KLE Tech Motorsports Club

Introduction:

KLE Tech Motorsports Club was started by students in 2014-15 to test their engineering skills against the best in the country. To compete with other engineering institutes on designing, building and racing cars. The idea was it to become a common platform for students participating in co-curricular projects to discuss and exchange ideas, innovative design concepts and develop camaraderie and thereby create an atmosphere of growth and healthy competition.

What We Do?

- **Our Approach:** To build an automotive project successfully a multi disciplinary team is essential. Special attention is placed on building the team with a mix of students from second year to final year of engineering. The final year students lead the entire team and also the sub-divisions in terms of design and fabrication. Depending on their experience and skills the third and second year students are allocated various tasks which not only help them understand the project better but also help them mature in terms of decision making abilities and leadership. As the final years pass out the third years take up the mantle and carry on with the projects. This also ensures continued learning and a continuous improvement process.
- Work:There are two divisions to the project work that is carried out in KLE Tech Motorsports Club. One is the technical aspect (Design and Fabrication) and the other non-technical (Sales & Marketing presentation, Sponsorship, Logistics, Procurement etc..).
- The technical team is sub-divided in terms of the vehicle sub-systems like Suspension, Frame, Powertrain etc.. It is compulsory for each team member to be in two different groups for any given project. This way we can ensure that the student learns about different aspects of the project and also that the work is not affected when other team members are unable to contribute for any reason.
- Benefits of being a part of this Club:
    1. Learning in terms of academics and research.
    2. Improvement in communication skills.
    3. Bridging the gap between theory and practical.
    4. Opportunity to interact with industry leaders.
    5. Improvement in personal attributes like attitude, confidence and social skills.

6. Improved job placement opportunities.
7. Helpful for higher education at many international universities.

Projects done so far:

- Following is the details of projects done by the inter discipline students and participated in the following events held during the respective academic years.

✓ **2014-15:**
  - Solar Array Electric Vehicle - 1
  - Electric Go-kart

✓ **2015-16:**
  - Solar Array Electric Vehicle - 2
  - Petrol engine Go-kart
  - Parallel Hybrid (Petrol-Electric) vehicle
  - SAE India E-baja

✓ **2016-17:**
  - SAE India E-baja
  - SAE India Supra

✓ **2017-18:**
  - SAE India E-baja
  - SAE India Supra
  - SAE India M-baja

✓ **2018-19:**
  - SAE India E-baja
  - SAE India Supra
  - SAE India M-baja
  - Formula Bharat

✓ **2019-20:**
  - SAE India Supra
  - SAE India E-Baja
  - SAE India M-Baja

Achievements:

- Following are the details of awards/acheivemnts in various events held at international/national level student competition under the support motor sports club.
- Secured All India 8th Rank in ISIE Solar Vehicle Challenge 2015.
- Awarded Fastest Go-kart in Eco-kart competition at the Goutam Buddh University 2015.
- Secured All India 5th Rank in ISIE Solar Vehicle Challenge 2016.
- Awarded 1st prize (National Champions) at Hybrid Vehicle Challenge 2016.
- Awarded 1st prize in Endurance event at Hybrid Vehicle Challenge 2016.

- Awarded 2nd prize for Autocross event at Hybrid Vehicle Challenge 2016.
- Secured 4th Overall at SAE India E-Baja 2016.
- Secured All India 2nd rank in SAE India E-Baja 2017.
- 1st in Engineering Design, 2nd in Endurance, 3rd in Acceleration at E-Baja 2017.
- Secured 4th at nationals for SAE India Supra 2017.
- Secured 4th at nationals and won Best Engine Tuning award for SAE India Supra 2018.
- 2nd in Endurance, 3rd in Cost presentation, 3rd in Maneuverability and 2nd Overall at E-Baja 2018.
- Secured 4th at nationals and won Best Engine Tuning award for SAE India Supra 2019.
- Secured 3rd at nationals with 2nd in Endurance, 2nd in Acceleration and 3rd in Sales presentation at E-Baja 2020.

Ongoing Projects:

- Following are the ongoing projects, to participate in the following SAE events to be held during the academic year 2020-21.

