



# वृत्तान्तसि

## A celebration of Creativity and Freedom

Launching of The Academy of Classical & Folk Arts at IIT Kharagpur



**Indian Institute of Technology Kharagpur**

The Science & Heritage Initiative

वाराणसी

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A celebration of Creativity  
and Freedom

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*It is probably true quite generally that in the history of human thinking the most fruitful developments frequently take place at those points where two different lines of thought meet.*

**– Werner Heisenberg**

# Preamble

The Department of Higher Education, Ministry of Human Resources Development, Government of India has steered a series of national and regional level workshops, for launching pilot projects, for creating centers of excellence based on a spirit of inter and intra-institutional convergence promoting research, development, innovation (RDI) initiatives. The idea is to pro-activate and augment a ‘people-centric’ course of India’s future growth plans, strategies and development programs based on clusters of projects to be executed by IITs and other allied institutes.

Addressing the aforesaid course, the Indian Institute of Technology Kharagpur has made a distinctive and forerunning headway for creating and initiating a cluster of projects under the ‘Science Heritage Interface’ scheme of Government of India. Other IITs and Institutes of national importance have also followed.

The present report is one of many to represent the progress. The report represents the effort to forward the vision of IIT Kharagpur, which will serve both as an umbrella to plan, design and activate a ‘people-centric’ ground reality for a cluster of projects. The vision is based on the

twin foundations of Indo-centric theme and an operational-cum-organizational structure of scientific exploration, at the same time. These projects represent inter and intra-institutional convergence of research, development, innovation (RDI) initiatives. The vision is called ‘SANDHI’. ‘SANDHI’ literally means convergence and confluence. ‘SandHI’ is also the platform of inter-disciplinary and inter-institutional assimilation. SandHI is the acronym of ‘Science-Heritage Initiative’.

Under ‘SANDHI’, there are four levels of activity: First, a deeper level of philosophical research based on scientific exploration; Secondly, an outward recovery of Indian heritage systems based on the epistemological domain of Indian science and technology driven traditions; thirdly, a re-positioning of traditional community planning and engineering systems based on the Indian ethos; leading to a fourth and demonstrative level, i.e., a pro-active resurrection of traditional knowledge systems of India based on creative economy regeneration and marketing in various corners of reality – concerning the people, their economy, their folk and the all-round livability of the surrounding they belong to.

## The background

To best address these levels, SandHI has three bandwidths of projects. First, it has a deeper level, where deep science and heritage interface based projects have been designed. Secondly, there are large scale Geo-exploratory and geo-technical riparian based paleo-hydrological investigations; epigraphic investigation and iconographic-archaeological interpretations; and contemporary application/ tourism revival based projects, which are also inclusive of a very Mega iconic project on 'Varanasi', the living and sustainable river-based urban habitat of India and the world for over 3500 years or more. Third and finally, SandHI has formulated a set of creative economic generation projects of which one is to re-explore the application and design of terracotta technology as a building material based on a pilot project in Kumartuli belt, Kolkata.

Variety and network of projects – exploration through cooperative inquiry Constituting Level one, which is an agglomeration of deep science and heritage interface based projects. These are:

- Two language based projects
- Two music projects and
- Two iconography-shape grammar driven heritage and historical exploration projects

The two language projects are for developing a scientific rationale of the huge and abstruse ambit of the Indo-European Language Systems (IELS) applying a range of approaches from computational linguistic algorithms (lab-tested) to cognitive geo-spatial and ethnographic pool-mapping

techniques (empirical-graphic) that are based on the trans-personal edifice of 'Hierarchy of needs'; and also a sonic (etymologic/ articulation based) matching innovations (fresh approach) technique using signal processing software applied on the basis of varnamala (the hierarchy of vowels and consonants based on the sonic etymologic of the word or the code that is soft (sabda) and its meaning or cognition/ recognition pattern/ the value or the hard worth (artha).

The two music projects aim at Decoding and Exploring Ancient Classification of Indian Classical Music through Machine Learning Methods and Audience Response. The first project looks at the decoding of Ancient Classifications of Indian Ragas and the second project aims at a deep evaluation of Audience Response to Indian Classical Music Classification.

The two iconographic projects are trying to establish a scientific correlation between 2-D footprints of the built environment (Architecture) based on a Ecologic-Climatic construct and anthropocentric patterns and establish a relationship with 3-D systems of iconographic patterns or 'footprints' called 'Mandala' as evident in designs of Temple, Sacred Precincts and General Settlement forms in Indian architecture and also in regions and countries beyond India.

The second Iconography driven project is attempting to establish linkages between iconographic re-interpretation of architecture and engineering patterns of Vedic and Buddhist periods based on:

1. Identification of underlying common patterns: built-forms; shape grammar; principles of design; styles and continuity embedded in the two layers
2. Earmarking a methodology to establish the continuity and re-interpretation of Indian history

**Additionally there are four other deep exploratory projects namely:**

1. The Effect of Meditation, Pranayam and Meditative Sounds on the Cognitive and Emotional Performance of Human Brain: a study using an integrated signal and image-based approach
2. Improving 'End-of-Life Care' (EoLC) for the Elderly by Integrating Indic Perspectives on Ageing and Dying called 'Vanaprastha/Sannyasamarga leading to 'Moksha'
3. Reconfiguring Dāna (Generosity) as a new Institutional Financial Mechanism for Social Enterprises based on Indic perspectives
4. Exploring historical Evidence, Myth and Geophysical Modelling to Assess the Tectonic Movement and Risks Associated with the Odisha Coastal 'Heritage' Belt

The interesting part is the relative association and convergence of various projects, like Language and Music – sharing a system of notations, syntax and grammar; Music and Meditation – converging to a common platform of therapeutic objective and cathartic healing; Iconography and Music – extracting common patterns of audience-response and audience-demand-systems and so on. To aim is to arrive at the spirit of grand thought, the grand convergence. This is SandHI.

The present report is an accumulation of wonderful work, exploration, studio, and ground level surveys over the years (Dec 2013 – March 2019) on a specific domain of SandHI, which is Project Varanasi. The accumulation has been presented as an Exhibition at a major event on February 06, 2019 at the India International Center, New Delhi in association with the Center of International Modern Art (CIMA), Kolkata and Ashoka University, New Delhi.

The exhibition also provided an occasion for launching of the Academy of the Classical and Folk Arts, IIT Kharagpur.

## A Scientific Study of the Deep Structure of Indian Ragas



### PROJECT LEADER

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## Learning Ragas



### INDIAN RAGA MUSIC IS NOT BOUND TO NOTATION

- The key is to learn the raga and render it in your own way
- The rendition is developed on stage – there is no pre-composed notation

### A RAGA IS NOT A COMPOSITION

- There can be many compositions in a raga
- If you know a raga you will be able to recognize compositions in that raga

### CURRENT PEDAGOGY

- Ragas are (primarily) learned through examples
  - Thereby, the system is biased by the stylistic aspects of the school of music (gharana)
- Inadequate understanding of the deep structure of ragas
  - Therefore students are unable to improvise / develop the raga in their own way

### DEFINING THE DEEP STRUCTURE OF RAGAS

- To develop a formal framework for defining the deep structure of ragas – *in collaboration with Computer Scientists for formalizing semi-lexical languages*
- To identify and archive the deep structure of many Indian ragas
  - This task needs deep understanding and years of experience

### FORMALIZING A MODERN PEDAGOGY OF INDIAN RAGA MUSIC

- The Shrutinandan style of training imbibes the understanding of deep structure of ragas
  - This has been yielding rich dividends and must be formally described so that others can adopt this pedagogy
  - Better understanding promotes innovation and inspires young minds

### CONNECTING THE RESEARCH WITH COGNITIVE INFLUENCES OF MUSIC

- The creative liberty of Indian Raga Music has deep cognitive implications, which has not yet been studied in depth

## Foundations of the Academy

### WHAT?

To revive, promote and sustain the deep foundations for the Classical and Folk Arts through the lens of THE SCIENCE and HERITAGE INITIATIVE (Acronym SandHI) of IIT Kharagpur

### HOW?

- By germinating the spirit of creativity in young minds through music and fine arts
- By exploring and linking the archaic foundations and contemporary ramification of various genres of Classical and Folk Arts
- *Through the innovative tools and techniques of Exploratory Science and by germinating the spirit of creativity in young minds through music and fine arts*
- Subsequently revert back the current pedagogy of Sciences and Technology in the IIT system to holism and synergy in research, development and application

### Whom?

- For nurturing a more accomplished and fulfilled generation of IITians in the years to come
- For creating a charter of innovation through a wider inclusion of practitioners, scholars and students
- For global dissemination of the scientific, cognitive, and creative principles behind Indian classical and folk arts

## Areas of Collaboration with Shrutinandan

### CREATION OF KNOWLEDGE AND ARCHIVING

- *Swaraparichay* and the science of listening
- Extended notation, including artifacts for meends and gamaks
- Deep structure of Indian Classical Ragas

### PEDAGOGY

- Exploring and linking the older and dying foundations (paramparas) – For example, the Thumri style
- The scientific rationale for the new pedagogy of Indian Classical Music
- Documenting Shrutinandan's pedagogy for Hindustani Classical Music

### DISSEMINATION

- Exploring technology driven avenues for dissemination of Indian Classical music on an international level

## Some Objective Goals

### Music Research Documentation and Archiving

- Utilize the rich and longstanding backdrop of Pandit Ajoy Chakraborty and his team's long years of performances and research as a single-point source of a) archiving; b) pedagogy for teaching young students; and c) Long-standing docs/ renditions under the NDL portal
- Develop a sustainable network of high-end resource persons/ talents/ artists/ musicians through SRUTINANDAN
- Develop a specific project (like the THUMRI work of Panditji) with some base funding from IIT Kharagpur and fund the new talents forwarded by SRUTINANDAN and reciprocally utilized by the academy as base-level faculty

### Deep Science and Musicology

- Projects on DEEP SCIENCE, say Cognitive layers of the Indian Music
- Supporting the sound engineering of musical instruments through the lens of modern manufacturing technology
- APPs, IoTs, Clouds on Innovative interventions in heritage sites and happiness ventures

### Music Research Documentation and Archiving

- **Film division:** Create film of various genres of Indian Classical music based on a SandHI style of exploration (lens of science)
- **Media division:** Develop in book or printed form
- **Photo division:** Explore an archive photographically
- **Electronic Media division:** Develop short performance boosting the morale of young artists





*Exhibition on*

# **Project Varanasi**

The Science & Heritage Initiative & Micro Projects, In Association With IIT (BHU), Varanasi & Jnana Pravaha (2013 - 2019)

*at*

## **INDIA INTERNATIONAL CENTER, NEW DELHI**

**February 06, 2019**





# Varanasi

*Its unfathomable genesis*



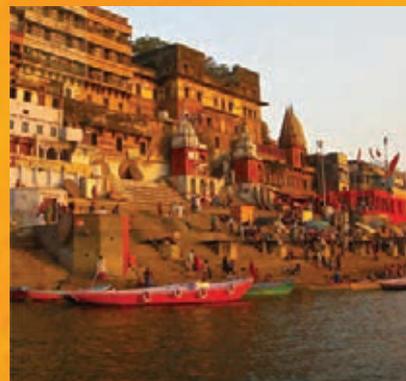
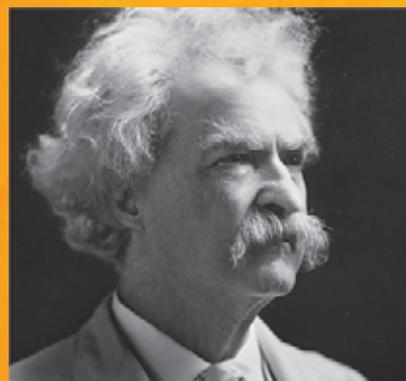
One of the oldest references of Kashi – ‘The city of eternal divine light’ emanates from the legacy of King-Sage Divodasa, whose pioneering lineage finds an exemplary mention in the Rig Veda where the City becomes a microcosm of all universal godheads (Viswadevas). From that time of remote antiquity, the line of kings which ruled Kashi and the Mauryan dynasty, an empire that ruled the Indian sub-continent from 320 BCE to 185 BCE claimed descent from Kusha, who descends from the Ramayana. The Rig Vedic Kaushitaki-Brahmana Upanishad refers to a dialogue between a Gargya generation Brahmin named Balaka, and an older king named Ajatsatru, the then emperor of Kashi. The story is also mentioned in one of the most antique of all Upanishads, the Sukla Yajur-vedic Vrihad Aranayak Upanishad 2.1 and the place

‘Kashi’ is re-mentioned in the same Upanishad 3.8.2. Additionally, the Atharva Vedic Pranagnihotra Upanishad bears a direct reference to Kashi in the name of ‘Varanasi’. Thousands of years later, another emperor by the same name Ajatsatru, ruled parts of greater Kashi, who was also contemporary to Gautama the Buddha and Mahavira the Tirthankara.

