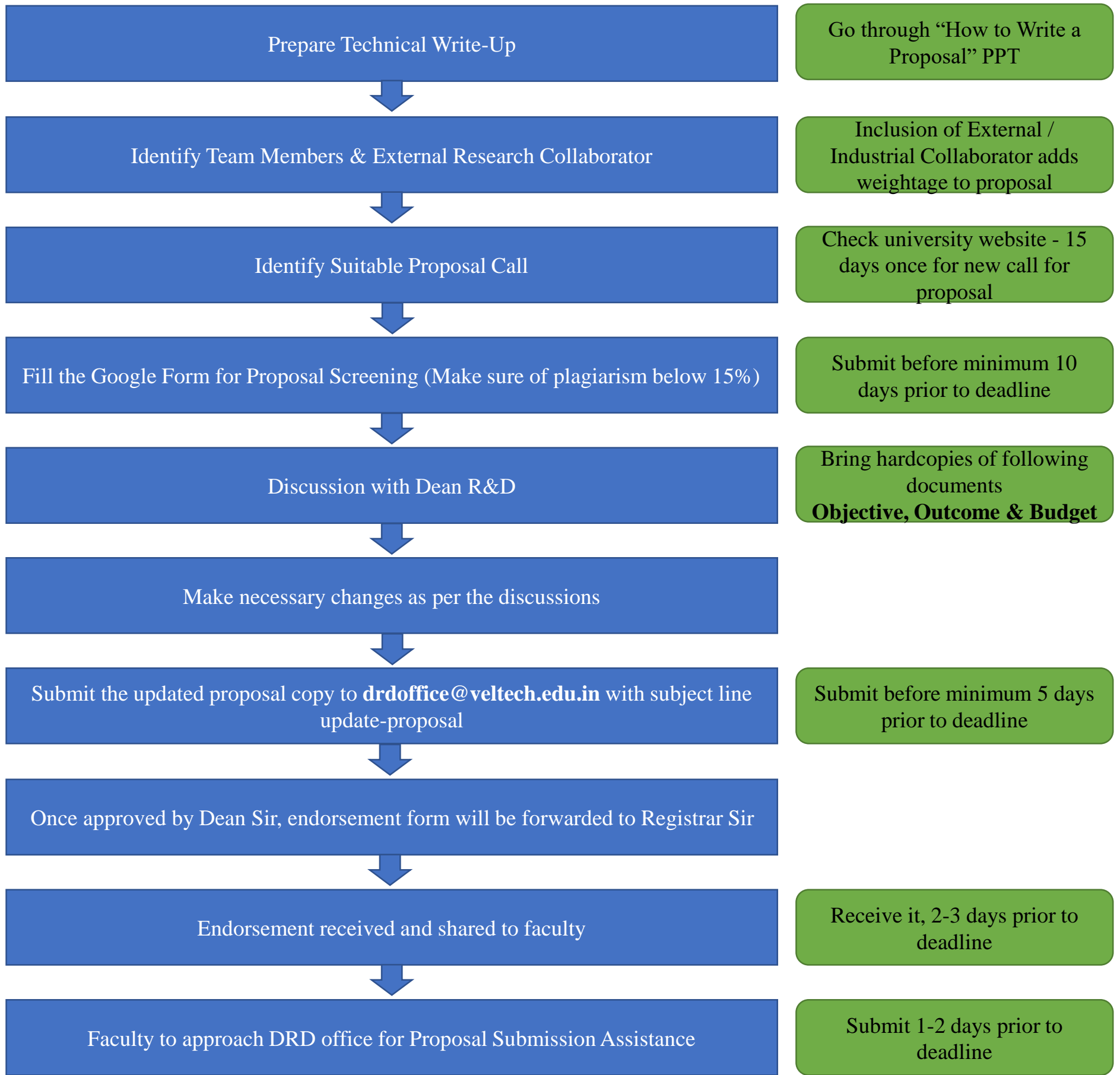


Proposal Submission Guideline



Scan or click below QR code/Link to submit the proposal for screening



<https://forms.gle/6A83smDyPMJCB6so6>

For Proposal Submission Assistance Contact

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How to write a research project proposal

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Before starting your proposal

- First, ensure that your idea or service is unique and not already funded by other government or private grants or is already implemented.
- Start by identifying a need. What problem or issue in your community can be improved or changed with the grant money and a good effort?
- You need to define your goals, estimate the cost, develop the timeline of your project and find prospective grants.
- Make sure that the benefits generated from the grant are tangible, measurable, benefit a wide spectrum of your community and are a good value for the money invested.
- Your proposal should suggest that you are a potential partner in furthering the funder's mission, not just a person asking for money.
- Use the same clear, objective language to describe the problem's impact, both in social and economic costs.



