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Sagar Singh **170100115**
Mechanical Engineering **UG Third Year (B.Tech.)**
Indian Institute of Technology Bombay **Male**
DOB: 03/06/1999

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2020	9.27
Intermediate/+2	Aligarh Muslim University Board	SH Senior Secondary School Boys, Aligarh Muslim University	2017	90.80
Matriculation	CBSE	Kendriya Vidyalaya no.1, Airforce Station, Pathankot	2015	10.00

Scholastic Achievements

- Currently **ranked in top 10%** in a batch of **150 students** of Mechanical Engineering Department *('19)*
- Ranked in **top 0.1%** in Joint Entrance Exam (JEE) Mains among **12,00,000** students *('17)*
- Amongst top **1%** in Joint Entrance Exam (JEE) Advanced among **2,20,000** students *('17)*
- Ranked **10th** in Aligarh Muslim University Engineering entrance exam among **22,000** students *('17)*
- Secured **national rank of 86** in National level Science Talent Search Examination *('16)*
- Qualified **National Defence Academy (NDA)** entrance exam among **6,00,000** students *('17)*
- Recipient of UP Science Talent **scholarship** for clearing **UPST Exam** *('17)*

Key Projects

IIT Bombay Racing team

*(Feb'18-present) Faculty Advisor- Prof. Amber Shrivastava, Dept. of Mechanical Engineering, IIT Bombay Cross functional team of engineers who build an electric race car for Formula Student International Competition conducted by SAE & **IMechE** held at Silverstone, United Kingdom. We finished **4th** among electric teams* ***Design Engineer | Drivetrain-***

- *Conceptualized **design, analysis and fabrication** of Drivetrain subsystem for the Season 2019-20*
- *Carried out **efficiency analysis** of the motor by developing a **MATLAB** model to reduce **energy** consumption*
- *Performed **Thermal analysis** of Gearbox in **ANSYS (fluent)** and analysed the **gears** in **KISSsoft***
- *Working on **Four-Wheel** drive by integrating **Compound** planetary gearbox and **In-Hub Wheel Assembly***
- *Researched on alloys of **Titanium**, **Magnesium** and **Aluminium** along with **Aero & High grade steels***
- ***Integrated** Planetary Gearbox and Tripod joint resulting in **25% weight reduction** and better performance*
- *Used **Optimum Lap** and **Simulink model** to simulate the total **time** taken for completion of race*

Junior Design Engineer and Trainee-

- *Developed a **Bicycle model** to analyze the characteristic behaviour of a car for varying inputs*
- *Performed **Topology Optimisation** on a experimental mount to reduce weight and remove excess material*
- *Actively participated in **Vacuum Resin** infusion of carbon fibre to fabricate battery box and aero wings*
- *Analysed different **electric motors** best suited for upgrading to Four Wheel drive depending on their characteristics and compatibility by developing a model for **ideal motor curve** in **Simulink***
- *Worked extensively in various subsytems like Wheel assembly, **Vehicle dynamics** and Drivetrain*

Electrochemical Machining (ECM) of Micro Array Tool

(Winter'19) Guide: Prof. Pradeep Dixit, Department of Mechanical engineering, IIT Bombay

- *Investigated the effect of non uniform dissolution rate of 3*3 multi-tip micro tool array by ECM*
- ***Modelled and Simulated** the process setup of ECM using **COMSOL** Multiphysics*
- ***Validated** the above simulated results by the actual data obtained after carrying out **experiments***

Autonomous Aiming Bot | Institute Technical Summer Project

(May'18-Jul'18)

- *Built a **mobile** and **wireless** robot which uses **Raspberry pi camera** to obtain **live video-feedback** from distant locations to aim at a selected target precisely, it can be used to **automate shooting** purposes.*
- *Provided **Two degrees of freedom** to the aiming mechanism by using step motors and microcontroller*
- *Fabricated the bot with **automatic operation** mode along with **manual mode** for better control*

Other Projects and Technical activities

- ***Micro-Piezoresistive Accelerometer & Pressure Sensor*** *(Autumn'19)*
  [Guide: Prof. Pradeep Dixit, Mechanical Dept, IIT Bombay | Course Project]
  -Simulated & analysed MEMS (Micro Electro-Mechanical System) based piezoresistive sensors using COMSOL
  -Proposed a fabrication and packaging method and validated simulated results with theoritical analysis