The Adi Parva of the Mahabharata narrates about Amba’s swayamvara, who was the eldest daughter of the king of Kashi (Varanasi), who organized a swayamvara (a ceremony of choosing a husband from among assembled suitors by the bride) for his three daughters which was organized by Bhishma, the son of the Kuru King Shantanu of Hastinapur and his wife Ganga, the living goddess - the spirit of

river Ganges (called Ganga in India). Of the later Puranas, there are special mention in the various chapters of the Agni Purana (119); the Padma Purana (14.191); the Kurma Purana (1,31,35); Matsya Purana (191); Linga Purana ( 92); and particularly, at length, in the entire fourth chapter of the Skanda Purana, which is called 'Kasi Mahatyam' (the Glory of Varanasi).The Buddhist Anguttara Nikaya (100 BCE), at several places gives a list of sixteen great nations or regional confederations of which one is Kashi. The Digha Nikaya or 'Collection of Long Discourses' is a Buddhist scripture, the first of the five nikayas, or collections, in the Sutta Pitaka, which is one of the 'three baskets' that compose the Pali Tipitaka of Theravada Buddhism, also mentions Kashi as a predominant confederation. The Jaina Bhagavati Sutra (300 AD) also mentions Kasi as one of the sixteen Mahajanapadas.

A very important event is the coming in of Siddhartha the Gautama to Varanasi looking to revive its sacred cosmic geography, turn the 'wheel of dhamma', and re-establish its green paradise for the Sages (Rishipatana), called 'Saranath' (Mrigadave or Deer's park), and named after the Unicorn Sage of Ramayana, Saranganath or Rishya-Sringa. From that archaic period to centuries till date, Varanasi, India's celebrated Spiritual Capital has continuously unfolded within a single bud (Karnika) an uninterrupted and sustainable urban lineage constituting many layers, embedding many traditions, and assimilating many schools of spiritual and intellectual legacies. As celebrated American humorist-explorer Mark Twain commented after experiencing Varanasi:



**“Varanasi is older than history, older than tradition, older even than legend, and looks twice as old as all of them put together.”**

Now, a Pan-IIT-SPA joint initiative is heading forth to take up Varanasi: as a mega-exploratory project. The goal is to explore in full depth a four phased design recovery

(cybernetics), encompassing the entire flow of Varanasi's unique land-river interface at all levels of eco-innovation.



**Project Varanasi: IIT KHARAGPUR & JNANA PRAVAHA, VARANASI in association with GaTECH, ATLANTA & IIT (BHU), Varanasi**

*Courtesy:*

1. Padmashree Bimala Poddar, Chief Patron, Jnana Pravaha
2. Prof. Kamal Giri, Chairperson, Jnana Pravaha
3. Prof. Vidula Jayaswal, renowned Archaeologist and Adviser, Jnana Pravaha







# EXHIBITION GALLERY

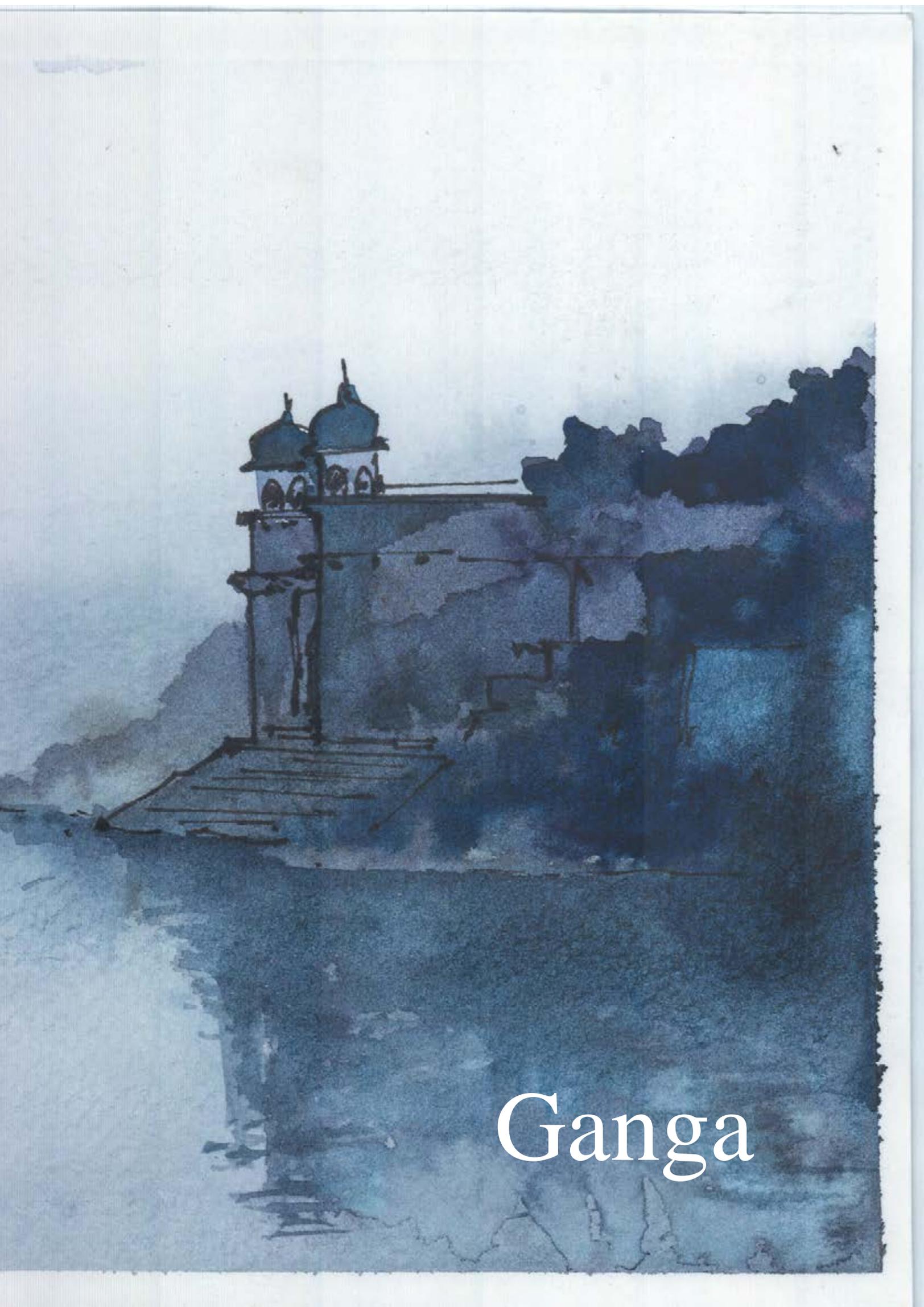


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*Returning is the motion of the Tao and going far means returning. The idea is that all developments in nature, those in the physical world as well as those of human situations, show cyclic patterns of coming and going, of expansion and contraction.*

**- Lao Tzu**



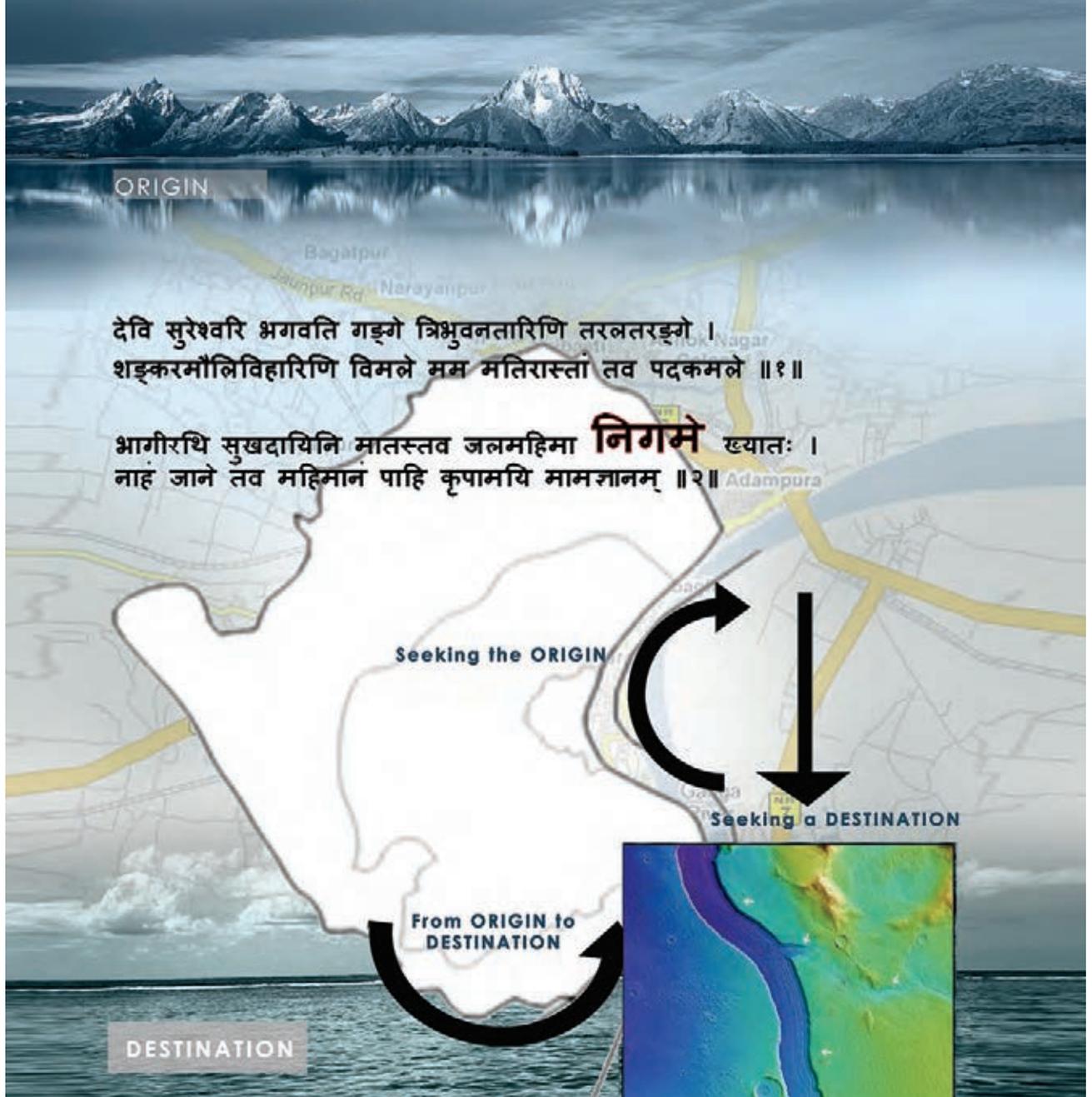


Ganga



**Ganges** is said to have its origins in the tresses of Lord Shiva and in Varanasi, it expands to the mighty river that we know of. The city is a center of learning and civilization for over 3000 years.

In Varanasi, the Ganges turned towards its origin, towards the feet of lord Shiva as the river is North bound. It manifests tracing the origin while destined towards the sea. Here the river exemplifies the synergy of Origin & Destination.



ORIGIN

देवि सुरेश्वरि भगवति गङ्गे त्रिभुवनतारिणि तरलतरङ्गो ।  
शङ्करमौलिविहारिणि विमले मम मतिरास्तां तव पदकमले ॥१॥

भागीरथि सुखदायिनि मातस्तव जलमहिमा **निगमे** ख्यातः ।  
नाहं जाने तव महिमानं पाहि कृपामयि मामज्ञानम् ॥२॥

Seeking the ORIGIN

Seeking a DESTINATION

From ORIGIN to  
DESTINATION

DESTINATION



ॐ त्र्यम्बकं यजामहे सुगन्धिं पुष्टिवर्धनम्  
उर्वारुकमिव बन्धनान् मृत्योर्मुक्षीय मामृतात् ।

“Om! let the whole universe worship the Lord of Rudras, the three-eyed one, the TRIAMBAKA, the Lord, who is perpetually linking everything (space) in the continuum of time, and also the very one, who is fragrant in spiritual essence and who nourishes and fosters all beings.

May he sever our bondage of samsara i.e. our attachment to

the wheel of worldly life, so that like a fruit or cucumber is set free and hence severed from the bondage of its creeper or branches; the Supreme liberate us from the fear of death, by making us realize that we are beyond our little personality and never ever separated from our immortal expression i.e. our interconnected cosmic and transcendental natures”

*Hymns to Maruti-Rudranath*

*Rig Veda: 7.59.12*

# *In summary: Sandhi of Future Varanasi City Themes*

## **Project 1 on Ganga**

**Origin, flow and destination:**  
Heritage tourism

## **Project 2 on**

**Future of Cities:** Livable flow of  
urban systems

## **Project 3 on**

**Creative communities and the river:** Creative flow of tourism

## **Project 3 and 4 on**

**Music & Iconography**

**Rig Veda:::Ramayana:::Sufism**

**Epigraphy & archaeology (Indian Muses)**

Revive a flow of Scientific (natural-cosmic and anthropic-anthropometric)

Traditional Knowledge systems

## **Project 5 on SARNATH & VINDHYAS**

**Origin of Buddhism & others...** Reconstruction of continuity & flow



“

*Varanasi is older than history, older than tradition, older even than legend, and looks twice as old as all of them put together.*

”

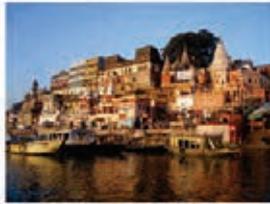
Mark Twain

Now, a Pan-IIT-SPA joint initiative is heading forth to take up Varanasi: as a mega-exploratory project. The goal is to explore in full depth a four phased design recovery (cybernetics), encompassing the entire flow of Varanasi's unique land-river interface at all levels of eco-innovation.



