



**Indian Institute of Technology Kharagpur (IIT Kharagpur)**

## About IIT KGP and the CSR opportunities

The objectives of Indian Institute of Technology Kharagpur (IIT Kharagpur), located in the District of West Midnapore in the State of West Bengal, India, include:

- To provide broad based education where students are urged to develop their professional skills.
- To draw the best expertise in science, technology, management and law to impart overall training to students.
- To incubate a spirit of entrepreneurship and innovation in students.
- To undertake world class research in areas of national and global importance.
- To provide technical services and support to industry, government and society in relevant areas.

IIT Kharagpur, the largest and oldest IIT, is a confluence of world class multidisciplinary courses, giving global exposure in academics and research, scope in entrepreneurship and best placement. The institute has 19 Departments, 12 Schools and 8 Centres of Excellence. Additionally there are more than 25 R&D units. Academic programs are offered are B.Tech.(15), B.Arch, Dual Degree(35), MBA, MHRM, LLB, MMST, M.Sc/ M.Tech/ MCP/ MS (68), PhD in 6 broad disciplines: (1) Engineering, (2) Basic Sciences, (3) Life Sciences, (4) Social Sciences & Humanities, (5) Law and (6) Entrepreneurship.

IIT Kharagpur promotes co-curricular and multidisciplinary programs through innovative research projects. This inculcates among the students research competence and industry-worthiness through sponsored research

- Student Driven Programmes - SAE Formula Car, Boeing Aircraft Design, Robosoccer, Humanoid, Swarm Robotics, Quadrotor Aerial Vehicle, Autonomous Ground Vehicle, Autonomous Underwater Vehicle
- Students' E-Cell: Workshops, Competitions
- Technology Transfer Group: IndAC, Tech Transfer, TEDx

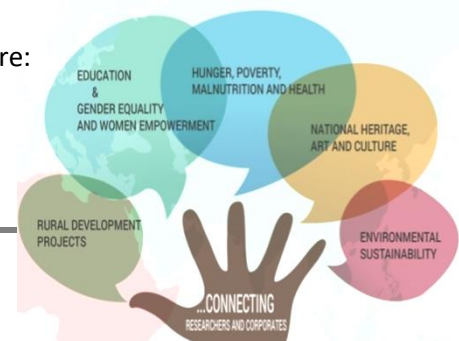
Students and faculty are actively involved in social activities through National Service Scheme (NSS)

- More than 1000 under-graduate students and 16 faculty members and officers donate ~5 lakh man-hour every semester in developmental initiatives in 25 villages and low-income urban neighborhoods around IIT Kharagpur



The broad areas in which majority of our CSR Projects aligned are:

1. Hunger, Poverty, Malnutrition and Health
2. Education
3. Rural Development Projects



4. Gender Equality and Women Empowerment
5. Environmental Sustainability
6. National Heritage, Art and Culture

Our major activities in societal development projects are through our mega projects, centers and deployable individual projects.

#### **Mega Projects:**

- Scientific Approach to Networking and Designing of Heritage Interfaces (<http://www.iitkgpsandhi.org>)
- Signals and Systems for Life Science (<http://signalsystemsforlifescience.in>)
- Sustainable Food Security through Technological Interventions for Production, Processing and Logistics (<http://sustainablefoodsecurity.in>)
- Future of Cities : Enhancing Urban Life in India (<http://www.facweb.iitkgp.ernet.in/~foc/>)

#### **Centers in IIT Kharagpur for Socially Relevant Initiatives:**

- Rural Development Centre  
(Head Prof. Virendra Kumar Tewari)

The centre has a strong foot in the rural Indian perspective covering district-based regional development schemes in many areas like Intensive Crop Farming, Forestry, Horticulture, NTFP-based crafts, Women and Child Welfare programmes etc.

- Design and Innovation Centre for Rural Technology  
(Principal Investigator, Prof. P.B.S. Bhadoria)

The objective is to upgrade and transfer rural technology through NGOs. The group has 40 NGOS covering Eastern India

Sponsor: PSA, Gol

- School of Medical Science and Technology  
(Head: Prof. Suman Chakraborty)

It is a platform for interdisciplinary teaching and research in the field of Medical Science & Technology, which can lead to a better integrated healthcare delivery system.