Before starting your proposal

- You should focus on multidisciplinary project
- You should become closely familiar with all of the criteria related to the program for which a grant is being sought.
- Understand the organization that is providing the funds, understand their goals and align your proposal to them.
- Emphasize the significance of your project and its contribution to science if implemented successfully.
- Back it up with relevant statistics, scientific facts, and research data on the subject.
- It's important to use simple terms comprehensible to the prospective Grantee.
- Why you are the one who can take-up this project: provide some proof of your expertise to make your proposal stronger



Key Points of Project Proposal

1. Project title
2. Project summary or Abstract
3. Introduction or origin of the proposal
4. Review of status of Research and Development in the subject (National and International) /
Background
5. Research gap
6. Objectives
7. Research methodology / work plan
8. Preliminary work done on the proposed project
9. Time frame and work schedule/Gantt chart
10. Budget and Justification
11. Outcomes
12. Expertise available with the PI Facilities available at PI and Institute





Project title

- The proposal should have a clear, descriptive and concise title.
- It has to indicate aim, what algorithms / technologies / methods you are going to use, achieving any societal missions and outcomes
- Title gives first impression of a proposal and hence it has to be catchy, small and informative.
- It shall not be same as objective, it has to be shorter but at the same time indicate broadly what is being attempted.
- Too long and technical of a title will not gain the reviewer's attention or interest.
- Too short and broad a title will make the reviewer too critical of grant.
- Max. 15 words
- **Example: Energy Efficient and Optimal Path Planning Strategies for SWARM of UAVs in Real Time Localization using Deep Learning Based Stereo Vision Systems**





Project summary or Abstract

- This is the most important part of the proposal – it has to catch the attention of the reviewer.
- The summary is an overview of the entire plan and helps decision-makers to quickly get an overview of your proposal so they can see if they are interested.
- Although it is at the beginning of the document, it is usually written last to capture the essence of the plan.
- Proposal summary summarizing the key points or objectives of the project. It should have sufficient detail and specifics.
- Recently, 250 -300 words are expected as a summary for various funding agencies





Project summary or Abstract

- Start with a background of your proposed research / applications
- Define the problem that exists, and explain why this project will help fill the gap to better serve the community.
- What methods / scientific technologies / algorithms to be used for your methodology
- How are you going to achieve various objectives
- What are your significant interpretations to contribute on technology demonstration and improving the existing system
- The results of your research how you can use in specific application
- What you will expect after this research as an outcome
- To whom it will be benefitted



Example : Summary

Formation of UAVs in the desired pattern to accomplish SWARM behavior is considered to be a challenging task and it demands numerous applications including defence, military, societal and coordination of satellites. The present work exploits coordinating large number of UAVs to achieve formation flight as a circle, line, square and other geometric patterns. 3D mapping of the environment using SWARM of UAVs in obstacle prone region and implementing energy efficient, optimal ant colony path planning algorithm with Markov model to reach the desired goal is envisaged. A decentralized control scheme will be executed where in electronic failure of a drone will be compensated with other neighborhood information to adjust the formation distance and a substitute UAV will be flown to replace the failed drone. Multiple UAVs with Stereo vision systems are incorporated to gather 3D point cloud data and they are merged using map merging algorithm to create a 3D map of an outdoor environment. The multiple images are stitched using K nearest neighbor algorithm to perform dynamic stitching with a deep learning environment. The developed SWARM of UAVs will be tested for inspection of water quality, environmental pollution monitoring and elevated infrastructure assessment.