# Ghat



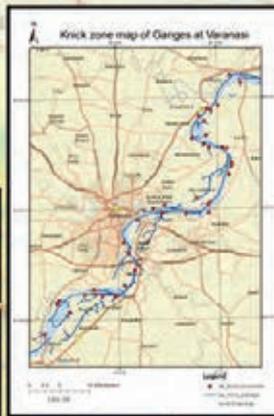
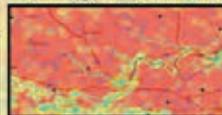
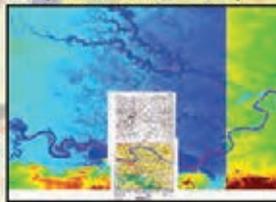


The city of Varanasi (Banaras or Kashi), located on the north bank of the River Ganges is regarded as one of the oldest cities of the world that has been continuously inhabited.

**OBJECTIVE:**

To delineate the extent of geological growth phases of Varanasi through ages, and also to understanding how the evolution of the river Ganges Alluvial System might have influenced the development and sustenance of Varanasi.

**GEOMORPHOLOGY:** Scientific study of the origin and evolution of topography and bathymetric features created by physical or chemical processes in Varanasi are studied by satellite-based remote sensing and field morphometric study

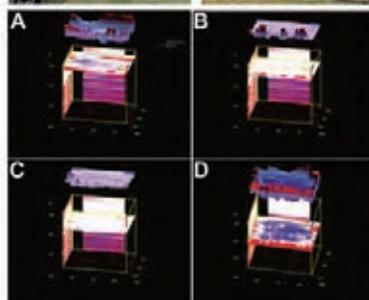


Along Varanasi the river flows in a N-S trend. The valley falls under Ganges Basin and is much narrower (1-2 km) in Varanasi relative to downstream other areas. The river along this region follows along the foreland bulge of the Himalayan orogenic system, following tectonogenic lineaments

**GPR SURVEY DONE IN EXCAVATED SITES. COMMON MID POINT SURVEY IS EXECUTED AT A FEW SECTIONS**

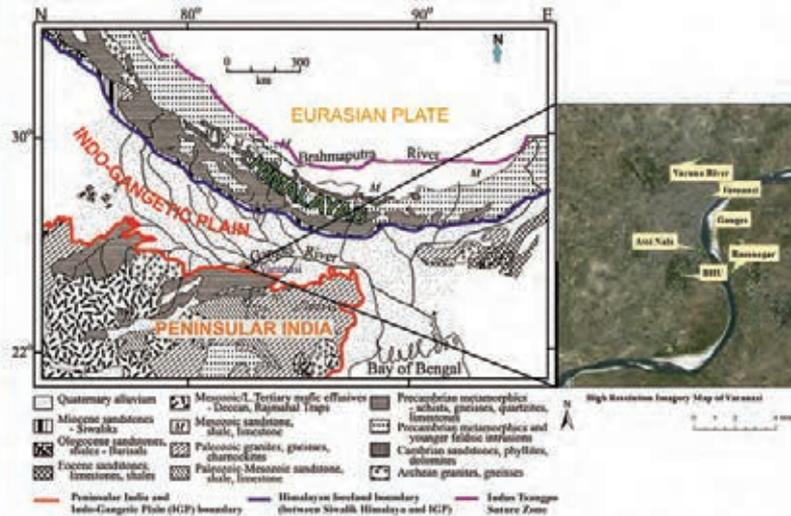


GPR survey instrument and the archeology discovered through drilling and excavation



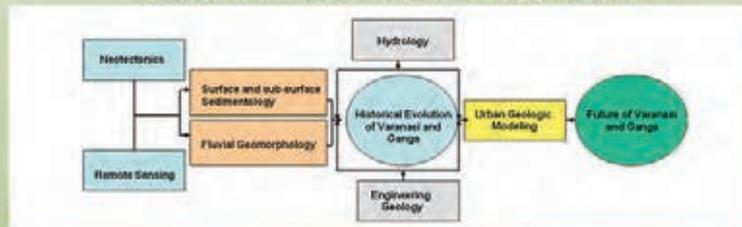
Different depth slices for corresponding depths have been prepared through volumetric GPR Survey. At 0.5 meter depth slice a high dielectric contrast with almost linear feature has been identified. It may represent the top of a buried brick wall. Here blue color zones represent the modern materials. Almost all the buried existing remains are brick made structure.





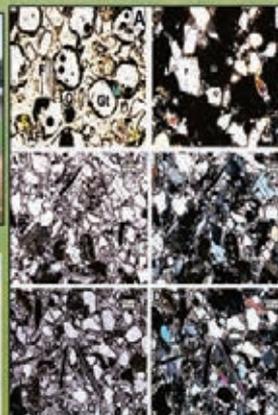
Geologic map of Indian subcontinent along with the location of Varanasi, showing the major geogenic features.

METHODOLOGY TO BE FOLLOWED



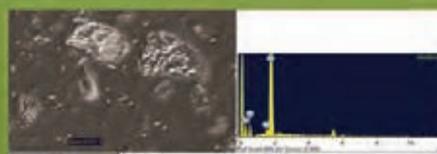
Thin section petrography showing silt sized particles with mineral composition of rock fragments, Sericite, zoned by Iron-stained clay, Quartz, and Quartzo-feldspathic matrix

Borehole sediment Samples collected from two sites. Further drilling are in progress



Element	Weight%	Atomic%
C	36.92	53.40
O	16.20	17.60
Al	0.42	0.27
Si	46.46	28.74

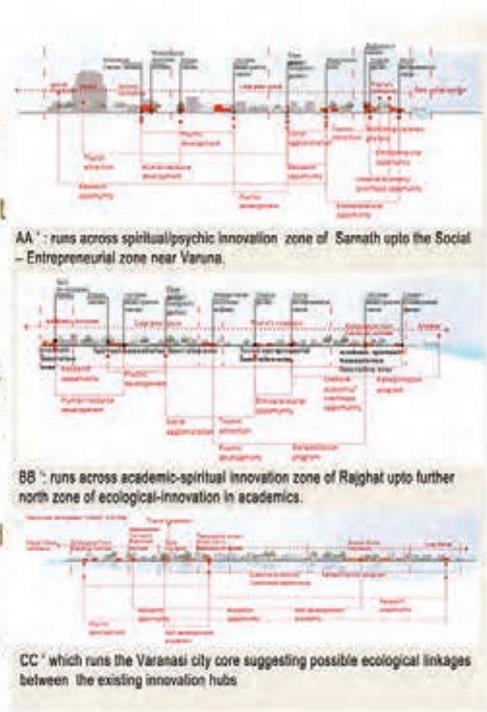
Percentile Mineral composition on the basis of SEM/EDX analysis.



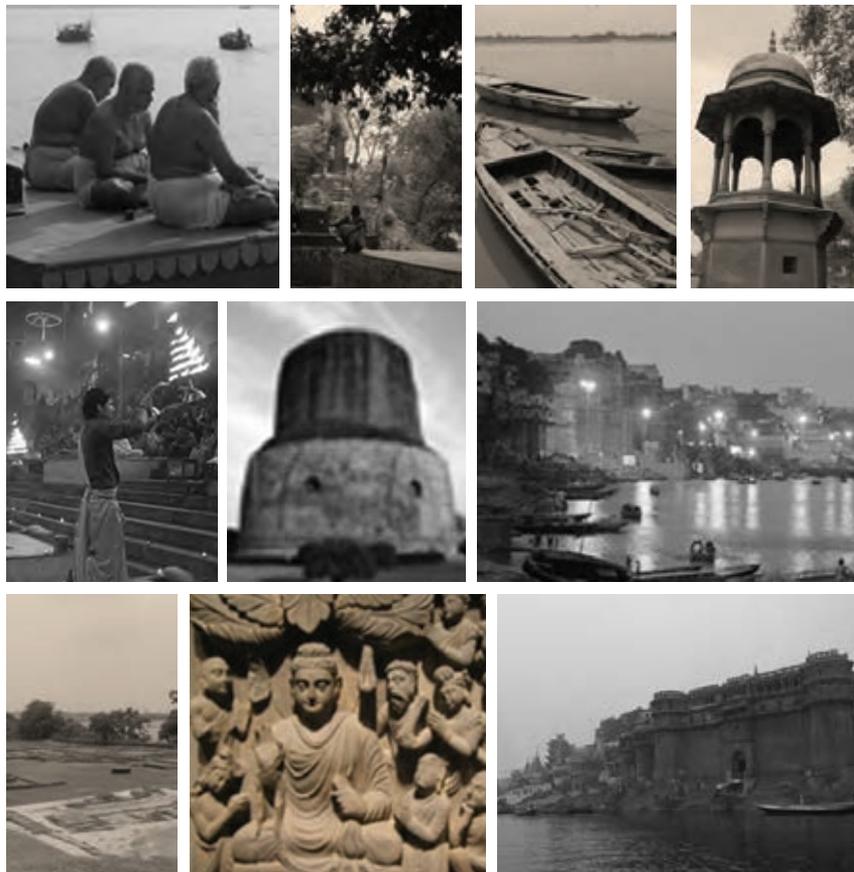


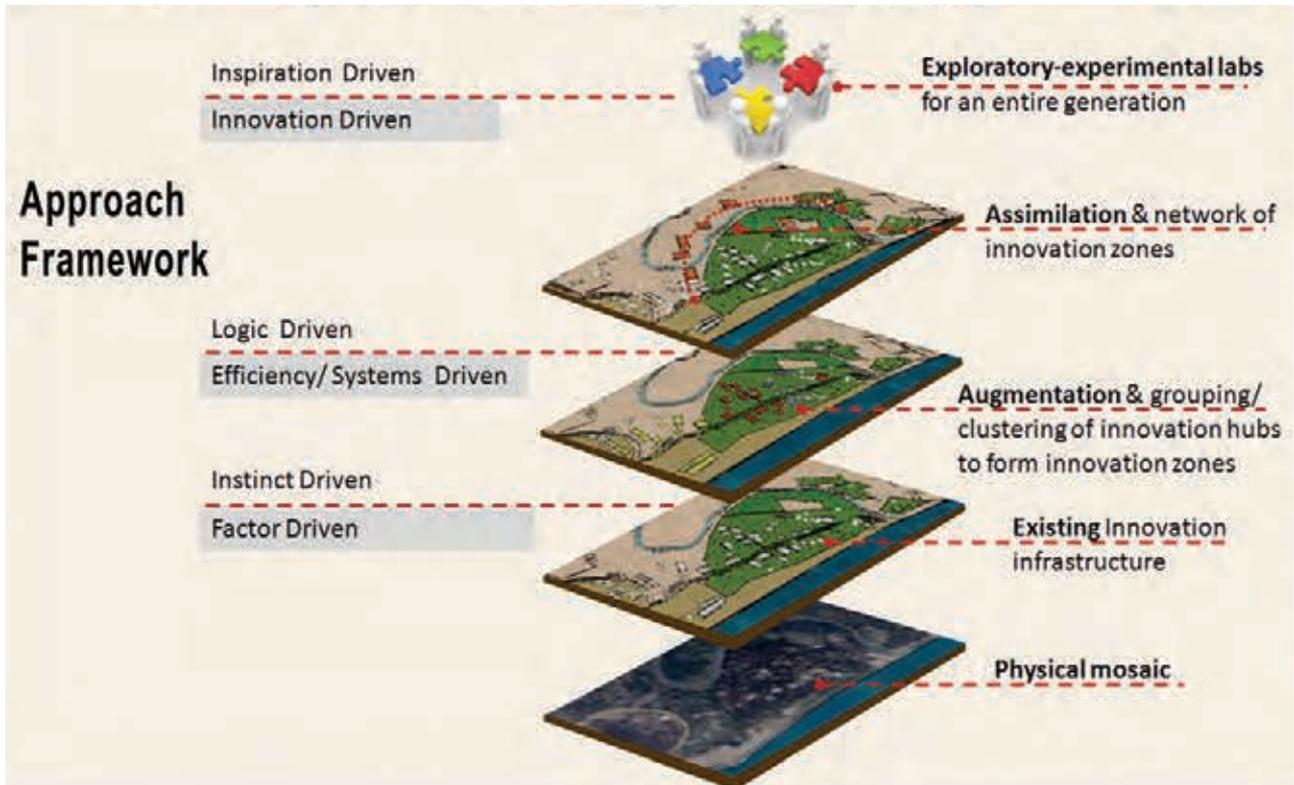
Part of Masters in City Planning dissertation, IIT Kharagpur, session: 2013-2015

Ecological innovation zone brings forward the idea of individual innovations brought together through spatial clustering, institutional networking and to and fro linkages of resources sharing, functions and facilities. A glimpse of to and fro linkage is suggested as follows in sections AA', BB', & CC'



Varanasi or Kashi 'the city of light' has always been a cradle for learning, innovation and change in thought, so the natural inclination is to strengthen the existing intellectual clusters of the city rather than dispersing it following the current trends of urban sprawling in her peripheries. "Ecological innovation" in context to this study tries to encapsulate the idea of innovation through grouping of academic institutions, spiritual institutions, social/ entrepreneurial setups & activities.