For more information, visit: <http://www.smstweb.iitkgp.ernet.in/>

- Unnat Bharat Cell

Unnat Bharat Cell has been set up as a part of Govt. of India's Unnat Bharat Abhiyan, with a view to bring about transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India. The Cell is a consortium of

- National Service Scheme (NSS) unit,
- Rural Technology Action Group (RuTAG),
- Rural Development Centre (RDC),
- School of Medical Science and Technology (SMST),
- Advanced Technology Development Centre (ATDC), and
- Department of Agriculture and Food Engineering (AGFE) members.

- Ongoing activities under National Service Scheme (NSS)  
(Program Coordinator: Prof. Debasis Roy)

- Income generation
- Vocational training (funded by Society for Self Employment of Unemployed Youth, Kolkata)
- Twelve 144-hour courses on tailoring, mobile phone repair, plumbing, electrical wiring, electrical appliances repair and maintenance, 2- 3- wheeler repair and maintenance
- 30-35 trainees per course
- Development work at public facilities by the trainees
- Nutritional intervention at schools
- Pilot at Malma: 95 kids, 5-12 y; eggs and fruits provided as midday meal supplement over 3 months; malnutrition reduced from ~80 % to ~50 %
- Follow-up: solya cultivation at three primary schools for sustained improvement of children’s nutrition
- Infrastructure
- Road building at Balarampur (2.5 km), Malma (1 km) and Bolla (1 km)

- Agriculture and Food Engineering (AGFE)  
(Head of the Department: Prof. Virendra Kumar Tewari)

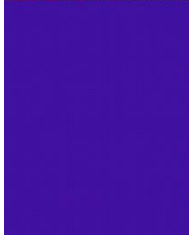
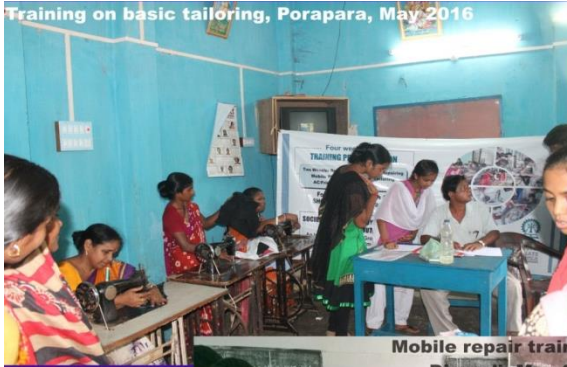
The department is unique among the IITs and carries extensive research and training activities in various areas of socio-economical relevance.

One of the projects that have been widely appreciated is “Formulation and Pilot Scale Unit for Production of Therapeutic Food in Ready-to-Eat Form (TF-RTE) for Management of SAM Children”  
By Professor H N Mishra, Department of Biotechnology

For more information, visit : <http://www.agri.iitkgp.ernet.in/>



**GLIMPSES OF ACTIVITIES UNDER THESE PROJECTS**



**Various Skill Development Programmes**



**Puffed rice making**



**Puffed rice making**



**Treatment of pond with clay**



**Biodiesel production from non-edible oils**



**Improved device for wet soil preparation**



**Mechanized production of Indian milk sweets**

**IIT Kharagpur has recently ventured into aligning with corporates for CSR funding. Some of the corporate CSR initiatives are :**

- Community Participation Model for Economic Development and Nutritional Health Management Through Organic-farming And Education (Sponsored By Eastern Coalfields Limited, CIL Executed by: Prof. Khanindra Pathak, Prof. Analava Mitra et al)
- Medical Imaging Informatics for Skin Wound and Malaria Screening (Coordinating Organisation: Charities Aid Foundation, India. Donor Organisation: Microsoft India Development Center Executed by: Prof. Chandan Chakraborty)
- Tracking the antiquity and climate during Bronze age Harappan/Indus Valley Civilisation (IVC) in India using isotope and latest chronological techniques (Sponsored By: Infosys Foundation, Initiated by: Prof. Anindya Sarkar)
- Top International Conferences travel (preferably for women) under CSR Initiative of Infosys Foundation.
- Balmer Lawrie Scholarship under CSR Initiative of Balmer Lawrie & Co. Ltd. Kolkata for SC/ST /PC students.

### CCC Project Proposal -9

1. **Area:** National Heritage, Art and Culture
2. **Name of the Project:** *Automated Analysis of Indian Classical Dance*

3. **Project Brief:**

Dance is multimedia in nature. It is a combination of visual (dance posture and movements, expression), auditory (music, tempo, rhythm, intonation) and textual (lyric of the song) information. While there are several dance forms across the world, Indian Classical Dance (ICD) holds a unique place for its deep heritage dating back over centuries, multitude of variants (eight forms are widely practiced now), complex structure of formulation, strict regimentation and unique tutelage traditions.