    1. SAE India E-baja 2020-21.
    2. SAE India M-baja 2020-21

KLE Tech Aero Club:

Learning Experiences of Unmanned Aerial Vehicles (UAV) Technology*@ AeroKLE Club*

INTRODUCTION

Started in the year 2016, "aeroKLE" is the Universities' multidisciplinary Aerospace Club found by Mechanical Engineering students under the mentorship of Dr. B.B. Kottursheettar and guidance of Mr. G.M. Hiremath to understand, organize, participate and carry out research in the field of Unmanned Aerial Vehicles (UAV).

Research in extracurricular involvement has emphasized the importance of supplementing academic learning with learning that occurs outside the formal classroom environment. Participation and membership in college-sponsored organizations provides college students ample opportunities to have a greater magnitude of student-to-student interactions and apply classroom knowledge to real world settings and develop skills that will assist in the practical realities of living after graduation and student's college experience. Extracurricular activity involvement cultivates noticeable changes in a student's behavioural traits and personality characteristics. The outcomes associated with student involvement in extracurricular activities (e.g., Student Club participation) were positively associated with cognitive development or higher intellectual processes such as critical thinking, knowledge acquisition, synthesis and decision-making as well as personal or affective development of attitudes, values, high educational aspirations, enhanced self-confidence, and increased interpersonal and leadership skills: "The greater the student involvement in college clubs, the greater will be the amount of student learning and personal development". At KLE Technological University, ***School of Mechanical Engineering*** upholds two active Student Organizations: "***Motor Sports Club" & "aeroKLE Club"*** to benefit the students of University.

1. STRUCTURE OF aeroKLE

1.1 Recruitment

Student Organization found to be thriving must have short term & long term goals, rules & regulations, enthusiastic club members and so on. Keeping it open for all the students of university, club membership recruitment drive started with the orientation on 12th September 2016 followed by rounds of interviews and build prototype oriented task. Out of about 148 participants 30 students were selected based on their performance, interests, willingness and strategic requirement of the club to kick start.

1.2 Club Members:

Mentor: Dr. B. B Kottursheettar*(HOD School of Mechanical Engineering)*
Research Advisor: Dr. N. R Banapurmath*(Head Centre of Material Science)*

Coordinator: Mr. G. M Hiremath*(Assistant Professor School of Mechanical Engineering)*

Technical Advisor: Mr. Kumar Rao*(Senior Design Engineer Rolls Royce)*

Student Members (Current):

Sl. No	Name	Branch
01	Vineet	Mechanical Engineering
02	Amit	Mechanical Engineering
03	Ahmed	Mechanical Engineering
04	Rohit	Mechanical Engineering
05	Koustub	Mechanical Engineering
06	Rahul	Mechanical Engineering
07	Shridhar	Mechanical Engineering
08	Alex	Mechanical Engineering
09	Calvin Lobo	Mechanical Engineering
10	Neelesh	Mechanical Engineering
11	Omprakash	Mechanical Engineering
12	Mallikarjun	Mechanical Engineering
13	Yajnesh	Mechanical Engineering
14	Sujay C	Mechanical Engineering
15	Siddanth	Electronics & Communication Engineering
16	Srikar	Electronics & Communication Engineering
17	Ajay Joshi	Electrical & Electronics Engineering
18	Yashwanth	Computer Science Engineering
19	Prajwal H	Electronics & Communication Engineering
20	Satwik	Electrical & Electronics Engineering
21	Karan Ladhad	Mechanical Engineering
22	Ravikumar Pise	Electrical & Electronics Engineering
2	Ameen Attar	Electrical & Electronics Engineering
24	Arun Jalavadi	Mechanical Engineering
25	Sohail Ahmad	Mechanical Engineering
26	Darshan Kumbar	Electronics & Communication Engineering

1.3 Start Journey

The members were divided into different teams to build RC planes and Quadcopters. Few members also had the responsibilities to look after finance, inventory, procurement of materials etc. and mentor design, fabrication and electronics activities of all the teams. The teams began with building RC planes and Quadcopters with the knowledge and exposure they have. The first models that students built are as shown.

FIRST BUILT RC PLANES

FIRST BUILT QUADCOPTERS

After test fly of models built, each team could realize that the knowledge, awareness of materials and fabrication techniques are not adequate to design and fly their models. The teams needed expert inputs and much exposure to the UAV Technology.

1.4 Visits to other organizations:

To understand the basics of UAV group of members visited HAL, PES University, BMSCET and RV College of Engineering & Technology, Bangalore and acquired much of the information on various materials, processing techniques, fabrication techniques, hardware & software tools and online resources related to UAV technology.