- ***Electrochemical Discharge based Micro Milling using Pulsed current*** *(Autumn'19)*
  [Guide: Prof. Pradeep Dixit, Mechanical Dept, IIT Bombay | Course Project]
  -Investigated the effect of Interelectrode Gap and Feed rate on the ECDM process of Micro channel formation by performing experiments and analysed the results
- ***Helical Springs*** *(Spring'19)*
  [Guide: Prof. Parag Tandaiya, Mechanical Dept, IIT Bombay | Course Project]
  *-Carried out **self designed** experiment of testing helical springs and their combinations under uniaxial tension*
  *-Performed **Finite Element Analysis** to compare the experimental and theoritical results with the simulation*
  Automobiles | Summer of Science *(May'18-Jul'18)*
  -Completed areporton the mechanical response of a car by studying its systems and their interdependence -Learned about the influence of important vehicle dynamics parameters on the performance of automobiles
- ***Jindal Steel Works (JSW) Dolvi - Industrial Visit*** *(Oct'18)*
  -Visited the 5 MTPA capacity plant and explored the processes of Blasting, Casting and Rolling
  -Presented a report regarding various steps and regulations involved in Steel Making at Industrial level
- ***Autocar Performance Show 2018*** *(Dec'18)*
  -Attended India's largest car and bike Exhibition as a representative of IIT Bombay racing car
- ***Inter IIT Tech Meet*** *(Dec'18)*
  -Coordinated with a team of 26 members from various disciplines to manage 760+ participants from all IITs
- ***Robot building competitions*** *(Sep'17,'18)*
  -Built a Bluetooth controlled obstacle manoeuvring bot and a year later mentored a team of 4 undergraduate freshers to make the same for institute level competition

Technical Skills

Softwares	*MATLAB, Simulink, SolidWorks, AutoCAD, Scilab, Optimum Lap*
Analysis tools	*ANSYS (Fluent, Thermal, Structural), COMSOL,MSC-Adams, KISSsoft*
Programming	*C++, Python, HTML, Julia, CSS, JavaScript*
Electronics	*Raspberrry Pi, Common sensors/actuators, Micro-controllers, Arduino*
Others	*LaTeX, G and M code, Linux (Ubuntu)*

Positions of Responsibility

Teaching Assistant | Department of Civil Engineering *(Autumn'19)*
CE 102 | Engineering Mechanics under Prof. Amber Jain

Teaching Assistant | Department of Chemistry *(Autumn'19)*
CH 107 | Physical Chemistry under Prof. Amber Jain
- *Among the f undergrads selected as Teaching Assistant across all branches to mentor & assist 250+ students*

Mentor | IIT Bombay Racing Summer Induction Program *(Feb'19 - Present)*
- *Guided **8 trainees** to excel in the basics of race car engineering through literature study, simulations and tasks*

Mentor | Summer of Science *(May'19-July'19)*
- *Guided student in learning Matlab, Scilab, Simulations, CADs and assisted him in the completion of his project*

Co-ordinator | Hospitality | Mood Indigo 2018 *(Sept'18-Dec'18)*
Asia's largest college cultural festival | Footfall: 141,000+ | 210+ events | 160+ international artists | 30+ venues
- *Worked in a team of 30 members, managing the hospitality needs of **1.4 lakh+** visitors*

Courses Undertaken

Mechanical courses	*Fluid Mechanics^{+}, Computational Fluid Dynamics and Heat Transfer, Thermodynamics, Heat transfer^{+}*, Engineering Metallurgy, Manufacturing Processes^{+}, Mechanical Measurements^{+}, Strength of materials, Solid Mechanics^{+} Engineering Mechanics, Engineering Graphics & Drawing^{+}, Design for Manufacturing, Micro Electro Mechanical Systems*
Systems and control	*Mathematical Structures for Systems and Control, Microprocessors and Automatic Control^{+}*, Kinematics and Dynamics of Machines^{+}**
Mathematics	*Calculus, Linear Algebra, Differential Equations, Numerical Analysis*
Chemistry	*Organic Chemistry, Physical Chemistry^{+}, Inorganic Chemistry^{+}*
Physics	*Quantum physics and applications, Basics of electricity and Magnetism^{+}*
Others	*Industrial Engineering and Operations Research, Operations Management, Electrical & Electronics Circuits, Biology, Economics*, Computer programming and Utilization^{+}, Psychology, Environmental Studies*

*Courses with * to be completed by summer' 20*
Courses with $^{+}$ are accompanied by lab

Extracurriculars

- *Received **80 hours** of training and completed an intermediate level one year training in **Basketball** NSO* *('18)*
- *Completed training and endurance test by continuously **swimming 1.55 Km** in **one hour*** *('19)*
- *Won **two** consecutive **gold** medals in inter school basketball competition at Aligarh Muslim University* *('16,'17)*
- *Awarded **best Project** at Regional level National Children Science Congress* *('14)*
- *Participated two times in Regional Sports meet in **Kho-Kho** at Kendriya Vidyalaya Jammu region* *('12,'14)*
- *Won several medals in **Football** and **Kabaddi** at Kendriya Vidyalaya Airforce Station Pathankot* *('13)*
- *Participated in Regional **Youth parliament** competition held at KV Army Area, Pathankot* *('14)*