Introduction or origin of the proposal

- Concerns with **background information, urgency, critical gaps in knowledge and need for the present work**
- In the problem statement, you explain who will benefit and how the solution will be implemented.
- You may need to do extensive research on the history of the underlying problem, previous solutions that were implemented and potentially failed and why your solution will make a difference.
- If you have previous experience of the proposed research then highlight the significant achievements and state the planning to continue which helps to establish your credibility as a grant applicant



Introduction or origin of the proposal

- Start with background towards your research topic, what are the applications and present trends / technologies
- What are the key issues and how to address them
- The problem should be stated in such a way that it's importance and relevance is realized by any one who reads it
- It should help the reader to acquaint with the topic
- What is your mission and how you are going to achieve with your proposed research should be brought out
- The reviewer should have a clear idea of your research problem after introduction





Review of status of Research and Development in the subject (National and International) / Background

A review of literature would answer these questions

- What is the current state-of-the-art of your proposed work (last 5 years)
- What is the context for the proposal?
- Why is this study needed?
- Others have not attempted the problem you had in mind
- will extend the work that has been previously done
- will avoid the mistakes and/or errors that have been previously made
- will serve to develop sound research proposal than existing initiatives

Review may suggest

- Ideas for your own work
- What not to do
- Convince others about your knowledge of past work in the area



Literature Survey and Research Gap

- It will take a lot of **reading and sieving** through the existing literature to identify a topic that has not been studied enough
- **Pay attention to the introductions and conclusions of articles.**
- **Limit yourself to more recent articles** (within the last 5 years)
- Some research articles also include a short section on '**suggestions for future research**'.
- **Reading systematic reviews, meta-analysis reports and content analysis reports** is a good way to get familiar with a large body of already collected and evaluated research without having to read each of the articles individually.
- We need to identify the research gap and how to formulate into a research topic as per the funding agency requirement.
- Use the statement of the problem to show that your proposed project is definitely needed and should be funded
- This can begin to establish a rationale for why your project needs external funding as it seeks to provide a long term response.
- Need to follow any one reference format



Objectives

- Each objective must be clear with indication to broad and specific measurable out put and possible to accomplish in the specified time frame

While writing the objectives try to answer the following queries.

- What do you want to achieve?
- The objectives are valuable to whom?
- Are they measurable?
- Are they realistic in terms of time and available resources?

**Specific, Measurable, Achievable, Relevant and Time-Bound
(SMART)**



Objectives

- Details of the desired outcome and how success will be measured. This section is key to providing information on the benefits that the Grantee, community, government or client will see for their investment.
- Refine your idea and tell exactly what you expect to accomplish in response to the need.
- Describe the overall goal or intended outcomes of the project
- State clearly what the project aims to achieve
- List the scientific methods / technologies / algorithms / other salient techniques that have to be utilized for implementing the project



Example: Objectives

- Energy efficient and optimal path planning for the SWARM of UAVs using Ant colony optimization and Markov model
- Formulation of decentralized control algorithm to achieve formation flight (various geometric patterns) for the SWARM of UAVs
- Real time localization and mapping of outdoor environments using stereo vision systems (depth measurement)
- Development of deep learning platform with KNN and map merging algorithm for dynamic image stitching
- Design of IoT based system for monitoring environmental, water quality and infrastructure assessment





Research methodology / work plan

- Be clear on state-of-the art equipment's / instruments / algorithms will be utilized for achieving the objectives.
- Try to utilize the latest technologies and multidisciplinary approach in addressing the research problem.
- There should be a very clear link between the methods you describe in this section and the objectives you have previously defined.
- Write how you would run the project and sequence of activities to achieve the specific objectives.

HOW will you answer your research question?