Visit to PES University Bangalore

Visit to RV College of Engineering Bangalore

Visit to BMS College of Engineering Bangalore

Visit to HAL Bangalore

The visit to similar Student Clubs brought in enthusiasm amongst the members and the teams continued to build RC Planes and Quadcopters with new learning, different materials and designs. Swiftly the

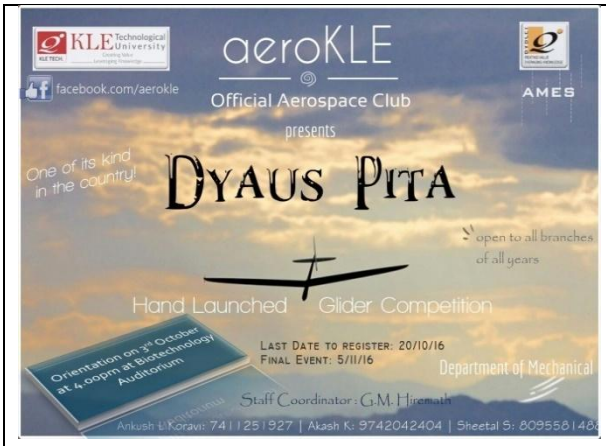
teams flew their new models which were much stable and successful in the test fly. Few teams started aligning their efforts put in student club as their academic projects by developing UAVs that met the project constraints. Other teams started working for prestigious competitions and the journey continued. Simultaneously club members continued to contribute the learning of this technology to other schools & colleges.

2. EVENTS ORGANIZED

Student organization should not restrict its learning experiences only to participation and self learning. In fact it is the responsibility of student organization to deploy its learning experiences to others, who are interested, by organizing events, workshops, lecture series, practical sessions and so on.

2.1 Dyaus Pita

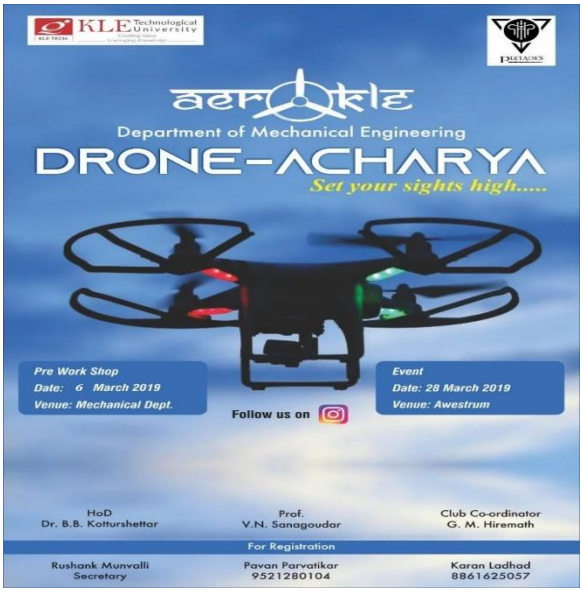
AeroKLE club was established with an ambition of igniting inquisitiveness and interest of young minds in aerospace domain. To make students curious of flying models and to grab maximum participation, aeroKLE organized an event **Dyaus Pita –** a Hand Launched Glider Competition in the month of November 2016. The club members guided 32 teams (4 each) to understand and build their models by conducting workshops and practical sessions.



Event Dyaus Pita

2.2 Drone Acharya:

Another national level technical event organized by aeroKLE club is ***"Drone Acharya"*** (a multi-rotor competition) during Pleiades-2019. Started with orientation the workshop on 6th March 2019 was a grand success with more than 250 students from various colleges. The students were taught basic physics and aerodynamic concepts, electronics, manufacturing techniques like laser cutting & 3D printing and drone piloting. More than 50 teams participated in the final event on 28th March 2019.



3. CONTRIBUTION TO COMMUNITY

Some commentators have suggested that a sense of belonging should also be fostered beyond the university. 'Civic engagement and service learning' is one mode of engagement where students are encouraged to collaborate to transfer the knowledge they have gained from their studies for the benefit of the community. The members of aeroKLE are ambitious to ignite curiosity and interest of young minds in the field of UAV. Series of workshops, guest lectures, Technical Talks and Practical sessions were conducted by club members to various schools, colleges and start-ups.