**One of the oldest living city of the world**

Banaras means (bana) "always ready" (ras) "juice of life". This "life-juice" flows in plenitude here in different colours, varying tones, multiple textures and layers, diverse situations, contrasting conditions, etc. It is the blending or "complex mixing" of these, which makes up the mosaic of culture known as Banaras, the city of Lord Shiva.

"कारकां हि काराने काराणि सर्वव्यवसायिका |  
सा काराणि विदित्वा येन तेन प्राप्तं हि कारिका ||"  
आदि शंकराचार्य



**Ganga Arti, Dashaswamedh Ghat**

"The Lord is so kind that He has spread the river Ganges throughout the universe so that by taking bath in that holy river everyone can get released from the reactions of sins, which occur at every step."

Sri Sri Prabhupada  
Srimad Bhagwatam 3.5.41



**Sarnath**

"Austerities only confuse the mind. In the exhaustion and mental stupor to which they lead, one can no longer understand the ordinary things of life, still less the truth that lies beyond the senses. I have given up extremes of either luxury or asceticism. I have discovered 'the Middle Way'."

First Sermon of Lord Buddha



# Sanskriti



# VARANASI

A celebration of Creativity and Freedom

## Rishyashringa & Adi Shankaracharya

### ADVAITA

Adi Shankaracharya is known as the incarnation of Lord Shiva and founder of Advaita philosophy. A firm believer of Vedas he was strongly against rituals and religious practices that were over exaggerated.

In Varanasi, Adi Shankaracharya advised a teacher to turn his mind to God in worship and adoration which would only save him from the vicious cycle of life and death and not the money earned through the teaching of the rules of Grammar. The hymn "Bhoja Govindam" is said to have been composed on this occasion.

The fourteen disciples who were with the Master on that occasion are believed to have added one verse each. These fourteen verses are together called "Chaturdasamanyaka-Stotra" (a hymn consisting of fourteen verse-blossoms).

This work is a vastly important part of general spirituality, as emphasised by Bhakti Yoga and the Bhakti movement. This work is generally considered a summary of Adi Shankara's Advaita Vedanta philosophy.

भज गोविन्दं भज गोविन्दं  
गोविन्दं भज मूढमते ।  
सम्प्राप्तं सन्नहिं काले  
नहिं नहिं रिक्तां डुकृङ्करणे ॥



In Varanasi, Adi Shankaracharya was on his way to the temple after finishing his bath. Suddenly he saw a chandala (an outcaste) and his four dogs on the way, and gestured to him to keep a distance, as per the custom in those days.

The outcaste then asked him some questions which form the substance of two verses which are a prelude to the main work. Among the questions asked, the significant one was like this: "Whether My body should give way to you or my Soul?"



On hearing these questions, Sri Shankara assumed (realized) that the person before him was no ordinary person but Lord Shiva himself, and the dogs, the four Vedas. Shankara replies to these questions in five verses.

These five verses have been collectively given the name 'Maneshaapanchakam'. The word 'maneshaa', meaning 'conviction' appears in the last line in all the five verses.



दासस्तेहं देहदृष्टयासमं शंभो  
जातस्तेषु जीवदृष्टया त्रिदृष्टे  
सर्वस्यात्मन अत्मदृष्टया त्वमेव  
त्वेवं मे धीर्नशिचिता सर्वशास्त्रैः ॥



Shankara went to Sringeri on the bank of the Tungabhadra river. There he established the famous temple of the Divine Mother Sharada which is popularly known as the Sringeri Sharada Peetham or the Seat of Sharada.

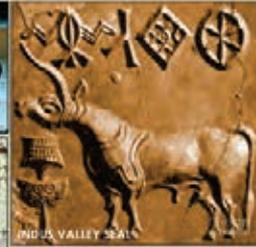


Sri Adi Sankara's Four Amnaya Mutts



### HIS DEATH

When Rishyashringa shuffled off his mortal coil, a lightning issued forth from his body and disappeared into the Linga he was worshipping as a symbol of formless Absolute. Unlike others, this Linga is invested with a horn on its head, to commemorate the merger of the sage.



### RISHYASHRINGA

Royal queens of Dasaratha in front of Sage Rishyashringa; sculptures on outer wall of Ramachandra temple in Hampi, Karnataka

During the Ramayan Era (Satyug - The Golden Age), near Sringeri, Sage Vibhandaka was determined to perform tapasya, chun tapa, acquire siddha, control nature and move her dance to his tune. Fearful that Vibhandaka would succeed and use siddha against him, Indra sent Urvashi (an Apsara) to seduce him. He ejaculated into the lake and a gazelle that drank that water gave birth to the unicorn sage - Rishyashringa.



Dasharatha (the King of Ayodhya) and his wife Kausalya had a daughter - Shanta. They gave her to Kausalya's sister Vanshi and husband Rompad (the King of Anga).



**Varanasi** has manifested **RECONCILIATION** of the **OPPOSITES** in every sphere of exposition. The sense of complementarity and Unity is rooted deep into quite different parts of human nature, culture, religious rites and rituals, sociability, economy, physical understanding of the space itself.



Death Vs. Immortality



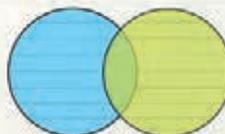
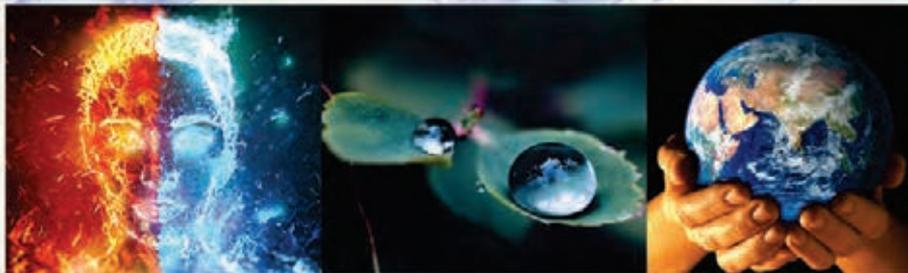
Austerity Vs. Fertility



Asceticism Vs. Celebration

*"It is probably true quite generally that in the history of human thinking the most fruitful developments frequently take place at those points where two different lines of thought meet."*

*W. Heisenberg*



**Boolean Diagram:**  
Showing Complementarity and the Unity of the Opposites

The quotation of Heisenberg shows the existence of the opposites for creation. Something new always emerged out of the synergy of the opposites as can be seen in different times or different cultural environments or different religious traditions: hence if they actually meet, that is, if they are at least so much related to each other that a real interaction can take place, then one may hope that new and interesting developments may follow.



Celebration of Complementarity

Celebration of Reciprocity

Celebration of Interdependence



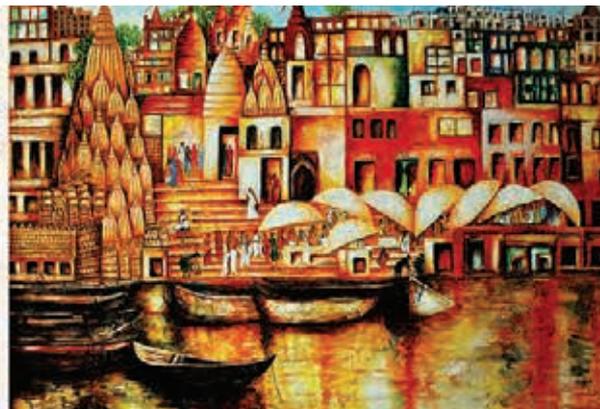


Dhashashwamedha Ghat: Activity change



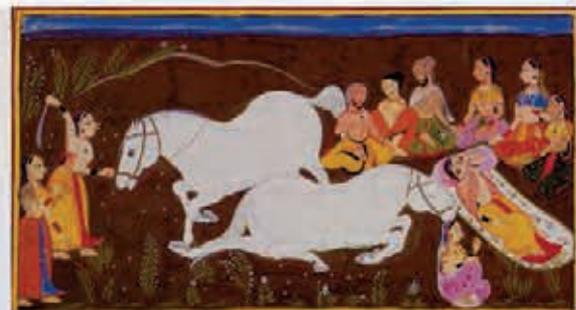
The Tenth Sacrifice: *"The horse sacrifice is the offering of the life power with all its impulses, desires, enjoyments to the divine existence. The life\_soul is itself the giver of the sacrifice... The illumined seer Aswamedha"*

Sri Aurobindo: Rig veda: 5.27.4



There are two mythologies about the ghat is that the Lord Brahma was created the Dashashwamedh ghat in order to welcome the Lord Shiva, and the second one is the Lord Brahma was sacrificed the ten horses in a yajna here. The Dashashwamedh ghat was reconstructed by the Bajirao Pesava I in the year 1740 AD. It was later reconstructed by the Queen of the Indore (the princess Ahilyabai Holkar) in the year 1774.

The Ashvamedha (Sanskrit: *aśvamedhá*) is a horse sacrifice ritual followed by the Śrauta tradition of Vedic religion. It was used by ancient Indian kings to prove their imperial sovereignty: a horse accompanied by the king's warriors would be released to wander for a period of one year. In the territory traversed by the horse, any rival could dispute the king's authority by challenging the warriors accompanying it. After one year, if no enemy had managed to kill or capture the horse, the animal would be guided back to the king's capital. It would be then sacrificed, and the king would be declared as an undisputed sovereign





### Queen Ahilyabai Holkar: ( 1725CE-1795CE)

**Ahilyabai Ghat :** Ahilyabai Ghat has the distinction of being the first ghat named in honor of a person, namely, the warrior queen Ahilyabai Holkar of Indore who actually built it in 1778 along with a number of temples and spiritual residences throughout the city of Varanasi.

*" As you love your own body, so regard everyone as equal to your own body. When the Supreme Experience supervenes, everyone's service is revealed as one's own service. Call it a bird, an insect, an animal or a man, call it by any name you please, one serves one's own Self in every one of them. "*

— Anandamayi Ma

### ANANDAMAYI MA : ( 1896 CE – 1982 CE)

Anandamayi Ma was regarded as a Self/God-realized master. Sivananda Saraswati of the Divine Life Society described her as "the most perfect flower the Indian soil has produced."

Precognition, faith healing and other miracles were attributed to her by her followers.

Paramhansa Yogananda translates Anandamayi as "Joy-permeated".

**Anandamayi Ghat:** Initially ghat after passage of time called Anandamayi Ghat. This ghat was made pucca by Rai Baldeo Sahai in ca 1942. In 1944 the noted female ascetic Mata Anandamayi has purchased this ghat and developed the upper part for her ashrama. There are two important buildings on the upper part of the ghat built by Anandamayi maa. One of the two runs as Anandamayi Ashram (no. B 2/ 291), contains the temple of Annapurna and Shiva, and also a big hall of yajna.

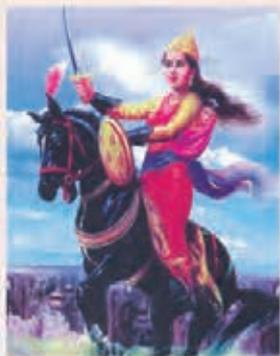


### Maharani Kunwar of Sursand (Bihar)

**Janaki Ghat :** In 1870 queen Rani Kunwar of Sursand (Sitamarhi district, Bihar) purchased this ghat and made it partly pucca and also built a shrine containing an image of Janaki (Sita, wife of Lord Rama). Since then the ghat is called Janaki Ghat. This ghat is also named as "Nagamber ghat".

### MAHARANI LAXMIBAI(1828 CE- 1858 CE ):

Lakshmbai was born in the holy town of Varanasi into a Marathi Brahmin family.



• कटियों में भी विषम वेदना, महलों में आहत अपमान  
वैर सैनिकों के मन में था अपने पुरुषों का अभिमान  
नाना धुंधपंत पेशवा जुटा रहा था सब सामान  
बहिन छबीली ने रण घण्टी का कर दिया प्रकट आहवान

• हुआ यज्ञ प्रारम्भ उन्हें तो सोई ज्योति जगानी थी  
बुंदेले हरबोलों के मुंह हमने सुनी कहानी थी,  
खूब लड़ी मदानो बहे तो झांसी वाली रानी थी

• महलों ने दी आग, झाँपड़ी ने ज्वाला सुलगाई थी  
यह स्वतंत्रता की चिन्गारी अतरतम से आई थी  
झांसी घेती, दिल्ली घेती, लखनऊ लपटें छाई थी  
मेरठ, कानपुर, पटना ने भारी धूम मचाई थी

### SITARA DEVI: ( 1920 CE- 2014 CE)

Sitara Devi is a well-known classical Kathak dancer of India. As she was born on Dipawali, she has also named as Dhanalakshmi (nickname of which is Dhanno). She was born in a Brahmin family of Varanasi.

She was depicted as the Nritya Samragini by the Rabindranath Tagore when she was just 16. Rabindranath Tagore encouraged her to revitalize the Indian arts through the Kathak. She was also known as the Kathak queen of the India.