ICD is a complex combination of body movements, facial expressions, hand gestures, music and song. Hence, analysis and interpretation of the complex sequence from multi-modal information is a challenging task. No significant work has been attempted to address ICD from such multiple facets. We see a huge opportunity in this and attempt to explore some of these issues in ICD.

We are using / plan to use different sets of sensors/ data including RGB video, 3D motion capture data from inertial sensors, marker based tracking, RGB-D camera tracking and multiple camera tracking. We have selected Bharatanatyam for its geometric dominance in choreographic forms and are already collaborating with dance experts from Kalakhsetra, Chennai, India; movement analysts from Dancing for the Gods, New York, USA; and multi-modal signal processing research group from Telecom Paristech, France.

Potential applications of this research would include:

- Dance tutoring systems for evaluation and self-learning
  - Dance transcription and documentation for Preservation of cultural heritage
  - Synthesis and animation of dance avatars
  - Interpretation of ICD in the context of society and culture.
4. **Total Fund Requirement: INR 1.5 cr.** INR 1 cr. will be used in phases to set up dance research studio including inertial and other sensors and synchronizers. INR 0.5 cr will be used for human resources (research staffs, dance experts), travel etc.
  5. **Time for completion:** 3years
  6. **Professor(s) In-Charge:** Dr. Partha Pratim Das,  
Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE)  
& Department of Computer Science and Engineering



### CCC Project Proposal -11

1. **Area:** National Heritage, Art and Culture
2. **Name of the Project:** *Protection of Art through Intellectual Property Regime*
3. **Project Brief:**

Setting-up of a big industry causes large-scale displacement of people of a region. The displacement of people does not only disturb the livelihood but also rob away art and culture of local population. Intellectual Property regime, in particular Geographical Indication offers a solution of protection of art and culture of the displaced people, mostly tribal or indigenous people residing in that region. Generally, it has been observed that large-scale industries, such as mining industry, set-up in tribal populated region, which adversely affect age-old tradition, knowledge and art significant for carrying on trade or occupation by them. Through CSR measure, the industry may facilitate the identification of art satisfying the condition laid down under the Geographical Indication Act, 1999 and help them in drawing financial benefit from registration of their art under the Act. Further, the engagement with tribal or indigenous people will contribute in strengthening economic condition by commercialization of the art. The industry-population collaborative approach under CSR umbrella will establish well-entrenched micro-economic model for sustainable and dignified life for tribal or indigenous people. For the study, the industries such as mining, steel, fertilizer of eastern region may be identified, particularly established in tribal areas.
4. **Total Fund Requirement: INR 20 Lacs**  
(Manpower: 12 Lacs; Awareness Workshop: 3 Lacs; Registration: 3 Lacs; Contingency: 2 Lacs)
5. **Time for completion:** 3years
6. **Professor(s) In-Charge:** T K Bandyopadhyay and Uday Shankar

### CCC Project Proposal 26

1. **Area:** National Heritage, Art and Culture
2. **Name of the Project:** Developing Sanskrit Computational Linguistic Tools for a Digital Library of Sanskrit with Advanced Processing and Reading of Sanskrit Text
3. **Project Brief:** The aim of the project is to develop advanced tools for Sanskrit text processing, display and search, which will be helpful to provide a robust environment for the users to study various genres of Sanskrit text. These tools will be used to build a well-organized web-service for reading Sanskrit text, offering a long-standing reliable system with sophisticated tools available for search and exploration. Emphasis will also be given to build tools to extract and integrate domain specific knowledge, available in various Sanskrit texts. The main objective of the project is twofold:
  - i). Enhancing the existing Sanskrit Computational Linguistics tools for text segmentation and dependency parsing to enable advanced processing of Sanskrit Text. These enhancements include using statistical methods to find the best solution from a set of many plausible solutions and enhancing the existing dependency parser with advanced relation analysis.
  - ii). Using semantic computation techniques to build a sophisticated distributed web-service, that will allow the users to search and explore the Sanskrit text corpus. Specifically, the new tools that will be developed during this project include:
    - Sanskrit Search Interface:** Real time search with advanced query options
    - Sanskrit Text summarizer:** Presenting various kinds of summaries from one or more Sanskrit texts on user demand
    - Finding Similar Texts:** Given a Sanskrit text by a user, this tool will use semantic similarity and topical categorization to find conceptually similar texts.
    - Linking to multi-lingual dictionaries:** Given a Sanskrit text, Sanskrit words will be linked to various Indian and European dictionaries.
4. **Total Fund Requirement:** INR 40 Lakh
5. **Time for Completion:** 3 years
6. **Professor(s) In-Charge:** Prof. Pawan Goyal, CSE

