMODELLING CLUB, NIT TRICHY** *(AUG'19|MAR'20)*

- Contributed to **5 projects in 8 months** and increased **outreach by organizing workshops to freshmen in STEM and innovative R&D**
- Developed extensive **documentation** for all projects done within the club
- Introduced unique **propulsion testing systems** to characterize **thrust delivered by motors**.

## LEADERSHIP AND VOLUNTEERING EXPERIENCE

➢ **NATIONAL SERVICE SCHEME-NIT TRICHY** *(AUG'18|AUG'19)*

- Organized and managed blood-donation and eye check-up camps under the National Service Scheme of NIT Trichy.
- Participated in extensive planation activities for a greener college

➢ **ILLUMINATE-NIT TRICHY** *(MAR'20)*

- Taught basic mathematics and English to under-privileged and the have-nots under Illuminate NIT Trichy

➢ **ROTARACT CLUB**

- Was the president of the Rotaract club of my school, spearheading a school-bag donation drive to under-privileged children

## EXTRA-CURRICULAR ACTIVITIES

➢ **CONTENT MANAGER @ SPORTS-FETE** *(AUG'19|MAR'20)*

- Managed and published creative content to increase fest outreach of the annual inter-departmental sports festival of NIT Trichy.
- Brought out a 2 fold increase in online engagement and fest participation

➢ **CONTENT MANAGER @ SYNERGY** *(AUG'19|MAR'20)*

- *Crafted technical articles for the annual departmental symposium of Mechanical Engineering, Synergy*

➢ **TECHNO-MANAGERIAL TEAM @ SCIENT NIT TRICHY** *(AUG'19|MAR'20)*

- Managed the use of tools and equipment at the alumni-funded research lab, SCIEnT
- Increased outreach and awareness by organizing workshops and interactive sessions

## REFERENCES

- *Prof.Konduri Aditya, Assistant Professor, Department of Computational and Data Sciences, IISc Bangalore*
- *Dr.Kaustubh Shankar Kulkarni, Senior Research Engineer, ExxonMobil Upstream Company, BTC, India*
- *Prof.Robert Spall, Professor emeritus, Head of Department, Mechanical and Aerospace Engineering, Utah State Univ.*
- *Prof.Satheesh.K, Assistant Professor, Aerospace Engineering, IIST Thiruvananthapuram*
- *Weiqi Ji, Post-doctoral Scholar, Massachusetts Institute of Technology, Mechanical Engineering*
- *Prof.P.Kaushik, Assistant Professor, Department of Mechanical Engineering, NIT Trichy*
- *Prof.S.Suresh, Associate Professor, Department of Mechanical Engineering, NIT Trichy*
- *Prof.M.Uday Kumar, Professor HAG, Department of Mechanical Engineering, NIT Trichy*