She was awarded with the Sangeet Natak Akademi award in 1969 and received the Padma Shree award in 1973. Later on she was awarded Kalidas Samman award in 1995 and Nritya Nipuna award.

Sitara Devi, a Kathak legend, has honored with the Lifetime Achievement Award 2011 for her great contribution towards the classical Kathak over the six decades.



### SMT. GIRJA DEVI: (BORN:1929 CE )

Girja Devi was born in Varanasi, India. She is an Indian classical singer from Banaras gharana. Awarded with the Padma Shri in 1972.

Girja devi was honored with Padma Bhushan in 1989. Later in 2012, she was awarded with Maha Sangeet Samman.







### KANTHE MAHARAJ :(1880 CE - 1970 CE)

Kanthe Maharaj, a famous Indian Vadya Shiromani of the Banares Gharana.

He was a professional tabla player of India and had performed at many places all over the country and abroad. He was the great tabla maestro who could generate unique and wonderful variety of tones from his tabla for any type of raga. It is also considered that he was practicing daily with a slow 'Na Dhin Na' whenever he wanted to be concentrated.

He made a record of playing tabla for about 2 and 1/2 hrs in the year 1954.



### KISHAN MAHARAJ (1923 CE-2008)

He was born in Kabir Chaura, Benaras in a family of professional musicians. He was initially trained in classical music by his father, Hari Maharaj. Kishan Maharaj won the Padma Shri in 1973. He was awarded Padma Vibhushan in 2002.

## VARANASI CHOSEN AS 'CITY OF MUSIC' BY UNESCO

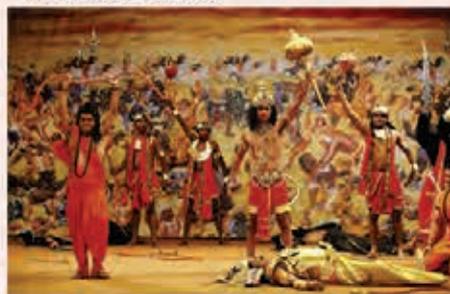


**GULAB BARI:** This is a summer music festival, started in early 1730. Also known as Kashi's Fragrant festival, rose water and rose petals are sprinkled across the venue, on the audiences and performers. The venue is decorated with pink roses and the musical form for this festival is the Chaiti, a semi classical song style. Distinctively the dress code for the festival sees men in white and women wearing pink.



### RAMLILA OF RAMNAGAR:

The unique Ramlila of Ramnagar has performed in the pageant style, was started around 1830 by Maharaja Udai Narayan Singh of Banaras and has today become world famous. This promotes the folk traditions of Varanasi.



**BUDWA MANGAL:** This festival is celebrated at the Dashashwamedh ghat on the first Tuesday after the festival of colors or Holi. This festival has a history of 350 years and was revived in a big way in 1996. The performances take place on the main boat and the audiences sit around in other boats, enjoying the ambience and the music. The festival also promotes crafts, handlooms and folk art traditions on the Ghat.



*"Varanasi is the eternal abode of Lord Shiva, and one of my favorite temples is that of Lord Hanuman, the monkey god. The city is also where one of the miracles that have happened in my life took place: I met Ma Anandamayi, a great spiritual soul. Seeing the beauty of her face and mind, I became her ardent devotee. Sitting at home now in Encinitas, in Southern California, at the age of 88, surrounded by the beautiful greens, multi-colored flowers, blue sky, clean air, and the Pacific Ocean, I often reminisce about all the wonderful places I have seen in the world. I cherish the memories of Paris, New York, and a few other places. But Varanasi seems to be etched in my heart"*

**-Pandit Ravi Shankar**



**PANDIT RAVI SHANKAR:(BORN: 1920 CE - 2012 CE)**

Pandit Ravi Shankar was born in Varanasi. He was a contemporary Indian musician and composer.

He was a master in instrument sitar.

He worked as a composer and create music for Apu Trilogy by Satyajit Ray.

Pandit Ravi Shankar was awarded with the **Bharat Ratna** and got three Grammy Awards in 1999 for India's highest civilian honor.

*"Even if the world ends, the music will still survive."  
"Music has no caste."*

**BISMILLAH KHAN: (1916 CE - 2006 CE)**

Ustad Bismillah Khan was a great Indian shehnai maestro of Benares .

He was requested to come to play shehnai at the first Independence on 15th August, 1947 in Delhi Red Fort by the Indian Prime Minister Pandit Jawaharlal Nehru.

Awarded with the Padma Shri in 1961.

Awarded with the Padma Bhushan in 1968.

Awarded with the Padma Vibhushan in 1980.

Awarded with the Bharat Ratna in the year 2001 being the third classical musician.

He got the fame worldwide for performing the shehnai more than eight decades.

**-Bismillah Khan**



**PANDIT HANUMAN PRASAD MISHRA:( 1913 CE - 1999 CE)**

Pandit Hanuman Prasad Mishra was born in the professional music family (related to the Banaras Gharana and Indian Classical Music) in the Varanasi city.

He was very interested in learning the music from his childhood which lead him towards becoming the great Sarangi player.

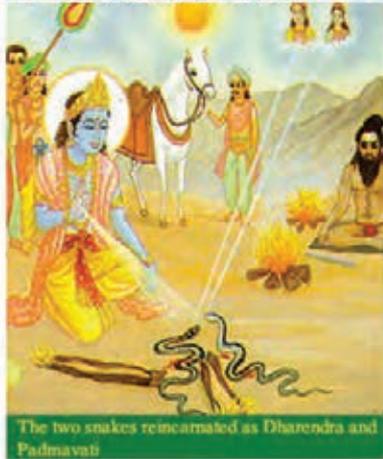
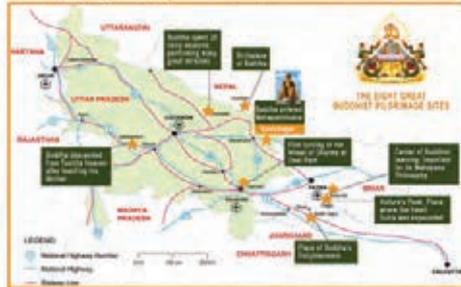
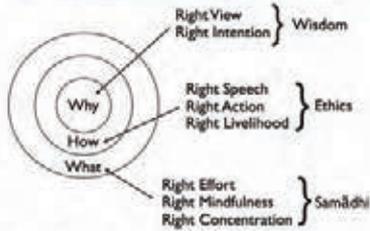
He has been awarded with the Sangeet Natak Akademi Award in the year 1988.



Vidya

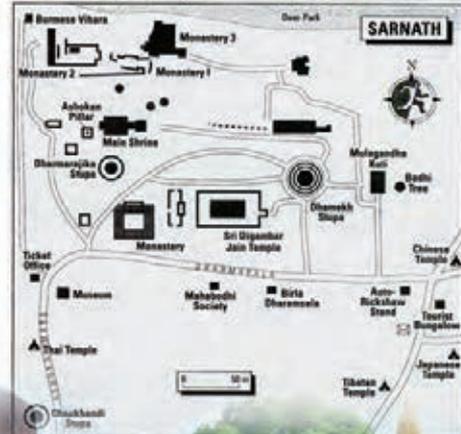


Jain literature supports that Kashi was one of the oldest cities of India. Mahavira, the 24th Tirthankara incarnated even before Lord Buddha. Before Mahavira there were 23 Tirthankaras and the seventh one Suparsvanath was born in Benares. Jains believe that the 23rd Tirthankara Parvasvanath, also born in Benares, was Krishna's contemporary in 3200 BCE.



Sarnath is a city located 13 kilometres north-east of Varanasi near the confluence of the Ganges and the Varuna rivers in Uttar Pradesh, India. The deer park in Sarnath is where Gautama Buddha first taught the Dharma, and where the Buddhist Sangha came into existence through the enlightenment of Kondanna. Singhpur, a village approximately one km away from the site, was the birthplace of Shreyansanath, the Eleventh Tirthankara of Jainism, and a temple dedicated to him, is an important pilgrimage site.

Also referred to as Isipatana, this city is mentioned by the Buddha as one of the four places of pilgrimage to which his devout followers should visit, if they wanted to visit a place for that reason. It was also the site of the Buddha's Dhammacakkappavattana Sutta, which was his first teaching after attaining enlightenment, in which he taught the four noble truths and the teachings associated with it.





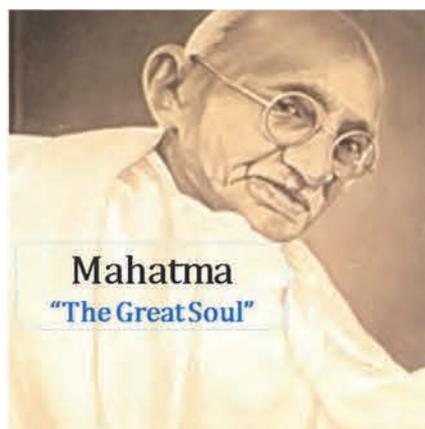
# VARANASI

A celebration of Creativity and Freedom

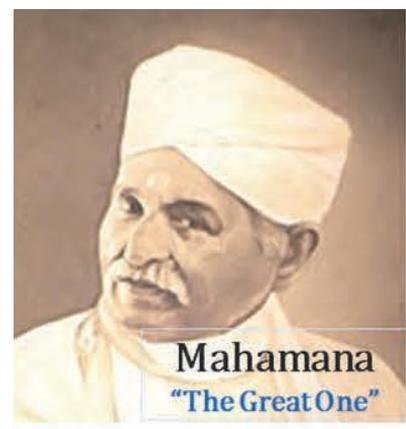
## *Madanmohan Malviya and Varanasi*



Annie Besant



Mahatma  
"The Great Soul"



Mahamana  
"The Great One"

Benaras is older than history,  
older than tradition, older even  
than legend and looks twice as  
old as all of them put together.

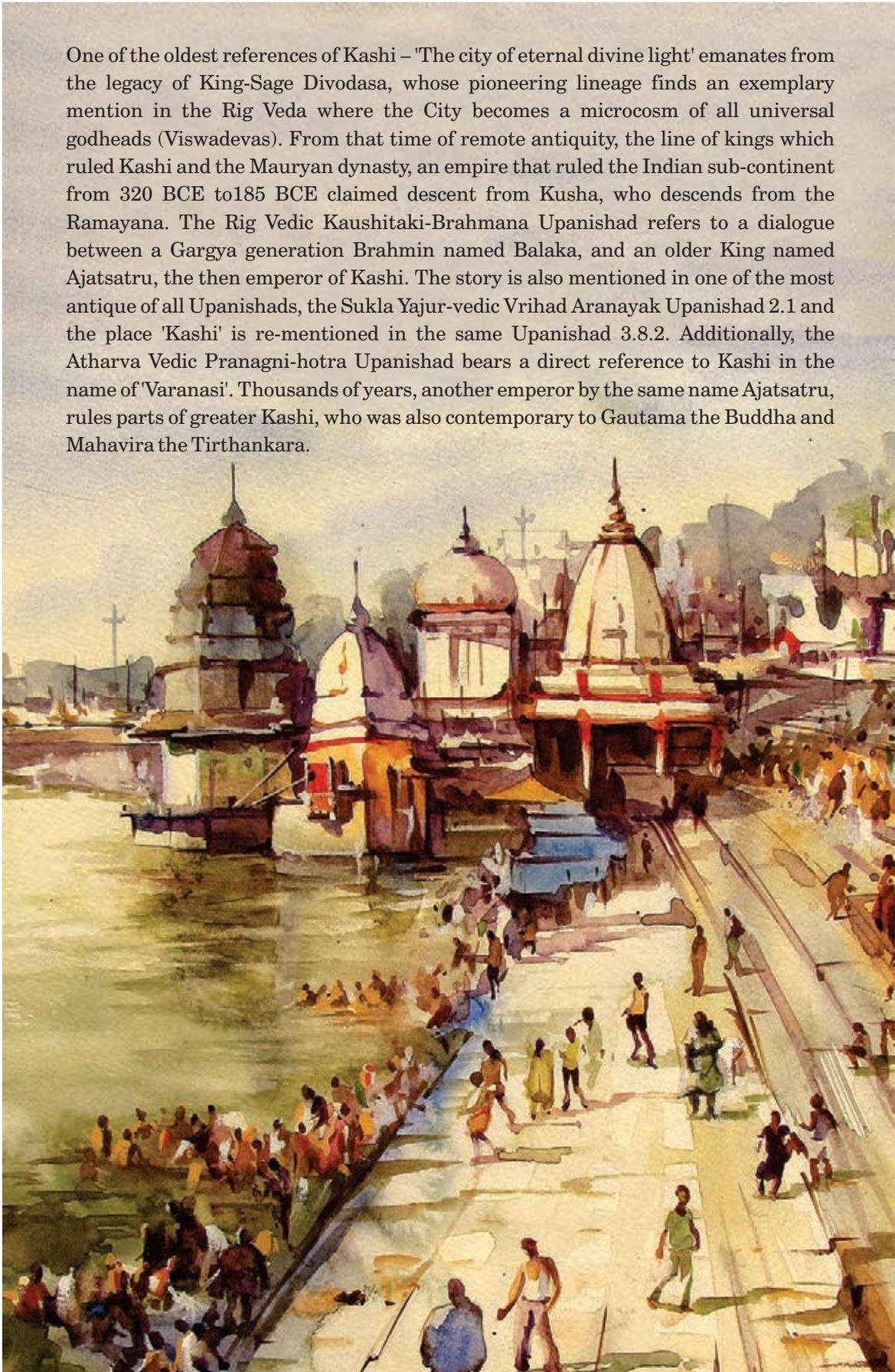
*Mark Twain*

# Itihas





One of the oldest references of Kashi – 'The city of eternal divine light' emanates from the legacy of King-Sage Divodasa, whose pioneering lineage finds an exemplary mention in the Rig Veda where the City becomes a microcosm of all universal godheads (Viswadevas). From that time of remote antiquity, the line of kings which ruled Kashi and the Mauryan dynasty, an empire that ruled the Indian sub-continent from 320 BCE to 185 BCE claimed descent from Kusha, who descends from the Ramayana. The Rig Vedic Kaushitaki-Brahmana Upanishad refers to a dialogue between a Gargya generation Brahmin named Balaka, and an older King named Ajatsatru, the then emperor of Kashi. The story is also mentioned in one of the most antique of all Upanishads, the Sukla Yajur-vedic Vrihad Aranayak Upanishad 2.1 and the place 'Kashi' is re-mentioned in the same Upanishad 3.8.2. Additionally, the Atharva Vedic Pranagni-hotra Upanishad bears a direct reference to Kashi in the name of 'Varanasi'. Thousands of years, another emperor by the same name Ajatsatru, rules parts of greater Kashi, who was also contemporary to Gautama the Buddha and Mahavira the Tirthankara.



