భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

1. **Title of the Project** –

    Procurement of new machinery and upgradation/ repair of existing machinery of the Central Workshop, IITH

2. **PI details with Dept and Designation** –

    Dr Karri Badarinath
    Associate Professor, MAE Dept.
    Faculty-in-Charge (Central Workshop)

3. **Origin /Background Problem** –

    Central Workshop (CWS) of IITH is a common facility created for imparting practical training to B.Tech students and for providing fabrication assistance for Research & Development works undertaken by the Institute. The facility was set up in 2009 in ODF, Medak and is presently located in an industrial model shed. The workshop hosts various heavy machinery like the 5 axis and 3 axis Vertical Milling Center, CNC lathe, heavy duty lathe etc., To keep up with the modern trends in manufacturing, to fill up identified gaps in conventional manufacturing requirements and to maintain efficient performance of existing machinery, there is a need for procurement of new machinery and for repair/upgradation of existing machinery as brought out subsequently.

4. **Aim and Objectives** –

    Procurement of following new machinery:-

Ser	Machine	Approx Cost, Rs	Justification
1	Precision lathe Make Geedee Weiler	11 lakhs	The light duty lathes are not suitable for precision works due to their reduced accuracy and non-sturdy construction.
2	Laser welding machine	22 lakhs	Presently, the department does not have a laser beam welding machine and hence unable to undertake welding of very thin work pieces. Post installation of the LBW machine, the central workshop would be able to undertake larger range of welding works which is presently not feasible.
3	Electric slip roll machine (sheet bending machine)	6 lakh	Presently, there is no facility for bending of metal sheets. Proposed electrical bending machine would enable bending of metallic sheets up to 3.5mm thickness.
4	Spot welding machine	1 lakh	Presently, there is no facility for spot welding of metals.
5	EDM Wire cut machine	50 lakhs	The proposed machine would enable precision machining of metallic components, especially internal shapes.

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(b)   Repairs of following existing machinery:-

Ser	Machine	Approx Cost, Rs	Remarks
1	5 Axis machine	16 lakhs	The machine has completed 10 years of service life. Presently, the spindle is due for maintenance as the machine has high run out.
2	Anil lathes (15 nos)	5 lakhs	The lathes have completed more than 12 years of service life. They are due for major maintenance including renewal of some parts like chucks & repairs to gearbox.

(c)   Upgradation of following existing machinery:-

Ser	Machine	Approx Cost, Rs	Remarks
1	Procurement of magnetic table for Vertical Machining Center	3 lakhs	The proposed magnetic table would enable machining of then magnetic materials as well as avoid the need for clamping for complex shapes thereby increasing versatility & productivity of the VMC

5.   **Current Status of your work (including TRL)** – not applicable.

6.   **Proposed Work** – The funder may choose to support any one or more of the items listed

in S.No.4.

7.   **Thematic areas covered under SDGs** *(Please mention SDGs separated by comma)*

SDG 4 - Quality Education, SGD 9 - Industry, Innovation and Infrastructure, SGD 12 - Responsible Consumption and Production,

8.   **Budget Details (***Please do not include any overheads. Overheads will be added as per institute CSR norms. Bifurcations within the budget may be provided. However, this can also be provided later. Please include the year wise budget with a max of 3 years.*

The sponsoring industry may choose to support any of the initiatives listed at para 3 above. The budget is indicated above and timelines would depend on the chosen initiative.

9.   **Social Impact (*Qualitative and Quantitative*)** -

Students and faculty undertaking research work will be the immediate beneficiaries. The society at large and industry will be the ultimate beneficiaries as the research work results in products which are consumed by the society or by the industry, thereby leading to betterment of the society. The country will also benefit from the early exposure of the engineers to the latest machining technology.   As the facility can be used for imparting training to external candidates also, the same will benefit the industrial units in Hyderabad.