- Five 'W's & H': Who, What, When, Where, Why, and How

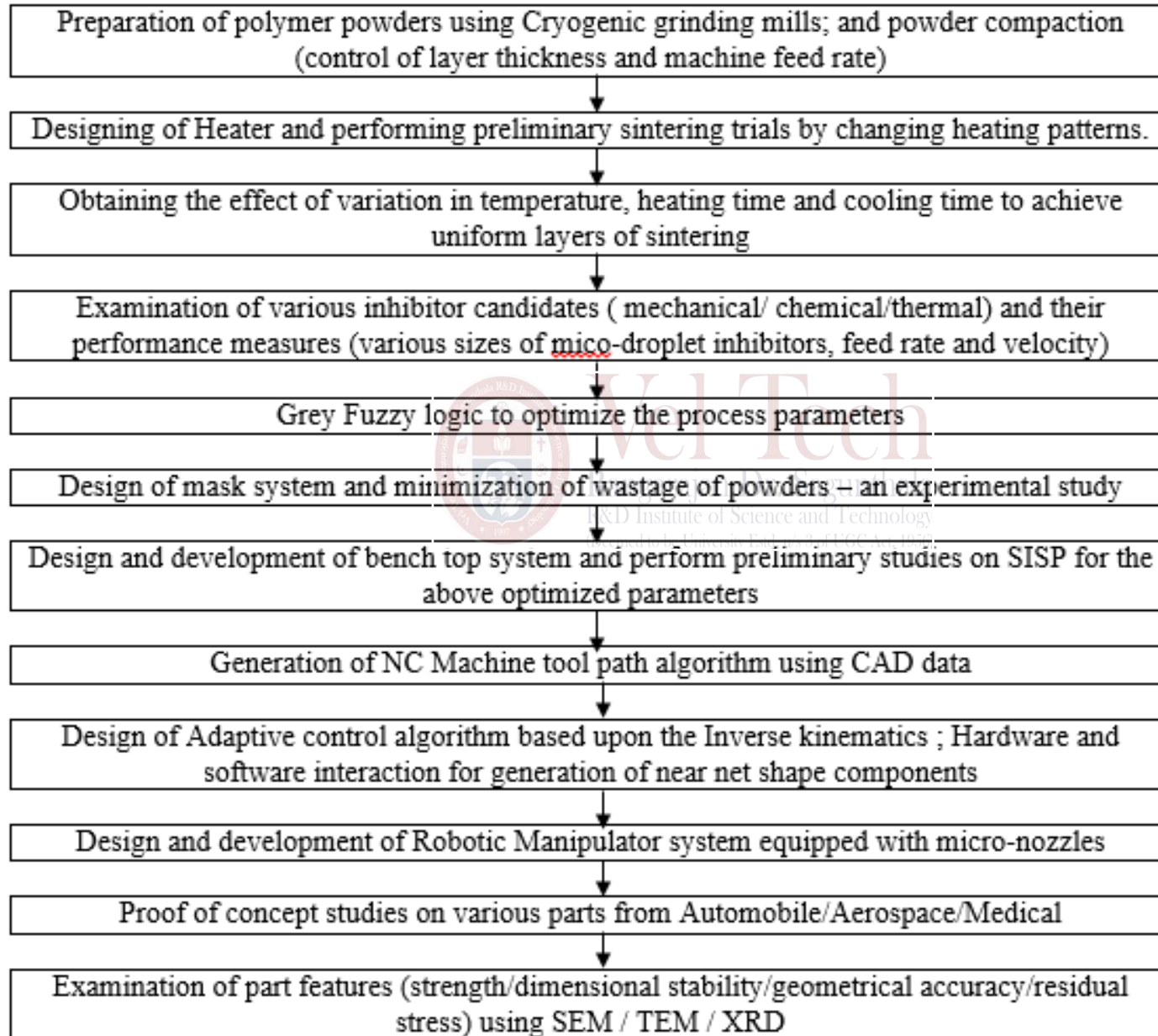


Research methodology / work plan

- The prospective funding agency will be looking at your methods to see what it is that you are proposing that will be **new, unique or innovative**.
- Make sure you clearly present the innovative aspects of your idea
- Do not forget to include the **collaborative relationships** your project will be developing with other cooperating groups.
- How will the methods for your project **encourage groups to join together** in dealing with the issues/concerns your project addresses?.
- Your Methods section should clearly indicate **how the methods that will be used will allow the outcomes of your project** to have value for others beyond your project.
- An overview of methodology can be given as flow chart so that reviewer will understand the sequence of the proposed work.



Sample flow chart for methodology





Preliminary work done on the proposed project

- If you have performed preliminary work on the proposed project then it will definitely help in convincing the reviewer
- It gives confidence to the reviewer that you will execute the project
- Preliminary theoretical / experimental studies on the subject of proposal is to be included in the methodology section to support.