3.1 Multi-rotor Workshop @ VDIT, Haliyal

AeroKLE team was invited to carry out multi-rotor workshop in KLS Vishwanathan Rao Deshpande Institute technology, Halyal on 7th September 2018. About 85 students were attended this one day workshop and learnt structures, aerodynamics, electronic components & circuits to develop drones. Live practical like designing in software, assembly and electronic connections with calibration of controllers were demonstrated helping students understand the concepts with great ease.

Workshop @ VDIT, Haliyal

3.2 RC Plane Demonstrations in Government School, Katnur Village

A bunch of members from aeroKLE club voluntarily went to government kannada medium school in Katnur villege and demonstrated fly test of RC planes to spot interest and curiosity of kids in UAV

technology. The kind of queries raised by kids made volunteers happy and penetrate to deeper explanations.

Demonstrations in Government School

3.3 Workshop on Quad-copter @ Sandbox Start-ups

'Google I/O extend' certified Workshop on quad-copters organised by sandbox start-ups in Hubballi on 10th may 2018 was executed by aeroKLE club. Over 50 students from different colleges participated in the workshop. The learning of participants was similar to the learning of multi-rotor workshop in VDIT, Haliyal.

Workshop @ Sandbox Start-ups

3.4 Guest Lecture on RC Planes & Drones @ Dharwad International School

In collaboration with NASA and Himalayan Research centre, NASA HRC hosted “First Young astronaut programme” for the first time in Asia at Dharwad International School. It was honour for aeroKLE club to accept invitation to give Guest Lecture on RC Planes & Drones. The students were extremely happy and excited at flying of planes & quad-copters.

Guest Lecture @ Dharwad International School

4. ACADEMIC PROJECTS

It is quite obvious that members involved in 'Student clubs' face additional burden to manage time, study and academic activities. As a mentor and facilitators of club, it becomes their responsibility to foster some of the club activities to their academic activities wherever possible. In the process, aeroKLE club activities include design, fabricate, generate virtual 3D models, virtual analysis, processing of materials and so on. It was found similar in academic requirement such as Mini, Minor & Capstone Projects, REU, Course Projects etc.

Without negotiating academic requirements and with little modifications in their work, the members were able to foster club activities to following academic activities:

1. Design and fabrication of Agricultural Crop Mapping drone.
2. Pesticide Spraying Multi-rotor for agriculture applications
3. Reverse Engineering & CAD modelling of
    a. RC Engine
    b. Boomerang Trainer RC Plane
    c. RC Plane for SAE India Aero Design Challenge
4. Performance analysis of wing made of balsa wood formers & aluminium spar.
5. Design & Development of Novel material hexacoptor for heavy Load lifting
6. IRP- Smart UAV using AI ML technology (On going)
7.

Agricultural Crop Mapping drone

Pesticide Spraying Multi-rotor

5. EVENTS PARTICIPATION

Participation in competitions provides opportunities for students to enhance their knowledge, exposure, learning experience, techniques and so on. Working in line with rules, regulations and constraints put by the event hosts make participants more structured and think out of box. The added advantage of competing in events is that it improves participant's leadership skills, critical thinking, team working, self confidence etc.

5.1 Techkriti 2017 at IIT Kanpur

Soon after first successful flight test of RC planes and Quadcopters, 3 teams participated in **Boeing Aerotrix (**aero modelling challenge) and 2 teams in **Drone Racing** events of "Techkriti" national level tech fest hosted by IIT Kanpur in the month of March 2017. A total of 28 student members of aeroKLE club benefited in terms of exposure in the field of UAV.

Techkriti 2017 at IIT Kanpur

5.2 Techkriti 2018 at IIT Kanpur

Even though no prizes or ranks were achieved by aeroKLE teams in Techkriti 2017, because of the exposure, techniques, knowledge and learning, the members tend to participate in Techkriti 2018. But this time 4 teams participated in **Boeing Aerotrix** and 2 teams in **Drone Racing** events enriching experiences of 35 student members.

Techkriti 2018 at IIT Kanpur

The outcome of both Techkriti events turned to be important and great learning experience for the students of aeroKLE. However the members were recognized among other university students in aero modelling because of presentation and performance in competitions.