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1. **Title of the Project** –

   Augmentation of infrastructure at the Central Workshop, IITH

2. **PI details with Dept and Designation** –

   Dr Karri Badarinath
   Associate Professor, MAE Dept.
   Faculty-in-Charge (Central Workshop)

3. **Origin /Background Problem** –

   Central Workshop (CWS) of IITH is a common facility created for imparting practical training to B.Tech students and for providing fabrication assistance for Research & Development works undertaken by the Institute. The facility was set up in 2009 in ODF, Medak and is presently located in an industrial model shed. The workshop hosts various heavy machinery like the 5 axis and 3 axis Vertical Milling Center, CNC lathe, heavy duty lathe etc., The existing area of the CWS is approximately 10000 sqft, which is considered to be inadequate for meeting the envisaged future augmentation of facilities at CWS. Further, the existing layout does not cater for any space for movement of vehicles/ cranes etc., which is necessary in order to install new machinery or to remove old machinery

4. **Aim and Objectives** –

   It is proposed to optimize the layout of the Central workshop with an aim to create more space for machinery and proper demarcation of the workshop into training and production floors. Towards this, there is a need to provide a mezzanine floor in the CWS for shifting of office and light machinery to the first floor and create additional space for augmentation of space available for machinery. In order to optimally utilize the space thus created, certain light machinery needs to be relocated within the CWS so that the heavy machinery being proposed for induction can be set up in that space. The augmentation proposal involves the following works:-

   (a)   Provision of mezzanine floor in the existing workshop building.

   (b)   Re-arrangement of the existing shop floor layout.

   (c)   Creation of new carpentry shop and paint booth.

5. **Current Status of your work (including TRL)** – Not applicable

6. **Proposed Work** – see 4 above.

7. **Thematic areas covered under SDGs** *(Please mention SDGs separated by comma)*

SDG 4 - Quality Education, SGD 9 - Industry, Innovation and Infrastructure,

8. **Budget Details** (*Please do not include any overheads. Overheads will be added as per institute CSR norms. Bifurcations within the budget may be provided. However, this can also be provided later. Please include the year wise budget with a max of 3 years.*

The proposed work is likely to cost approximately Rs. 75 lakhs. Detailed estimates are being worked out by the CMD department of IITH. The work is likely to be completed within a span of 03 months.

9. **Social Impact (*Qualitative and Quantitative*)** -

Students and faculty undertaking research work will be the immediate beneficiaries. The society at large and industry will be the ultimate beneficiaries as the research work results in products which are consumed by the society or by the industry, thereby leading to betterment of the society. The country will also benefit from the early exposure of the engineers to the latest machining technology. As the facility can be used for imparting training to external candidates also, the same will benefit the industrial units in Hyderabad.

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1. **Title of the Project** – Development of experimental lab for the M. Tech on "Quantum and Solid State Devices"

2. **PI details with Dept and Designation** – S. Narayana Jammalamadaka, Associate Professor, J Mohanty Associate Professor and S. S. K. Raavi, Associate Professor

3. **Origin /Background Problem** –

Devices which work based on quantum mechanical principles would be of great interest in future technological devices such as communications, spintronics, optoelectronics, semiconducting devices, nanoelectronics and biosciences respectively. On the other hand, a worldwide race to harness the power of quantum correlation is underway to build powerful quantum computers for encrypted communications certified by quantum theory. Undoubtedly there is a huge demand for trained professionals who can develop future quantum devices. Essentially, quantum technologies or devices work based on manipulation of individual particles and their linkages. Such devices utilize important quantum mechanical principles such as tunneling, confinement, superposition and entanglement respectively. Above ideas have been implemented in many technological devices as mentioned above. However, the realization and understanding above principles of aforesaid devices at the teaching level is elusive as the instrumentation pertinent to them is too expensive. However, the quantum initiative by the Govt. of India ignited a momentum, which requires tremendous manpower who can develop future quantum technologies in India. It is in this context, we started a new M. Tech program on "Quantum and solid state devices" at Department of Physics, IIT Hyderabad with specific aims to (a) train professionals for future quantum & solid state technologies (b) fill the gap between theory and experiment that may cater

to state-of-the-art technologies (c) provide hands-on experience in terms of experiments and simulations related to quantum and solid state devices. Through our program, students across the country will be able to get hands-on experience in developing devices, optical instrumentation for quantum optics, quantum communication protocols, computational simulations related with quantum devices, quantum algorithms, physical principles behind various quantum devices etc. In order to make it practical following experimental tools are mandatory which we would like to propose through this CSR project.