Time frame and work schedule/Gantt chart

- An estimate of the project timelines
- The important dates of the project including all the steps in the organization of the project. A Gantt chart may be useful
- A well-formed grant proposal is one that is carefully prepared, thoughtfully planned, and concisely packaged

Activities	Duration in Months														
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
I	█	█													
II		█	█												
III		█	█	█											
IV			█	█	█										
V					█	█	█								
VI							█	█	█	█					
VII									█	█	█				
VIII									█	█	█	█			
IX.												█	█		
X.												█	█	█	█

S/No	Activity module
I	Simulation studies on energy efficient model for the SWARM of UAV
II	Identification of optimal path using Ant colony algorithm and Markov model
III	Formulation of decentralized control algorithm and experimental studies
IV	Design of altitude, attitude, collision and obstacle avoidance algorithms for SWARM of UAVs
V	3D mapping of outdoor environment using Stereo vision system
VI	Development of map merging algorithm to merge multiple UAVs 3D point cloud data
VII	Implementation of KNN algorithm and performing dynamic image stitching
VIII	Development of IoT based system to measure water quality, environmental pollution and infrastructure assessment
IX.	Design of graphical user interface and also client-server architecture
X.	Demonstration of SWARM of UAVs in real time for 3D mapping of environment incorporating the developed algorithms



Time Schedule of Activities through BAR Diagram

sl No	Activity	Year -1					Year -2					Year -3					Year -4									
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	
1	Polymer Powder Preparation and compaction	█																								
2	Designing of Heater and performing preliminary sintering trials	█	█	█																						
3	Examination of various inhibitor candidates (mechanical / chemical / thermal) and their performance measures		█	█	█	█																				
4	Design of mask system				█	█															█	█	█	█		
5	Grey Fuzzy logic to optimize the process parameters			█	█	█	█	█																		
6	Design and development of bench top system and perform preliminary studies on SISP			█	█	█	█	█																		
7	Generation of NC Machine tool path algorithm using CAD data									█	█	█	█								█	█	█	█		
8	Design and development of Robotic Manipulator system									█	█	█	█	█												
9	Design of Adaptive control algorithm based upon the Inverse kinematics										█	█	█	█	█	█										
10	Hardware and software interaction for generation of near net shape components											█	█	█	█	█										
11	Examination of part features (strength/dimensional stability/geometrical accuracy/residual stress) using SEM/ TEM/ XRD									█	█	█	█			█	█	█	█							
12	Proof of concept studies on various parts from Automobile/Aerospace/Medical																				█	█	█	█	█	
13	Preparation of Reports								█										█						█	█



Budget and Justification

- All budget items should be included in the proposal. Create a line-item budget that breaks every component down.
- Itemized list of income and expenses that shows precisely how much money you will need and how you will spend it to accomplish your objectives.
- Budgets need to be watertight, full of detail and demonstrate full competence on the part of the applicant organization.
- How much money is required to be funded to deliver the results? Provide full justification for all expenses
- Remember that the project budget section is the true meat of your grant proposal. Overcharging or having a high quote can lose you the grant and can be seen as profiteering.
- Underquoting might win you the business but you may not be able to deliver on your proposal which could adversely impact on your standing with the Grantee



Example: Budget

Fund requirement under various heads	1 st Yr (Rs)	2 nd Yr (Rs)	3 rd Yr (Rs) (25-30 months)	Total (Rs)
Junior Research Fellow (Rs 31,000 + 8% HRA – First and Second Year) Senior Research Fellow (Rs 35,000+ 8% HRA for Third Year)	4,01,760	4,01,760	2,26,800	10,30,320
Equipment	9,55,000	Nil	Nil	9,55,000
Satellite data/data	Nil	Nil	Nil	Nil
Consumables & Supplies	50,000	20,000	15,000	85,000
Internal Travel	35,000	35,000	20,000	90,000
Contingencies	25,000	20,000	20,000	65,000
Others	Nil	Nil	Nil	Nil
Overheads(Overhead Expenses of 20% of Total Project Cost not exceeding 3.00 lakhs)	30,000	30,000	15,000	75,000
Total	14,96,760	5,06,760	2,96,800	23,00,320



Justification for Man Power (Junior Research Fellow):

A Masters in Embedded system with image processing skills will be required to carry out designated project tasks. He will work on handling of stereovision images, development of map merging, KNN and ant colony algorithms. He will be also involved in integrating hardware and software platforms to achieve formation flight with real time 3D mapping of an environment.