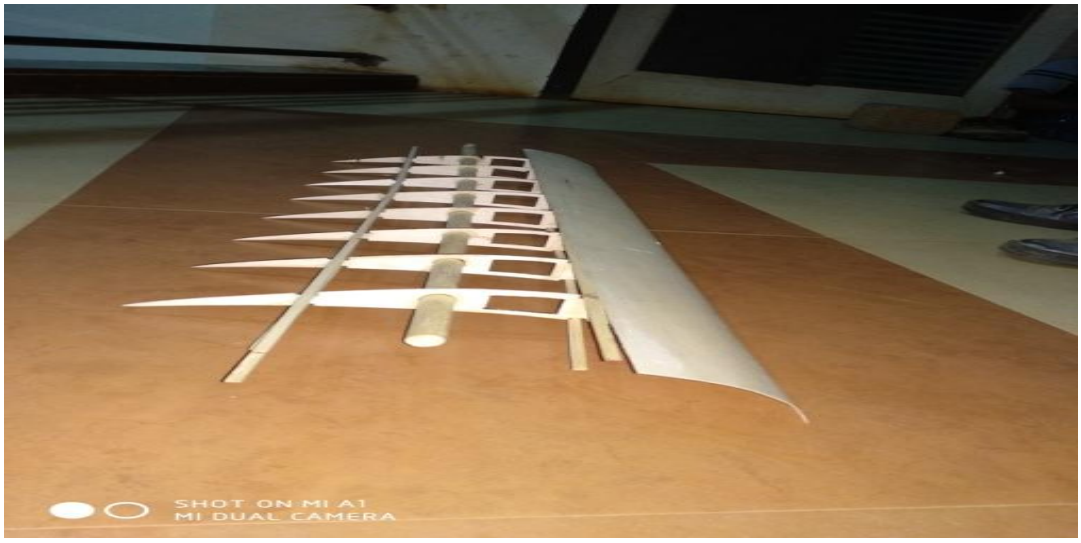
5.3 SAE Aero Design Challenge 2018 (Regular Class)

Propagating the initial spark, a team of 18 members from aeroKLE club, took the leap by registering for "SAE Aero Design Challenge 2018" competition. It is the top one prestigious competition organized by "Society of Automotive Engineers" in India. Unlike other competitions, the rules &regulations and constraints are very much rigid locating the participating teams to the cutting edge technology of UAV.

With clear understanding of rule book, constraints and structure of evaluation, aeroKLE team started building prototypes for SAE Aero Design Challenge 2018.

5.3.1 SAE Aero Design Proto type 1

The wing, fuselage, tail, firewall, landing gear etc. were designed as per the constraints and produced in Maker's Space facility of the university. After fabrication of all the components, the prototype1 was flight tested.



SAE Aero Design Proto type 1

5.3.2 SAE Aero Design Proto type 2

Though enough care was taken while design, fabrication and assembly, the team was not able to fly prototype1 as per the expectations. The team needed expert's guidance, inputs and reviews. Fortunately, Mr. Kumar Rao (Senior Design Engineer, Rolls Royce) guided the team to build prototype2 with whole new design.

SAE Aero Design Proto type 2

Prototype 2 was successful in its flight test reaching maximum altitude. Still stability of the model was not promising. At full throttle and peak altitude the wing collapsed. Deeper analysis of failure alerted team that structural rigidity and load carrying capacity of the wing and fuselage was not sufficient.

5.3.3 Final Model SAE ADC 2018

Final Model SAE ADC 2018

By learning experiences and failure analysis of prototype 1 & 2 and with valuable inputs and comments from Mr. Kumar Rao, the team developed final model for the competition with aircraft specifications: 2200 mm wing span, 1410 mm fuselage length, 597 mm height, 3.3Kg weight and 4070g maximum thrust.

The team was cautious of wing and it was tested with 6.5Kgs of load. Replaceable firewall of plywood secured full proof of 1.8Kgf servo drive. Flight test of final model was extremely promising even with pay

loads added in it. The plane could reach much higher altitude with more stability as compared to earlier prototypes. The team aeroKLE demonstrated their learning experiences as technical presentation and flew the aircraft with a maximum pay load of 1.3Kgs.

5.4 SAE Aero Design Challenge 2019 (Regular and Micro Class)

The great learning experiences, exposure and achievements in SAE ADC 2018, motivated aeroKLE teams to participate in both Regular class (Highest pay load capacity) and Micro class (Highest pay load fraction) categories of SAE Aero Design Challenge 2019. The regular class aircraft was targeted to build 3 times greater load carrying capacity than previous aircraft. Accordingly the team designed, processed materials, fabricated and test flew the aircraft with a maximum pay load of 4.5Kgs. While the micro class, though it was first experience, was targeted with a pay load fraction of 0.71. Both the aircrafts were smooth and much stable in their series of flight tests.