### CCC Project Proposal 30

1. **Area:** National Heritage, Art and Culture
2. **Name of the Project:** *Protection of Art through Intellectual Property Regime*
3. **Project Brief:** Setting-up of a big industry causes large-scale displacement of people of a region. The displacement of people does not only disturb the livelihood but also rob away art and culture of local population. Intellectual Property regime, in particular Geographical Indication offers a solution of protection of art and culture of the displaced people, mostly tribal or indigenous people residing in that region. Generally, it has been observed that large-scale industries, such as mining industry, set-up in tribal populated region, which adversely affect age-old tradition, knowledge and art significant for carrying on trade or occupation by them. Through CSR measure, the industry may facilitate the identification of art satisfying the condition laid down under the Geographical Indication Act, 1999 and help them in drawing financial benefit from registration of their art under the Act. Further, the engagement with tribal or indigenous people will contribute in strengthening economic condition by commercialization of the art. The industry-population collaborative approach under CSR umbrella will establish well-entrenched micro-economic model for sustainable and dignified life for tribal or indigenous people.  
For the study, the industries such as mining, steel, fertilizer of eastern region may be identified, particularly established in tribal areas.
4. **Total Fund Requirement:** INR 20 Lacs ( Manpower: 12 Lacs; Awareness Workshop: 3 Lacs; Registration: 3 Lacs; Contingency: 2 Lacs)
5. **Time for Completion:** 3 years
6. **Professor(s) In-Charge:** Prof. T K Bandyopadhyay, Uday Shankar and Arindam Basu

### CCC Project Proposal 36

1. **Area:** National Heritage, Art and Culture
2. **Name of the Project:** : Benchmark Data Set Creation and Annotation for Cultural Preservation of Bharatanatyam

3. **Project Brief:** Background:

Bharatanatyam, an ancient heritage of India, consists of visual (posture, movements, and expressions), auditory (music, tempo, rhythm, and intonation) and textual (lyric of the song) information that tell a story through body movements, hand gestures, vocal and instrumental music, facial expression or emotions, costume, and make-up.

Our objectives are to analyze various aspects of Bharatanatyam using Kinect and other sensors. This is useful to create dance tutoring systems, preserve cultural heritage by dance transcription, synthesize and create animated avatars, interpret the story of a recital, and more.

We focus on Adavu's in Bharatanatyam. Adavu's are basic units of composition and are used to teach the dance. An Adavu comprises an opening stance, followed by a combination of – Posture of Standing (Mandalam), Hand gestures (NrittaHastas), Walking movement (Chari), and Position of the legs (Sthanakam). All the four are performed in synchronization with rhythm or tala and are put together in a time sequence by means of rhythmic syllables called Sollukattu. There are 15 Adavu's with 58 variations. Each Adavu is performed with one of the 23 Sollukattu's.

**Benchmark Dataset and Annotation:**

While there has been quite some research on computer representation and analysis of Western dance forms like Ballet, Samba, Salsa – not much work has yet been done on Bharatanatyam.

For this a large volume of data needs to be recorded and annotated at the syllable / beat level (for audio) and frame level (for video) so that effective algorithms and applications can be developed by all using the same. There is no comprehensive annotated benchmark data set for Sollukattu's and Adavu's.

**Work Done:**

We have recorded two sets of audio and video using dancers from Natanam Kalakshetra Dance School, Kolkata, India.

Sollukattu's are recorded by Zoom H2n Portable Handy Recorder. For each of 23 Sollukattu's we have recorded 2 sets performed by 2 (1 female and 1 male) accomplices. One set has been annotated by experts by marking the onset of every beat and the accompanying bol.

Adavu's are captured by Microsoft Kinect 1.0 using nuiCapture software. Every recorded file comprises RGB, depth, skeleton, and audio streams. For each of 58 variants of 15 Adavu's, we have recorded over 20 sessions each as performed by 2 dancers (1 female and 1 male). Again one set has so far been annotated by experts at frame level.

**Proposed Activity:**

We intend to build a rich benchmark dataset and annotate the same for research. This involves:

1. Recording of 4 sets of 23 Sollukattu's
2. Recording of 4 sets of 58 variants of 15 Adavu's
3. Annotation of the existing data as well as the new recordings – audio as well video
4. Preparation of Benchmark, documentation and hosting

Note: Prof. Amita Dutta of Rabindra Bharati University will provide technical guidance in matters of recording and annotation.