Budget

Equipment	Budget
Scanning tunneling microscope	1130000
Quantum eraser/Quantum cryptography analogy	610000
Characterization of Anisotropic magnetoresistance device	1500000
Single photon source and detector	2500000
	5790000

1. **Title of the Project** – Infrastructure Support for AI department

2. **PI details with Dept and Designation** – Dr. Maunendra Sankar Desarkar, Associate Professor, Head of the Department, AI department

3. **Origin /Background Problem, Aim and Objectives** –

The Department of Artificial Intelligence at IIT Hyderabad was established in 2019. IIT Hyderabad is the first institute in India, and third in the entire world to have a Department of AI. The department has BTech, MTech and PhD programs, and a total student strength of around 200, of which more than 50% of the students are from PG or PhD programs.

The department started as a virtual department, and was later converted to a physical department. The department has around 30 affiliated faculty members. There are three faculty members who are recruited directly to the department, and the remaining faculty members have primary affiliation with other departments at IIT Hyderabad, but are associated with the AI department as adjunct faculty members. The faculty members work in various cutting edge research problems spanning across fundamentals of AI to applied AI. The research flavor includes the areas of foundational aspects towards developing robust AI algorithms, Computer Vision, Natural Language Processing, Speech Processing, Robotics, Fairness in AI, Neuromorphic computing, to interdisciplinary approaches such as AI for IoT, Compilers, communication, autonomous navigation, agriculture, healthcare etc. The department runs multiple projects with funding from Government sources such as DST, SERB, MEITY, DRDO, as well as leading industries such as Google, Microsoft, Adobe, Honeywell, Sony, Qualcomm, Accenture etc. The faculty members regularly publish their research work in highly reputed conferences and journals such as AAAI, ICML, NeurIPS, AISTATS, CVPR, WACV, BMVC, ECCV, UAI, IJCNN, ACL, NAACL, IEEE Transactions on Artificial Intelligence, IEEE Transactions on Image Processing, IEEE Transactions on Green Communications and Networking, IEEE Transactions on Computational Social Systems, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Signal Processing, IEEE Transactions on Information Theory etc.

The department is planning to expand its infrastructure to increase the research support it can provide to the students, and also ways which may enable it to strengthen its collaborations with different external agencies in terms of sponsored research and consultancy. The department is looking forward to having its own building, having a large data center of its own. This proposal is to request grants from willing donors for these developments, which are more towards non-recurring expenditure to support the department's infrastructure. The department looks to generate a fund amounting to approx 25 crores for the above purpose, from donors, and philanthropists who can be individuals or organizations.

4. Current Status of your work (including TRL) –

Not applicable directly, as the request is for infrastructure support. Several works carried out by the department faculty members have been (a) published, (b) patented, and/or (c) delivered as technology products.

5. Proposed Work –

Faculty members from the AI department work on various problems related to foundational as well as applied AI. The foundational problems include working with limited labeled data, designing fair and bias-free AI algorithms, developing resource-efficient AI solutions, handling multimodality etc. In terms of applied work, multiple areas such as agriculture, mobility, healthcare, education, defense, disaster management etc. are targeted. We plan to continue working in these areas. We hope the help in infrastructure expansion will enable us to accommodate more researchers to work on these problems, and also provide necessary compute facilities so that better models can be developed, benchmarked and demonstrated.

6. **Thematic areas covered under SDGs** *(Please mention SDGs separated by comma)* –
Not applicable, as the request is for infrastructure support.

7. **Budget Details (***Please do not include any overheads. Overheads will be added as per institute CSR norms. Bifurcations within the budget may be provided. However, this can also be provided later. Please include the year wise budget with a max of 3 years.*

We expect to pool together and generate a fund of approx. 25 crores for the construction of a separate building for the AI department, and also to develop a large data center that will be dedicated to AI-related research at IIT Hyderabad. The construction and expansion will be a continuous activity spread over multiple years, and hence year-wise budget is not reported.