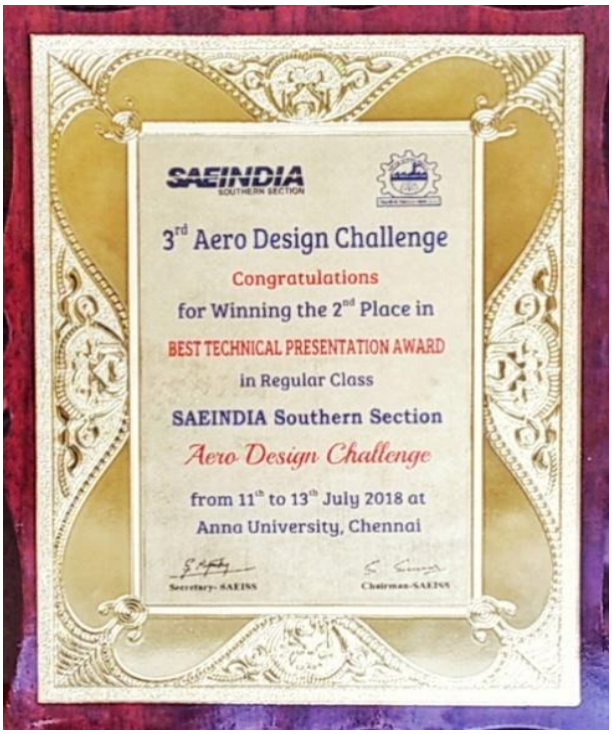
SAE ADC 2019 Regular Class & SAE ADC 2019 Micro Class

6. AWARDS AND PRIZES

Though winning in competitions was not the primary objective of the aeroKLE club, the dedication, team spirit, eagerness to learn, self confidence and experience awarded the teams of aeroKLE many prizes and positions as follows:

- 2nd Position in “Best Technical Presentation Award” of SAE ADC 2018
- 8th position in All India Ranking (AIR) of SAE ADC 2018
- 1st Position in “Overall Performance” (AIR) of SAE ADC 2019 (Regular Class)
- 1st Position in “Best Design Report Award” of SAE ADC 2019 (Micro Class)
- 3rd Position in “Overall Performance” (AIR) of SAE ADC 2019 (Micro Class)

6.1 SAE ADC 2018 Achievements



SAEINDIA Southern Section
Aero Design Challenge 2018

OVERALL RANKING - REGULAR CLASS AIRCRAFT (RCA)

S.No	Team Name	Team ID	College Name	Overall Rank
1	TEAM UAS DTU	ADC20180149	Delhi Technological University	1
2	ARCIS	ADC20180141	Dayananda Sagar College of Engineering	1
3	STALLION AERO	ADC20180147	SKNCOE	2
4	IARE ABHYAS	ADC20180207	Institute of Aeronautical Engineering	2
5	Sirius	ADC20180138	University of Petroleum & Energy Studies	2
6	AERO GANTZ	ADC20180103	MLR Institute of Technology	3
7	FIREHAWKS	ADC20180161	Panimalar Institute of Technology	3
8	DHRUVA	ADC20180198	Kongu Engineering College	4
9	SKY BLAZERS	ADC20180186	Sri Krishna College of Engineering & Technology	5
10	TEJAS	ADC20180108	MLR Institute of Technology	6
11	Team GRIFFIN 3.0	ADC20180181	Vishwakarma Institute of Technology, Pune	7
12	AeroKLE	ADC20180180	KLE Technological University	8
13	Team Onyx India	ADC20180137	K. J. Somaiya college of engineering	9
14	sky troopers	ADC20180106	Maharastra Institute of Technology, Pune	10
15	SKY WALKERS	ADC20180176	JSS Academy of Technical Education	11
16	Team W.A.V.E	ADC20180211	Sadar Patel College of Engineering	12
17	Team Da Vinci	ADC20180136	Silver Oak Group of Institute	13
18	TEAM GARUDASHWA	ADC20180112	AISSMS COE Pune	14
19	TEAM BRUISER HEADS	ADC20180123	Gokaraju Rangaraju Institute of Engineering and Technology	15

Best Technical Presentation award & All India Rank 8th in SAEADC 2018

6.2 SAE ADC 2019 Achievements

SAEINDIA SOUTHERN SECTION
Aero Design Challenge 2019

OVERALL RANKING - REGULAR CLASS AIRCRAFT (RCA)