The Adi Parva of the Mahabharata narrates about Amba's swayamvara, who was the eldest daughter of the king of Kashi (Varanasi), who organized a swayamvara (a ceremony of choosing a husband from among assembled suitors by the bride) for his three daughters which was organized by Bhishma, the son of the Kuru King Shantanu of Hastinapur and his wife Ganga, the living goddess - the spirit of river Ganges (called Ganga in India). In the later Puranas, there are special mention of the Agni Purana (119); the Padma Purana (14.191); the Kurma Purana (1,31,35); Matsya Purana (191); the Linga Purana (92); and particularly, at length, in the entire fourth chapter of the Skanda Purana, which is called 'Kashi Mahatyam' (the Glory of Varanasi). The Buddhist Anguttara Nikaya (100 BCE), at several places gives a list of sixteen great nations or regional confederations of which one is Kashi. The Digha Nikaya or 'Collection of Long Discourses' is a Buddhist scripture, the first of the five nikayas, or collections, in the Sutta Pitaka, which is one of the 'three baskets'

that compose the Pali Tipitaka of Theravada Buddhism, also mentions Kashi as a predominant confederation. The Jaina Bhagavati Sutra (300 AD) also mentions Kashi as one of the sixteen Mahajanapadas.

A very important event is the coming in of Siddhartha the Gautama to Varanasi looking to revive its sacred cosmic geography, turn the 'wheel of dhamma', and re-establish its green paradise for the Sages (Rishipatana), called 'Saranath' (Mrigadave or Deer's park), and named after the Unicorn Sage of Ramayana, Saranganath or Rishya-Sringa. From that ancient period to centuries till date, Varanasi, India's celebrated Spiritual Capital has continuously unfolded within a single bud (Karnika), an uninterrupted and sustainable urban lineage constituting many layers, embedding many traditions, and assimilating many schools of spiritual and intellectual legacies. As celebrated American humorist-explorer Mark Twain commented after experiencing Varanasi:

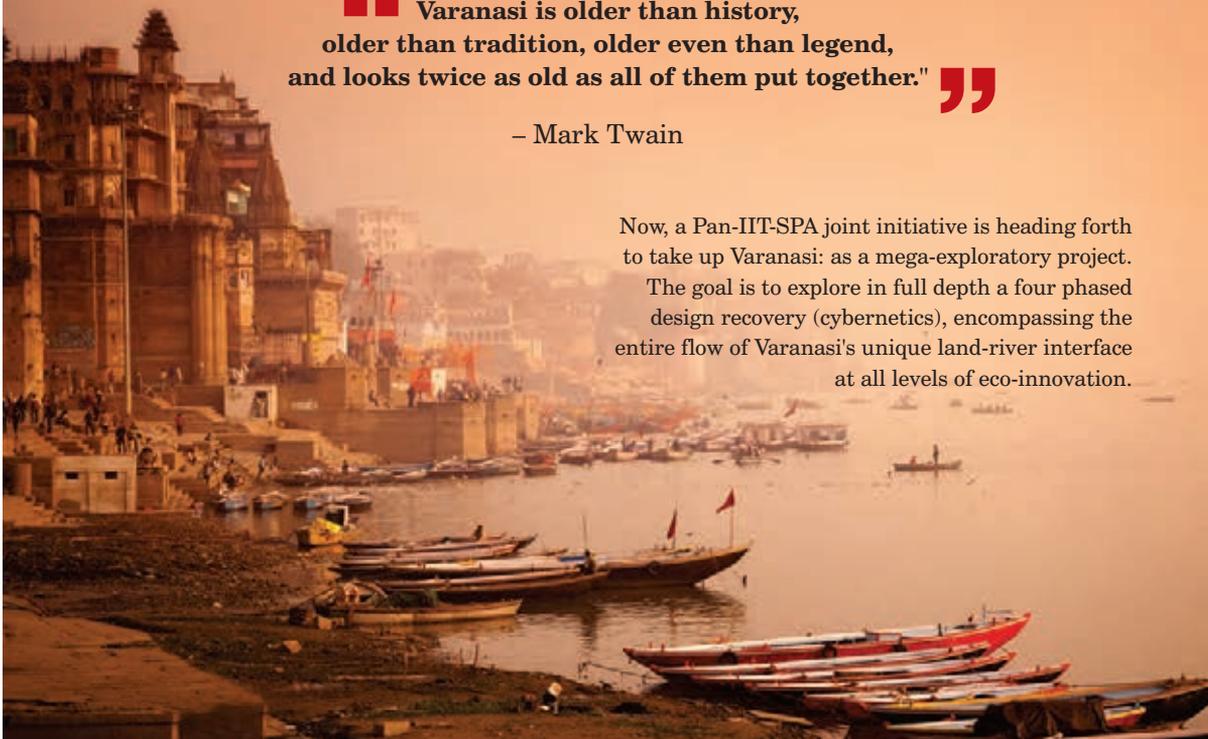


**“ Varanasi is older than history,  
older than tradition, older even than legend,  
and looks twice as old as all of them put together.” ”**

– Mark Twain

Now, a Pan-IIT-SPA joint initiative is heading forth to take up Varanasi: as a mega-exploratory project.

The goal is to explore in full depth a four phased design recovery (cybernetics), encompassing the entire flow of Varanasi's unique land-river interface at all levels of eco-innovation.



# VARANASI

A celebration of Creativity and Freedom

## Evolution of MANIKARNIKA and Harishchandra Ghats

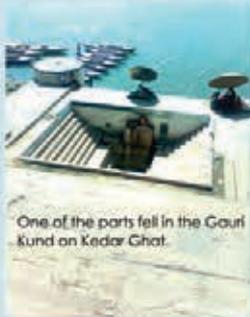
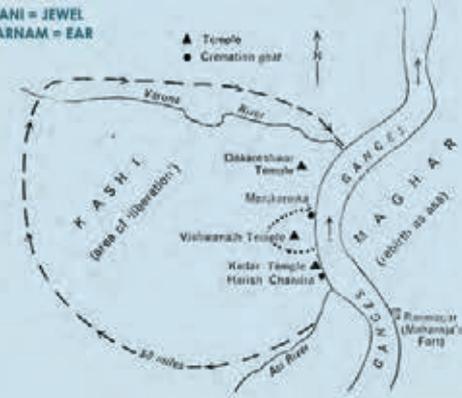


MANIKARNIKA GHAT 1922

Mata Sati (Aadi shakti mata) sacrificed her life & set her body ablaze after Raja Daksh Prajapati (one of the sons of Lord Brahma) tried to humiliate Lord Shiva in a Yagya practiced by Daksh. Lord Shiva took her burning body to the Himalaya.

On seeing the unending sorrow of Lord Shiva, Vishnu sends the Divine chakra to cut the body into 18 parts which fall on earth. They are called "Ashtadash Shaktipeeth". Lord Shiva established Shakti Peeth wherever Sati's body had fallen. At Manikarnika ghat, Mata Sati's Ear's ornament had fallen.

MANI = JEWEL  
KARNAM = EAR



One of the parts fell in the Gauri Kund on Kedar Ghat.



### Ardha-Nari-Ishwar | God as a Half Woman

This image is often assumed to represent gender equality. But the male and female halves of the image have less to do with the reality of gender and more to do with the representation of gender-neutral ideas.

God, in Hindu mythology, represents human imagination that can be worshipped (Independent Shiva, dependable Vishnu) or not worshipped (dependent Brahma) while Goddess represents nature.

Human imagination needs nature but nature does not need human imagination. Hence God becomes half the Goddess but the Goddess never becomes half a God.



### HARISHCHANDRA GHAT

Harishchandra said himself, his wife and child. He was made to work at a cremation ground and collect fees for every body cremated there.

One day his wife arrived, holding the dead body of their son, who had died of a snake bite. Harishchandra would not let her cremate their son without paying the fee.

At that time, all the deities appeared led by the deity of Dharma and accompanied by Vishwamitra. They praised Harishchandra for his good qualities, and invited him to heaven.



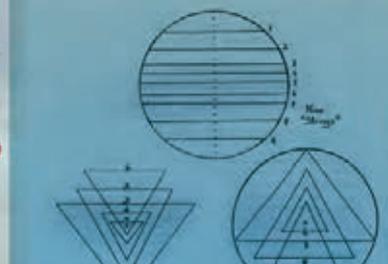
HARI HARA

Sivananda states:

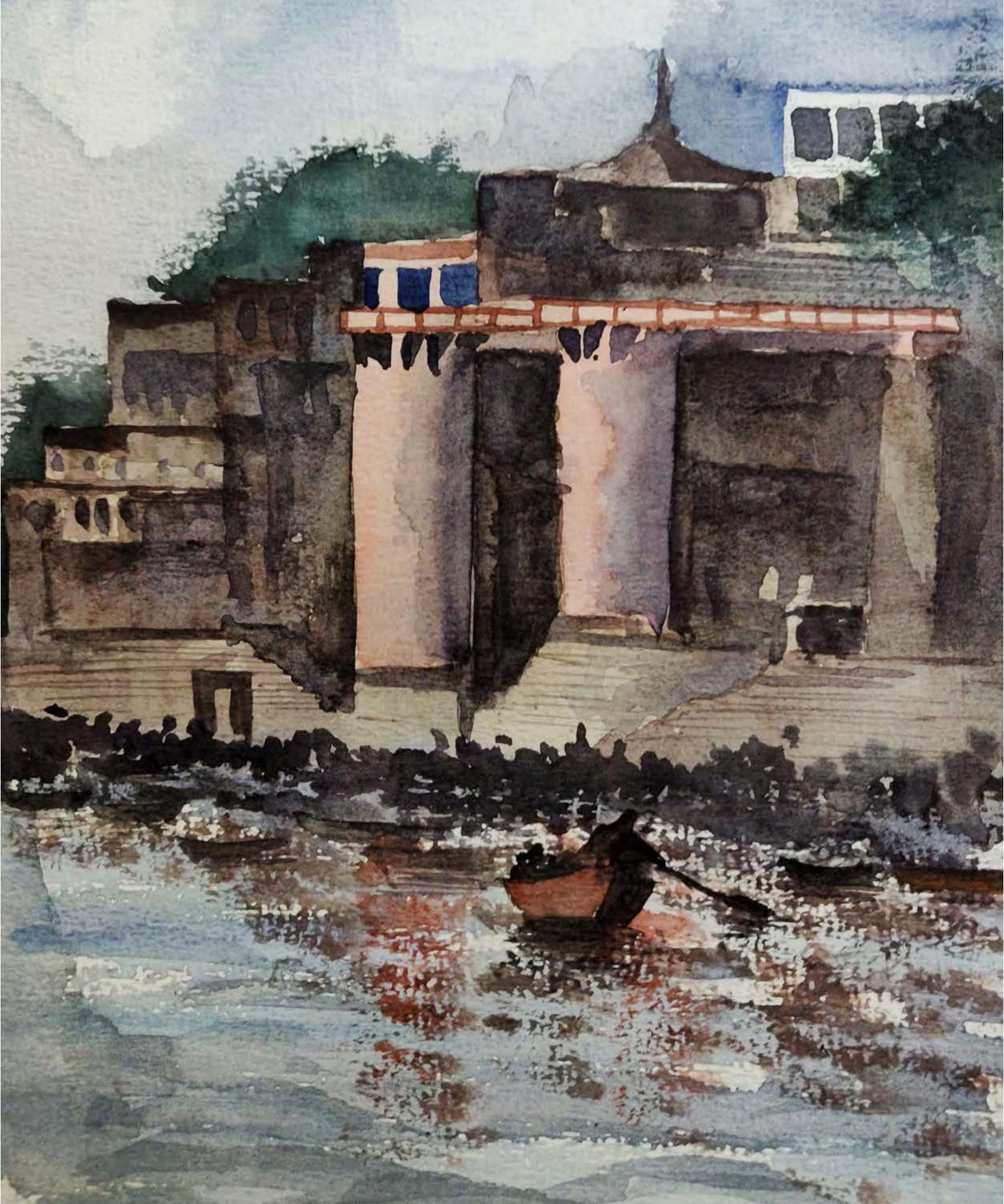
"Shiva and Vishnu are one and the same entity. They are essentially one and the same. They are the names given to the different aspects of the all-pervading Supreme Parabrahman the Supreme Being or the Absolute. 'Sivasya hridayam vishnu-vishnoscha hridayam sivah—Vishnu is the heart of Shiva and likewise Shiva is the heart of Vishnu'."