Justification for Consumables:

Consumables such as wires, connectors, soldering units, glue guns, zip ties, screws, nuts, sleeves, screw drivers and other basic tools will be purchased. In addition, few electronic accessories, Arduino boards and Zig-bee modules will be also procured for preliminary simulation and hardware integration studies.



Justification for Equipment's:

Experimental studies on SWARM of UAVs (atleast 3 Nos) require BLDC motors, propellers, ESCs, flight controllers (Pixhawk 4), Li-Po batteries, telemetry units and carbon fiber frames. In addition, to acquire images, stereo vision cameras with gimbal and corresponding on-board processors, transreceiver units for video streaming, transmitters and other electronic modules are planning to be purchased. Real time transmission of video data has to be processed and integrated using high end processing units. In view of this, graphical processor NVIDIA Jetson will be procured. Wi- Fi antenna modules, ground control station and swarm link sets also necessary for performing 3D mapping of environment using SWARM of UAVs and broadcasting the same in real time for effective visualization. All these aforementioned electronic components will be procured after discussion and getting the concurrence from NESAC team.



Justification for Travel:

Discussion with ISRO scientists will help for the betterment of project outcome and enhancing the research activities. At least one visit will be planned to meet Dr. Dibyajyoti Chutia, North Eastern Space Application Centre (NESAC), Shillong, Meghalaya. A team comprises of PI, Co-PI and JRF will be visiting to NESAC. During this visit clarification on technical aspects, discussion on various milestones achieved and envisaged works under this project for each year will be planned. In addition, traveling to places where other eminent professors working on this field to discuss is anticipated during the course of real time execution on SWARM of UAVs.

Contingencies

During the event of real time testing of UAVs, motors and propellers may break. Also, batteries may have to be replaced. Under this circumstance, replacement of these components necessitate contingency amount. Also, up gradation of graphics card and other computer accessories may require funding.



Outcomes

- Outcomes should be directly tailored to the goals and objectives for your project.
- Outcome statements describe specific changes in your knowledge, attitudes, skills, processes and products you expect to occur as a result of your research
- What will occur as a result of your project? Any govt. policies made / farmers, industries, govt. sectors and other stakeholders are benefitted from your research.
- How might the results contribute to the solution of social, economic, or other types of problems? Any societal missions – water, air , food
- What will be improved or changed as a result of the proposed research?



The outcomes of the proposed study are as follows:

- Utilization of sericin for producing novel edible coating material for fruits and vegetables
- The developed coating material will aid in postharvest treatment and storage of fruits and vegetables by providing antioxidant and antimicrobial properties
- The functional properties of the produced edible film will reduce the water vapor permeability and enhance film transparency
- The envisioned coating approach is simple, non-toxic and non-laborious
- The composition of the edible coating material will be from sustainable, waste and cheaper resources. This makes the process inexpensive and scalable



Common Errors

- Does not fit agency's mission
- Beyond capabilities of PI, students, or institution (don't propose too much)
- Lack of proofing: Grammar, spelling, formulas, numbering, math errors
- Missing pages, figures, tables, or signatures
- Unfocused, poorly organized
- Low personnel budget – Not enough people
- Low impact – no publishable results even if funding is obtained





Do's

- Innovative
- Relevant
- Proposal demonstrates expertise on the issue
- Feasible
- Show enthusiasm in your writing
- Simple, straightforward language
- Research based





Don'ts

- Not being in alignment with the funding agency's – objective, cost, duration
- Being too ambitious in your projects
- Using generalities
- Assuming a linear reading
- Assuming readers know your capabilities
- Hiding costs
- Sending the proposal in at the last minute
- Failing to revise and resubmit the proposal





THANK YOU

Further Details Please Contact

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