Overall Rank	Team Name	Team ID	College Name	State
1	AeroKLE	ADC20190104	KLE TECHNOLOGICAL UNIVERSITY	KARNATAKA
2	DARKSIDERS	ADC20190109	MLR INSTITUTE OF TECHNOLOGY	TELENGANA
3	Altos infinitum	ADC20190106	RAJIV GANDHI INSTITUTE OF TECHNOLOGY	MAHARASTRA
4	TEAM ALBATROSS	ADC20190178	VELLORE INSTITUTE OF TECHNOLOGY	TAMIL NADU
5	AEROX	ADC20190107	RAJIV GANDHI INSTITUTE OF TECHNOLOGY	MAHARASTRA
6	SILVER SNITCHES	ADC20190136	SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY	TAMIL NADU

Overall First Position in SAE ADC 2019 (Regular Class)

SAEINDIA SOUTHERN SECTION
AERO DESIGN CHALLENGE 2019

SAEINDIA SOUTHERN SECTION

AWARD WINNERS - MICRO CLASS AIRCRAFT (MCA)

Award Category	Position	Team Name	Team ID	College Name	Prize Money (INR)
Overall Performance	01	Team Arrow	ADC20190183	Institute of Technology, Nirma University, Gujarat	100000
	02	Team Garudashwa	ADC20190199	AISSMS College of Engineering, Maharastra	50000
	03	AeroKLE	ADC20190105	KLE Technological University, Karnataka	25000
Best Design Report	01	AeroKLE	ADC20190105	KLE Technological University, Karnataka	10000
	02	ABHYUDAY	ADC20190158	Veermata Jijabai Technological Institute, Mumbai	NIL
	03	IARE LAKSHYA	ADC20190202	Institute of Aeronautical Engineering, Hyderabad	
Best Technical Presentation	01	TEAM ARROW	ADC20190183	Institute of Technology, Nirma University, Gujarat	10000
	02	TEAM BHARADWAJ	ADC20190126	MKSSS Cummins college of engineering for women, Maharastra	NIL
	03	IARE LAKSHYA	ADC20190202	Institute of Aeronautical Engineering, Hyderabad	
	03	AEROTANTRIX	ADC20190235	The National Institute of Engineering, Karnataka	
	01	SWIFT 7.1	ADC20190209	Vidya Vardhaka College of Engineering	10000

First Position in Best Design Report SAE ADC 2019 (Micro Class)

SAEINDIA SOUTHERN SECTION

SAEINDIA SOUTHERN SECTION
Aero Design Challenge 2019

OVERALL RANKING - MICRO CLASS AIRCRAFT (MCA)

Overall Rank	Team Name	Team ID	College Name	State
1	TEAM ARROW	ADC20190183	INSTITUTE OF TECHNOLOGY, NIRMA UNIVERSITY	GUJARATH
2	TEAM GARUDASHWA	ADC20190199	AISSMS COLLEGE OF ENGINEERING	MAHARASTRA
3	AeroKLE	ADC20190105	KLE TECHNOLOGICAL UNIVERSITY	KARNATAKA
4	Team Curtiss RC	ADC20190102	VIT UNIVERSITY	TAMIL NADU
5	AEROCLUB-NITTE	ADC20190103	NMAM INSTITUTE OF TECHNOLOGY	KARNATAKA
6	TEAM BHARADWAJ	ADC20190126	MKSS CUMMINS COLLEGE OF ENGINEERING FOR WOMEN, PUNE	MAHARASTRA
7	CAZADORA	ADC20190159	Veermata jijabai Technological Institute	MAHARASTRA

Overall Third Position in SAE ADC 2019 (Micro Class)

Conclusion:

Learning UAV Technology either in classroom or as an individual is difficult as it involves Aerodynamics, Balancing, Structuring, Electronics and Electro-Mechanical Systems. However by establishing student clubs involving members from different disciplines the process of learning complex technology can be made easier. Hosting events, workshops, guest lectures and practical demonstrations enhances self confidence, leadership skills, team working & communication skills, and responsibilities of the club members. Participating in competitions is a great platform to enrich higher order thinking, problem-solving skills, decision making, learning experience, exposure to the cutting edge technologies. Winning awards and prizes motivates the club members to explore more learning, positive feelings and proud of elevating university brand and image to greater extent.