... here with the forerunners of the 12 Infinite Luminous Adityas: Vishnu, the guardians of the Rudraputras, The Marutis, Rudranath participate in the Union of Cosmic Exchanges: Harihara\_Legend of Manikarnika

(Rig Veda: 5.87.8)



# Kashi



**Alertness Monitoring Devices – Byproducts from Meditation and Cognition**  
 Indian Institute of Technology Kharagpur

## On-board Monitoring Devices

### DDDS: Driver Drowsiness Detection System

**Why DDDS?**

Driver negligence contributes to 85% of the road accidents



Drowsy Driving may lead to loss of attention

**Operation**

**Image from camera**

- Computes PERCLOS
- High PERCLOS, high drowsiness level

**Speech from microphone**

- Voiced to unvoiced ratio
- Low ratio, higher drowsiness level

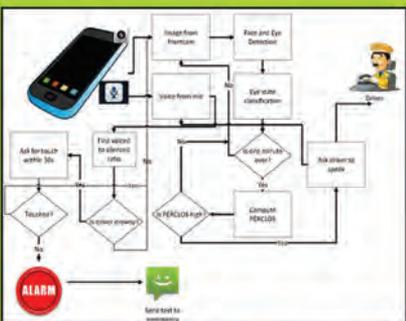
**Sent out alarm**

- Both metrics indicate drowsiness



### DDDD: Diver Drowsiness Detection Device

- a portable smartphone-based system for the detection of drowsiness in automotive drivers.
- system uses image and speech data from the camera and microphone respectively to compute metrics which are authentic indicators of reduced attention level
- two metrics viz. the percentage of eyelid closure (PERCLOS) and the voiced to the unvoiced ratio (VUR) obtained from the image and speech data respectively





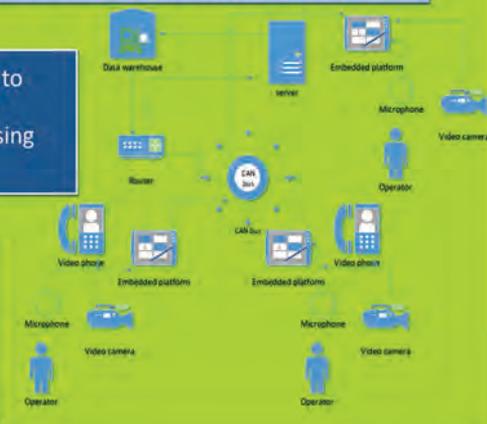
### ODDS: Operator Drowsiness Detection System

**What is ODDS?**

A network of embedded systems to detect the drowsiness level of an industrial operator in real-time using ocular images.

**Why ODDS**

- Drowsiness in operators can cause accidents
- Also may result in reduced performance
- Risks of lives and also to economy



### Pre-screening Devices

#### GNGS: Go No-Go System

**What is GNGS?**

- A system for pre-screening operators engaged in safety critical tasks.
- Decision based on alertness level.
- End users: Pilots, doctors, industrial operators.

**Why GNGS?**

- Safety Critical tasks require high cognitive loading.
- Operator needs to be alert enough to meet such deadlines.
- Low alertness may cause accidents.
- Need a pre-screening device to rule out fatigued operators.

**Method**

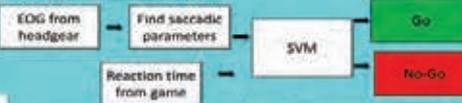
- EOG – physiological parameter.
- Game – psychological parameter.



#### WNGS: Wireless Go No-Go System

**What is WNGS?**

- ☐ Wireless version of GNGS
- ☐ EOG acquisition unit is a headband
- ☐ Game is played on Android device





Positioning of components on the headgear



(a) Batteries (b) Electrode (c) Signal conditioning circuitry

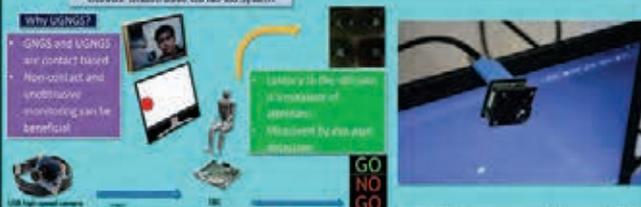


Game screenshots

#### UNGO: Unobtrusive Go No-Go System

**Why UNGO?**

- GNGS and WNGS are contact based.
- Non-contact and unobtrusive monitoring can be beneficial.



Lack of the obtrusive placement of sensors. Measured by the user themselves.



### Publications from the work

- A. Sengupta, A. Dasgupta, A. Chaudhuri, A. George, A. Routray, R. Guha, "A Multimodal System for Assessing Alertness Levels due to Cognitive Loading," in *IEEE Transactions on Neural Systems & Rehabilitation Engineering* (in press), (2017).
- S. Sahoo, and A. Routray, "A Novel Method of Glottal Inverse Filtering," *IEEE/ACM Transactions on Audio, Speech, and Language Processing* 24.7 (2016): 1230-1241.
- SL Happy and A. Routray, "Automatic facial expression recognition using features of salient facial patches," *IEEE Transactions on Affective Computing* 6.1 (2015): 1-12.
- S. Sahoo and A. Routray, "Detecting Aggression in Voice Using Inverse Filtered Speech Features," *IEEE Transactions on Affective Computing* (2016).
- SL Happy, P. Pattnaik, A. Routray, and R. Guha, "The Indian Spontaneous Expression Database for Emotion Recognition," in *IEEE Transactions on Affective Computing*, 2016, DOI: 10.1109/TAFFC-2015.2498174.
- A. Dasgupta, S. Chakraborty and A. Routray, "A two-stage framework for denoising electrooculography signals," *Biomedical Signal Processing and Control* 31 (2017): 231-237.
- A. Basu, A. Routray, R. Mukherjee, and S. Shit, "Infrared imaging based hyperventilation monitoring through respiration rate estimation," *Infrared Physics & Technology* 77 (2016): 382-390.
- Dasgupta, Anirban, Anjith George, S. L. Happy, and Aurobinda Routray, "A vision-based system for monitoring the loss of attention in automotive drivers," *IEEE Transactions on Intelligent Transportation Systems* 14, no. 4 (2013): 1825-1838.
- George, Anjith, and Aurobinda Routray, "A score level fusion method for eye movement biometrics," *Pattern Recognition Letters* (2015).
- George, Anjith, and Aurobinda Routray, "Fast and Accurate Eye Localization Algorithm for Gaze Tracking in Low Resolution Images" *IET Computer Vision*, (2016).
- S. Kar and A. Routray, "Effect of sleep deprivation on functional connectivity of EEG channels," *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 43(3), pp.666-672, (2013).

**Sleep Monitoring Devices**  
Indian Institute of Technology Kharagpur

### Why Monitor Sleep?

34% adults suffer from some type of sleep disorder and most of them don't know. According to WHO, the top five respiratory diseases account for 17.4% of all death and 13.3% of all DALYs loss. 20% of all serious car crash injuries are associated with driver sleepiness, independent of alcoholic effects. In 2008, cardiovascular deaths represented 30 percent of all global deaths, with 80 percent of those deaths taking place in low and middle-income countries.

Talking in full sleep  
 Heart Rate Increase  
 Body Temperature Change  
 Unusually Loud Snoring

### Objective

To develop a accurate unobtrusive, non-invasive, non-contact, and low power sleep monitoring devices.

### Features

- Monitors Respiration & Heart Rate and its changes in pattern**
  - Continuously monitors the breathing and body movement to give a sleep score.
  - Data is stored in real time in your phone and in remote server.
- Non-Contact and Wireless**
  - Placed RADAR based sleep monitoring device on a wall or ceiling.
  - Place the pressure sensor based bed sheet on the bed.
- Integrates with home Appliances like A.C, Lights.**
  - Also can be used as sleep switch for smart home automation systems.
  - Can be integrated with lights and A.C. for controlling them when a person is asleep or awake

### Different Stages of Sleep

Non-rapid eye movement (NREM)				Rapid eye movement (REM)
Stage 1	Stage 2	Stage 3	Stage 4	
Lightest stage of sleep	Most common stage of sleep in adults	Both 3 and 4 are the deepest stages which decreases with age		

**Infrared Sleep Monitoring System- *Let the heat reveal the truth***

### Why Infrared?

- Reliable mode of sleep monitoring only from heat patterns
- Online monitoring from remote locations
- Very effective for old people, children and people having sleep issues
- Online sleep thermal videos recorded can give an insight into a deep dive study of the REM phase of sleep for dream interpretation
- Easy monitoring through various android based apps

### Parameters Measured?

- Respiration Rate
- Cardiac Pulse Rate
- Blood Flow
- Body Temperature
- Pupil Movement

### The Device

Board Size	80mm x 50mm
Processor	PI3 MPP
RAM	512 MB
Power Connector	microUSB (5V)

### Measurement of Respiration Rate

### Estimation of variation in blood flow

WORKFLOW: Capturing a stack of N sequential frames → Thermal image processing, de-noising and correction → Time and gradient calculation → Time gradient based image enhancement → Detecting vessel thermal hotspots near the skin region → Characterizing respective vessels on the basis of thermal hotspots → Estimating the blood flow on the basis of the hot-spot model

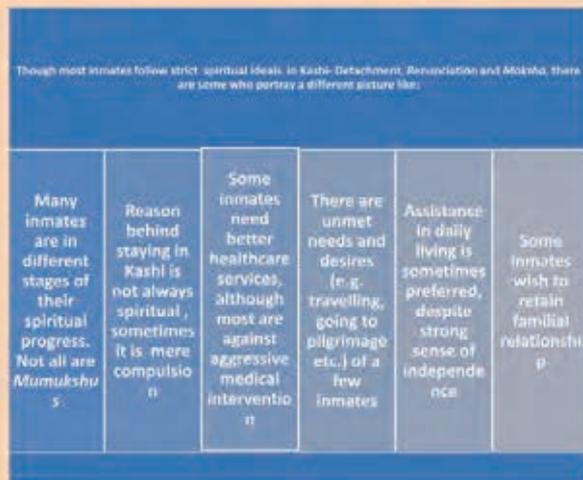
### Results

Subjects	0-40 (min)	40-500 (min)	500-600 (min)	600-900 (min)	900-1100 (min)
Subject 1	28	28	33	32	22
Subject 2	15	18	16	16	15
Subject 3	21	21	19	16	17
Subject 4	20	19	17	17	18
Subject 5	13	13	12	12	12
Subject 6	20	20	19	18	18
Subject 7	15	13	12	12	14
Subject 8	16	16	17	16	16
Subject 9	14	16	16	16	16
Subject 10	23	23	21	19	18

## Components of Good End-of-Life Care



## Preliminary Findings



Compiled by: Dipannita Chand (Research Scholar)  
Supervised by: Prof. Suhita Chopra Chatterjee

## Need based objectives

- To suggest spatial renovations involving barrier-free architecture in accordance with global design principles for Care homes and Hospice, yet suited to the distinct cultural ethos of Varanasi
- To introduce palliation and indigenise it through *Ayurveda/ Yoga/ Pranayam*
- To suggest better care management based on existing SANDHI research on End of Life Care
- To develop close collaborations with civil society organisations, charitable and spiritual organisations, hospitals, and the Varanasi Nigam to bring old age homes within a service network.