The benchmark will be made open access and the CSR support of the company will be duly recognized in every document / site / dataset.

4. **Total Fund Requirement:** INR 29.8 lacs
5. **Time for Completion:** 2 years
6. **Professor(s) In-Charge:** Prof. Dr. Partha Pratim Das  
Professor, Department of Computer Science & Engineering,  
Head, Rajendra Mishra School of Engineering Entrepreneurship,  
Professor-in-Charge, IIT Kharagpur Research Park, Kolkata, and  
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### CCC Project Proposal 45

1. **Area:** National Heritage, Art and Culture
2. **Name of the Project:** : Connecting Past and Present for Future – Interpreting Heritage of a Place : The Campus at Indian Institute of Technology Kharagpur
3. **Project Brief:** The first Indian Institute of Technology was born in May 1950 in Hijli, Kharagpur, and a place which has multiple layers of history. Conceptualized in British India as a District Head Quarter, which never materialized, the place has passed through several phases - from being a Detention Camp to a WWII Military Base and finally the birthplace of IIT system in free India. Quite a few remnants from various periods including the initial days of IIT, still exist in the campus, conveying the untold saga . These are invaluable links to culture and heritage of this place – significant at both local and national levels.

#### **Objective**

1. To create a repository for heritage site data developed through laser scanning, digital modeling, and other state-of-the-art spatial technologies.
2. Designing and implementation of a Heritage Trail and Heritage Interpretation Center at IIT Kharagpur campus for enhanced visitors experience.
3. Carry out necessary repair/ up gradation the structures/sites.

#### **Interpretation strategy**

When organised in an accessible, methodical way, the visitor can readily engage with the places, their values and significance, providing context and insight. Children and youngsters may need an extra incentive like games, treasure hunt with help of audio visual and communication technology. Variety of ways through which the meanings of a site will be communicated to visitors:

- Guided historic walks/ trips on battery operated light vehicles/ self-guided tours-linking buildings/ artifacts and creating trails of heritage, linking significant events that happened on specific sites;
- Creating maps for specific historical periods based on archival materials and research ;
- Depicting change through dynamic models with laser technology, visualization of site's appearance through recreated image.
- On site interpretation through on site installations and display , interpretation panels, prerecorded audio aids/ self-explanatory print and electronic publications;
- Linking smart phone users directly to the videos / information ;
- Special illumination effect to highlight significance sites / building ;
- Public lectures, on-site and directly related off-site educational programmes, community activities.
- Short videos made by heritage groups about local historical sites and uploaded on to YouTube

4. **Total Fund Requirement:** INR 30 lacs
5. **Time for Completion:** 3 years
6. **Professor(s) In-Charge:** PI : Chairman, Nehru Museum of Science & Technology  
Co-PI : Prof. Sanghamitra Basu, Dept. of ARP

### CCC Project Proposal 46

1. **Area:** National Heritage, Art and Culture.
2. **Name of the Project:** 3D model reconstruction of national heritage buildings from uncalibrated aerial video data.
3. **Project Brief:** 3D models of national heritage buildings can facilitate their refurbishment and surveillance, creating 3D Google-maps alongwith their surroundings for simulated views from all orientations and recreations of them in reality and celluloid. The proposed project would collect streaming aerial video data from an uncalibrated (flying) drone camera from different views of the heritage building. First 2D High-definition (HD) views of the building would be developed by video-based super-resolution technique. Then 3D dimensions of individual faces of the building would be estimated in an object-centered-coordinate (OCC) system utilizing a novel directional template library (DTL) technique. For curved surfaces, appropriate parameters would be learned through generalized Hough transform. Finally 3D parameters from multiple views would be intelligently fused into single 3D model utilizing another novel machine learning tool, namely structure-modifiable adaptive reason-building temporal Bayesian graph (SmartBG). This probabilistic graphical model (PGM) would start from very few generic building-structure relations and grow in complexity based on quality of available data and requirement of finer details of the heritage building. Learned 3D model would be tested first with HD views developed earlier for closed-loop fine-tuning of the algorithms, and further validated with images of the heritage-building available in the internet from different tourists.
4. **Total Fund Requirement:** INR 26.80 lacs (breakup will be provided if requested)
5. **Time for Completion:** 3 years
6. **Professor(s) In-Charge:** Nirmalya Ghosh Assistant Professor,  
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*IIT KGP- Trendsetters in CSR*