8. **Social Impact (***Qualitative and Quantitative***)** – The infrastructure support is expected to strengthen the AI department. Better infrastructure will attract better faculty candidates, will help to accommodate more researchers, and to undertake a large number of socially relevant research problems. The support will contribute significantly not only to the growth of the department but also to the growth of the country through its impact on the lives of people in various ways.

1. **Title of the Project** – Setting up a Light Microscopy Undergraduate Learning Centre at IITH

2. **PI details with Dept and Designation** – Dr. Mahesh Ganesan, Assistant Professor, Department of Chemical Engineering

3. **Origin and Proposed Work** – The proposal seeks to setup a centrally accessible research grade fluorescence microscope, with particular focus on training undergraduate students and for conducting educational outreach activities, with committed maintenance by the PI and their group. The infrastructure will give undergraduate students an early hands-on exposure to research level microscopy techniques which will give them an advantageous jump-start to join the advanced research groups of other faculties in the institute or enable them to be competent personnel for materials industries across the country. Setting up this Light Microscopy Undergraduate Learning Centre at IIT Hyderabad (IITH) is opportune because, IITH has a strong teaching and research competency in the field of soft matter, with expertise in corroborating microscopy derived microstructural information to macroscopic material properties. Certain materials that are unique to IITH are particulate matter, functional fibres, adhesives, polymer-based products, biological soft matter and pharmaceuticals. The Soft Matter Group in Chemical Engineering and the cross-disciplinary Soft and Active Matter Group are examples of ongoing collaborative efforts in this space. A key research technique used in soft material studies and product development is fluorescence microscopy which can provide rich information on microstructure and microdynamics in these complex materials. The information gained from a microscope can be directly correlated with macroscopic functional properties such as viscosity, texture, appearance, growth, and colour. The proposed microscope will be organized such that it provides the young undergraduate students, across departments, an opportunity to learn and explore the research opportunities in the field of soft matter involving microscopy-based analysis. The PI will organize periodic training workshops inviting other expert faculty in the institute on essential topics related to microscope operation, techniques for high quality image acquisition and methods of image

post-processing and image analysis. Additionally, the microscope will also be accessible for PG, PhD and project students in the institute for use in basic scientific research, applied research, industrial consultancy projects as well as be uniquely positioned to offer scientific and educational outreach programs. Towards the latter point, the PI has strong expertise in the physics of light scattering, optics and microscopy which will be utilized in organizing outreach activities and workshops on fundamentals and applications of microscopy for high schools and industry professionals.

4. **Thematic areas covered under SDGs** – The proposal covers UN SDG #4 – Quality Education.

5. **Budget Details (***Please do not include any overheads. Overheads will be added as per institute CSR norms. Bifurcations within the budget may be provided. However, this can also be provided later. Please include the year wise budget with a max of 3 years.***

The proposal seeks to set up a Nikon Eclipse Ti2-E Inverted Microscope as the key infrastructure in the proposed learning center. The cost of the equipment, along with basic accessories and software is**: Rs 25,00,000**

6. **Social Impact (*Qualitative and Quantitative*)** – The proposal broadly aligns with the National Educational Policy 2020 of the Government of India focussing on equitable, hands-on and active learning modalities for high school and college students. Indeed, one of the key objectives in setting up the Light Microscopy Undergraduate Learning Centre is to enable it for scientific and educational outreach activities. The impact of this infrastructure will be the dissemination of knowledge and hands- on know-how to people from high-school, junior colleges, post-graduates to industry professionals on how microscopes and image analysis techniques related to it can be utilized for a variety of research, therapeutic and product development applications.

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1. **Title of the Project** – Hybrid Classroom - A step towards Global Outreach

2. **Coordinator of the Project with Designation** – Prof. Mudrika Khandelwal, Dean Alumni and Corporate Relations.

3. **Origin /Background Problem** – Adversarial learning environment for offline students, travelling expenses, Fixed Schedule, lack of advanced technology, limited choices of courses.

4. **Objective of Project** – IIT Hyderabad is planning to equip its class rooms with facilities and display panels enabling interactive display. This will enable digital transformation in teaching at the institute. It will benefit learners by providing interactive learning access across the globe and good quality teaching. IITH would be the first to open all its courses for the benefit of students worldwide and to increase students' employability.

5. **Executive Summary of Proposal/Current Status** – IITH has a total number of 54 classrooms from which 15 classrooms are enabled to Hybrid Classroom with the help of generous funding by the donors and remaining 39 needs to be transformed.

6. **Proposed Work** – To concur with the literature advocating for HYBRID CLASSROOM which is described as "the convergence of traditional face-to-face meetings with online instructional methods to provide course content flexibility and customization of classes" Amount required for 1 classroom is INR 5.5 Lac and the endowment amount for the maintenance of the classroom is INR 5 Lac

7. *Thematic areas covered under* SDGs *(Please mention SDGs separated by comma)* –
   i. SDG 4 – Quality Education
   ii. SDG 9 – Industry, Innovation & Infrastructure

8. **Budget Details (*Detailed Funding Break-Up with 5% Overhead*) in the format below-**

No. of Classrooms	Budget (in INR)	Year 1	Year 2	Year 3
For 1 Classroom	Rs. 11,00,000/-	Rs. 11,00,000/-	0	0
For 39 Classrooms	Rs. 4,29,00,000/-	Rs. 4,29,00,000/-		

9. **Social Impact (Qualitative and Quantitative)** –
   i. *Qualitative Impact* - IITs owe responsibility towards social upliftment inclusively and this is certainly one way ahead.
   ii. *Quantitative Impact* – Large number of students outside IITH will benefit with the implementation of Hybrid Classroom.

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Proposal for Knowledge Resource Centre (KRC) - IT Infrastructure components

Recording and Editing Studio

About this facility:

The recording and editing studio is intended to serve the IIT Hyderabad community to record and disseminate videos, tutorials, interviews and other audio-visual media to further enhance the role of IIT Hyderabad as a pioneer in integrating new technologies for disseminating scientific and engineering knowledge to the Indian community. This would be a strong platform for the motto of IITH - Innovating and Inventing in Technology- that it stands for. This facility, open to all the community, would enable a single point solution for recording and editing of high-quality media.

Purpose:

- To enable the recording and editing of various types of audio-visual media to enhance the dissemination of knowledge.
- To be used for recording interviews of eminent personalities
- To be used for recording IITH videos (by faculty, staff and students) required for purposes
- To record online lectures (e.g. for NPTEL and other platforms)
- To be available for use for teaching activities for various interested departments

Target Users: IITH fraternity (faculty, staff and students) can access and utilize this facility.

IT and Furniture requirements:

| Area / Location	Measurement (L x B)	Infrastructure Requirements	Qty	Existing Available	Newly Required
Library (1st floor – Group study room 101)	4.2 m x 6.9 m	Recording equipment ● High quality video camera and accessories ● Audio recording facility ● Furniture (tables and chairs) required for conducting the interviews/sessions ● Acoustic shielding of the room for sound proofing ● Computer (two) and associated recording equipment	1	No	Yes (20 Lakhs)
		Video editing equipment ● Two high end computers with sound system for editing videos (along with necessary accessories) ● Software for editing videos (e.g. Adobe Premiere Pro etc.) ● Furniture for working and to house the computers ● Cloud storage for easy transfer of data?	1	No	Yes (20 Lakhs)
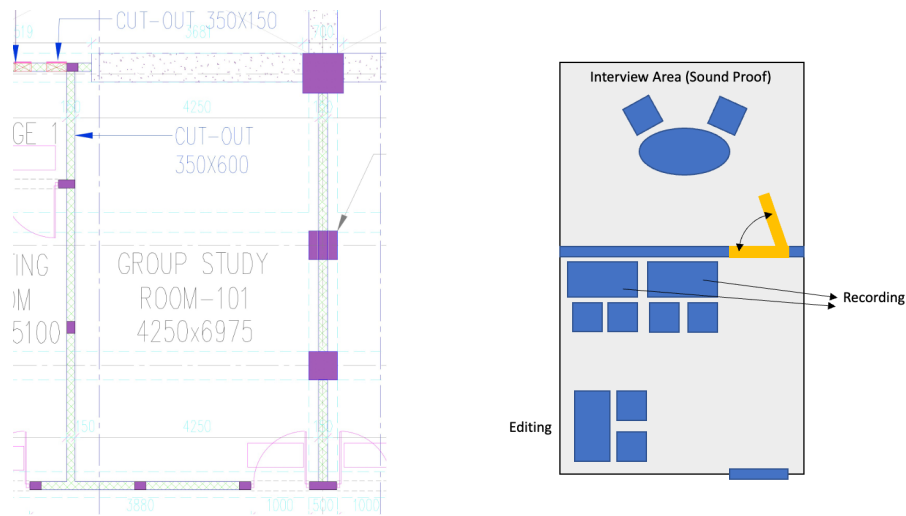
Figure. Recording and editing studio. (Left) Layout of the room proposed for housing the recording & editing studio. (Right) Proposed layout of the recording studio and editing room.

Further references:

- https://lightchildmedia.com/the-benefits-of-a-recording-studio/
- https://www.epiphan.com/blog/lecture-recording-studio/

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1. **Title**: Establishing a World-Class Medical Institute at IIT Hyderabad for Innovations in Healthcare and Research

2. **Coordinator of the Project with Designation** Prof. Renu John, Professor, Department of Biomedical Engineering Email: renujohn@bme.iith.ac.in Phone: +91-8985156631

3. **Background Work**: IIT Hyderabad has a strong track record and infrastructure in MedTech Innovation, delivering world-class programs in Medical Technologies across various engineering and science departments. With a focus on medical devices, advanced diagnostics, biotechnology, bioinformatics, and regenerative medicine, IIT Hyderabad has been working closely with leading medical institutes to translate cutting-edge research into practical applications. The Institute has a dedicated Business Incubator, the Center for Healthcare Entrepreneurship (CfHE), which has supported numerous startups in the medical technology sector.

4. **Aims & Objectives:** The primary aim of establishing a Medical Institute at IIT Hyderabad is to create a paradigm shift in medical education, research, healthcare delivery, and medtech innovations. The objectives include:

   - Foster innovations in medical devices, advanced diagnostics, and imaging.

   - Harness the potential of artificial intelligence and deep learning in augmenting medical diagnostics and therapy.
   - Advance biotechnology and bioinformatics for understanding disease states, drug discovery, and development.
   - Conduct research in genetics and genomics for improved disease treatments.
   - Develop novel materials for biomedical applications.
   - Collaborate with leading medical institutes for full-fledged clinical trials.
   - Utilize advanced computation for drug discovery and in silico modeling of the human body.

5. **Current Status of Work:** IIT Hyderabad has a team of over 40 faculties and has secured grants amounting to 100 Crs from various sources, including the Government of India and the Japanese International Cooperation Agency (JICA). The Institute has robust research infrastructure in diagnostics, medical devices, neuroscience, neurotechnology, biomaterials, and regenerative medicine. The CfHE has supported around 25 startups in the medical technology sector, attracting funding from organizations such as the Bill and Melinda Gates Foundation.

6. **Proposed Work:** The proposed work includes strengthening the infrastructure and capabilities of IIT Hyderabad in medical education and research. This involves furthering innovations in medical devices, advanced diagnostics, artificial intelligence algorithms, biotechnology, bioinformatics, genetics and genomics, novel materials, clinical trials, and advanced computation. Collaborations with medical institutes and hospitals will be expanded to facilitate the translation of technologies from lab benches to bedside applications.

7. **Thematic Areas Covered under SDGs:**
   Good Health and Well-being (SDG 3)
   Industry, Innovation, and Infrastructure (SDG 9)
   Sustainable Cities and Communities (SDG 11)
   Partnerships for the Goals (SDG 17)

8. **Budget Details:**

9. **Social Impact (Qualitative and Quantitative):** The establishment of a world-class Medical Institute at IIT Hyderabad will have significant social impact, both qualitative and quantitative. Qualitatively, it will contribute to the advancement of healthcare delivery, medical education, and research in the region. It will enhance the availability of accessible, affordable, and high-quality healthcare to the local community, fulfilling the motto of universal healthcare. Quantitatively, the institute aims to:

Increase the number of cutting-edge medical technologies developed and implemented. Improve diagnostic accuracy and efficiency, leading to early