## Outcomes

- MAPPING AND WEBPAGE CREATION ON OLD AGE HOMES OF VARANASI**
  - Mapping the needs of the old age homes at Varanasi
  - Mapping need for other support structures
  - Creating culture sensitive and need based modules
- CONFIGURING OLD AGE SUPPORT STRUCTURES**
  - Space and ergonomics
  - Technology
- IDENTIFYING HEALTH NEEDS AND DEVELOPING PARADIGMS FOR CARE**
  - Survey of disease pattern
  - Pain management
  - palliative medicines and protocol for administration to be identified

## What can be done ...

### HELP IMPROVE EXISTING ARCHITECTURE



Staircase



Bathroom



Flooring

### ADOPT A GRANNY : READ HER A BOOK



### RENUNCIATES MAY ALSO NEED FINANCIAL ASSISTANCE



- Assessment and development of compatible and flexible **yoga** protocols
- Motivational strategies to practice them

### PROVIDE YOGA INTERVENTIONS



### PROVIDE ASSISTANCE IN DAILY LIVING TO THOSE WHO NEED YOU



### Provide culturally sensitive MEDICAL INTERVENTIONS

*Join us to help improve Old Age Care  
at Varanasi*

In case you wish to be associated with us contact:  
Prof. Priyadarshi Patnaik (09434209084)  
Prof. Suhita Chopra Chatterjee (09933076150)  
Diparnita Chand (08016899370)  
All are associated with  
Department of Humanities and Social Sciences  
Indian Institute of Technology, Kharagpur  
West Bengal, 721302

## माहेश्वर खण्ड

(From Skanda Purana)

इस खण्ड में दक्ष-यज्ञ वर्णन, सती दाह, देवताओं और शिव गणों में युद्ध, दक्ष-यज्ञ विध्वंस, लिंग प्रतिष्ठा वर्णन, रावणोपाख्यान, समुद्र मंथन, लक्ष्मी की उत्पत्ति, अमृत विभाजन, शिवलिंग माहात्म्य, राशि-नक्षत्र वर्णन, दान भेद वर्णन, सुतनु-नारद संवाद, शिव पूजन का माहात्म्य, शिव तीर्थों सहित शाक्तिपीठ आदि की प्रशंसा, अरुणाचल स्थान का महत्त्व तथा विष्णु को शिव का ही रूप बताया गया है। विष्णु और शिव में कोई अन्तर नहीं है।

## Hari-Hara mahatyam: synthesis of Asceticism and Fecundity; and that of Austerity and Celebration

यथा शिवस्तथा विष्णुर्यथा विष्णुस्तथा शिवः। अन्तरं शिव विष्णोश्च मनागपि न विद्यते ॥ (स्कन्द पुराण)

**Bhagirath-Gomati Basin: Legend of Naimisharanya**

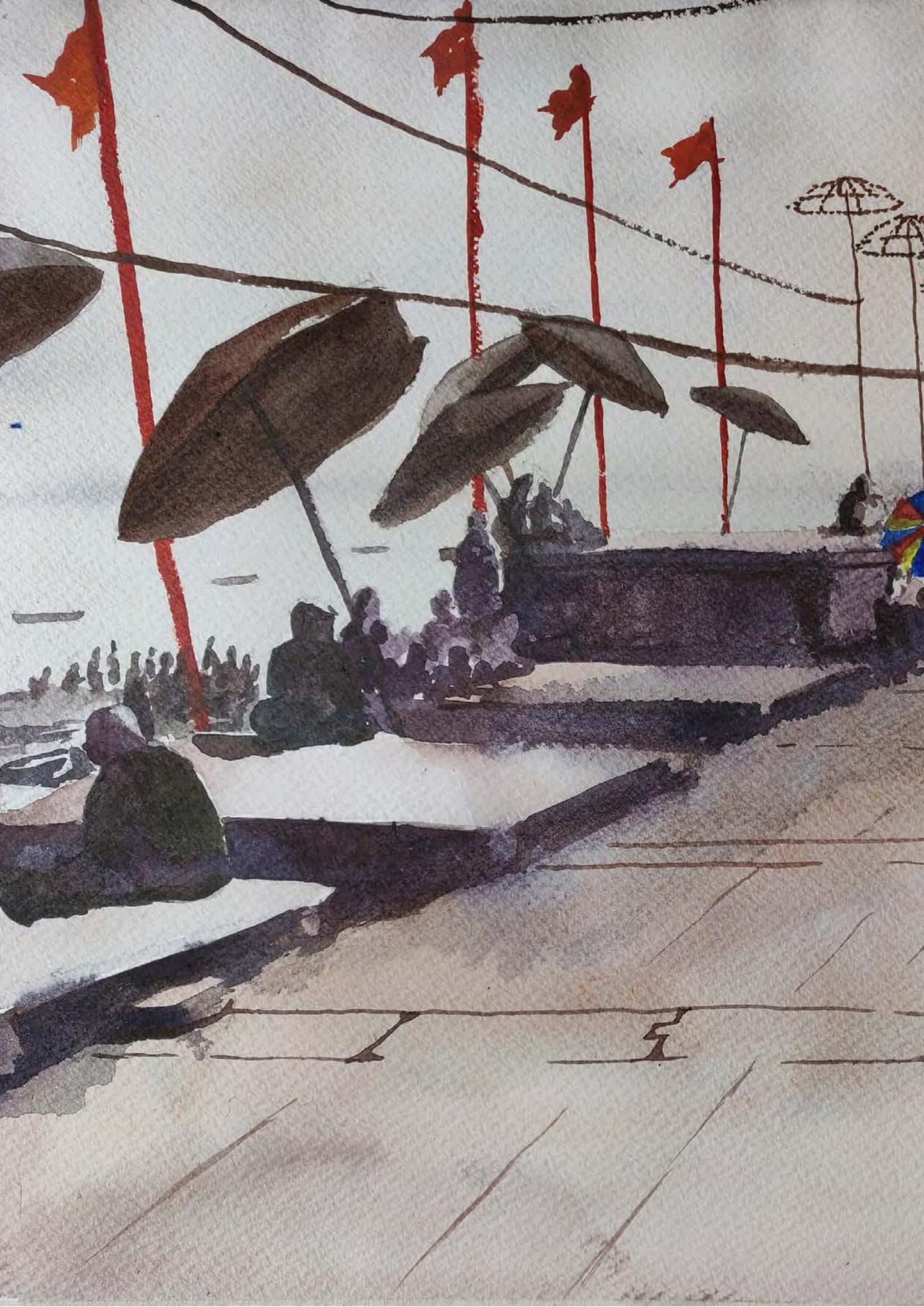
**Seer Saunaka of Bhargabi Samhita (Rig Veda, 2<sup>nd</sup> Mandala and Atharva Veda)**

इस पर महाकाल उत्तर देते हैं कि एक बार पहले भी ऋषि-मुनियों ने नैमिषारण्य में वास करते हुए यह प्रश्न सूत जी से पूछा था। सूत जी ने अपनी दिव्य शक्ति से उन्हें पहले ब्रह्मलोक में, फिर वैकुण्ठ लोक में और फिर कैलास पर भेजा। वहां उन्होंने देखा कि ब्रह्मा जी विष्णु और शिव की उपासना कर रहे हैं। विष्णु जी ब्रह्मा और शिव की उपासना में मग्न हैं। शिव जी विष्णु तथा ब्रह्मा के ध्यान में रत दिखाई दिए। तब ऋषियों ने जाना कि ये त्रिदेव एक ही परम शक्ति के रूप हैं, जो परस्पर एक-दूसरे को महान् समझते हैं। पुराणकार द्वारा व्यक्त की गई यह सद्भावना अति सुन्दर और स्तुति करने योग्य है।

अधिकांश पुराणों में 'बुद्धावतार' का नाम देने के अतिरिक्त उनकी कोई भी चर्चा नहीं की गई है। परन्तु 'स्कन्द पुराण' में उनका 'माया-मोह' के नाम से विस्तृत वर्णन किया गया है, जो पुराणकार की निष्पक्ष मनोवृत्ति की परिचायक है। कलियुग प्रसंग में बुद्ध का विस्तार से वर्णन है और उन्हें विष्णु का अवतार माना गया है। उनके माध्यम से 'अहिंसा' और 'सेवा भाव' का मार्ग प्रशस्त किया गया है।

Source: <http://bharatdiscovery.org/india/>



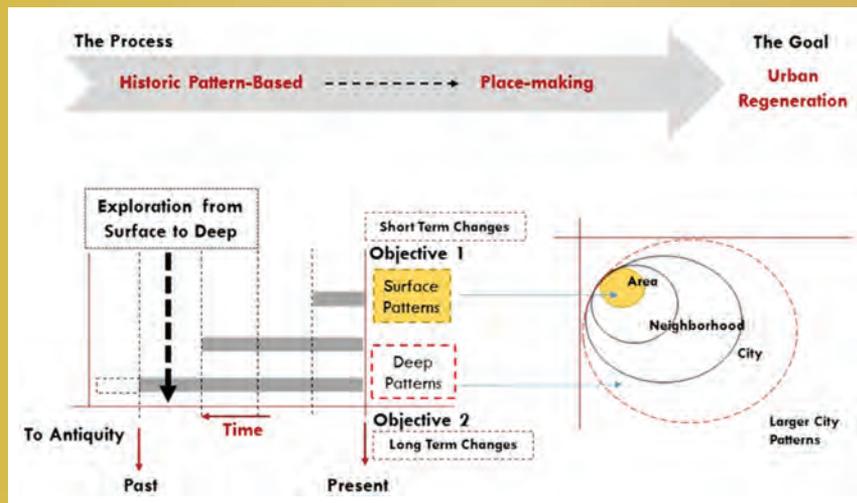




Nagar



# An Urban Regeneration Initiative through Historic Pattern Based Place-making - Case of Indian Traditional Cities



## Aim

To evolve an integrated system of Place making strategies based on a Pattern Language and allied techniques. The system will govern the urban regeneration initiative for Case of Varanasi.

## Objectives

- 1 To identify urban patterns and their representing place making as Surface / Visible / Quantified Elements of Design (EoD)
- 2 To subsequently extract deep patterns which are long term cultural representatives and can be reproduced as deeper Elements of Design (EoD)
- 3 To develop a framework for practical application by comparing and layering the first two objectives and evolving a Planning Support System (PSS) based approach towards urban regeneration of historic cities.

Research Scholar Vidhu Pandey,  
ARP, IIT Kharagpur

## An assessment of spatial-economic impacts of airports on airport-oriented development (AOD)

### Objectives

- 1 To analyze the spatio-temporal patterns (landscape dynamics) of growth around airports in Tier-II Indian cities using multi-resolution data and spatial metrics.
- 2 To assess the exploratory spatial parameters of air network (type, accessibility, and connectivity) and spatial effects (distribution, autocorrelation, and econometrics).
- 3 To predict and simulate the spatio-temporal patterns using cellular automata and related soft computing techniques and to develop an overall AOD Index for the airport-region.

### Deliverable

- 1 Analysis and prediction of the spatio-temporal patterns of airport on its respective region over a duration of time.
- 2 Assessment of spatial metrics, network (type, accessibility, and connectivity), and spatial effects (distribution, autocorrelation, and econometrics) with respect to AOD.
- 3 A methodology to understand and predict the relationship between air transportation, land-use/location, and economic development and its augmentation with the estimation of an AOD Index.
- 4 Action-plans and recommendations derived from managerial and institutional policy innovations in accordance to airport-oriented development to make more efficient urban systems.

## Performance evaluation of urban pedestrian infrastructure network

### Objectives

- 1 To develop a selection technique for identifying attributes affecting performance of sidewalk networks
- 2 To develop a performance measure for sidewalk networks
- 3 To develop policy scenarios to measure impact of sidewalk networks on local economy

### Deliverable

- 1 A Pedestrian Level of Service (PLOS) measure which will cover the entire spectrum of walking (flow characteristics, built environment quality and users' perception).
- 2 Machine learning based PLOS assessment
- 3 A network-wide assessment methodology for PLOS
- 4 Policy guidelines for planning pedestrian network so as to impact the local economy



Research Scholar **Deepanjan Saha**, ARP, IIT Kharagpur  
 Research Scholar **Sunny Bansal**, RCGSIDM, IIT Kharagpur



“ In every case this symbolism is one of aggregation, recurring in China, where the Swastika is the sign for the number ten thousand, which is the totality of beings and manifestations. It is also the earliest shape of the ideogram FANG denoting the four quarters of space. It might well be related, too, to the numbers of the LO-CHU, which in any case conjure up cyclical and gyratory motion. ”

— *The Penguin Dictionary of Symbols*

# Samaj





## Real Time Elderly Monitoring Device for the OACIS (Old Age Comprehensive Information System)

### Monitoring Old Age People Using Infrared Imaging



**OBJECTIVE**

- To develop a monitoring device which will monitor the physical and emotional state of elderly persons.
- The condition of the elderly persons can be viewed from a remote location and assistance can be arranged accordingly.
- It will also take care of the facilities that may be required by the elderly persons in future.

**Motivations**

- Increase in diseases and delay in cure
- Lack of facilities at old age homes
- Lack of caretakers
- 24 hrs monitoring needed
- Availability of Doctors
- Multidisciplinary approach needed

**Our Solution**

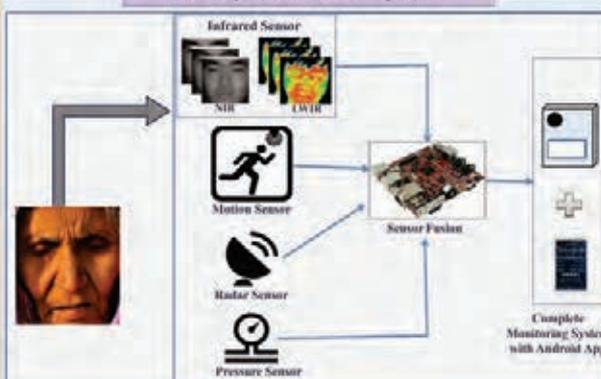
- Body Temperature
- Heart Rate
- Respiration Rate
- Blood Flow Rate

**Problems faced in Old Age**

Problem	Level
Psychological Condition	High
Lungs	High
Heart	High
Digestion Problem	High
Physical condition	High
Vulnerability to diseases	High
Brain power	Low
Sleep	Low
Mobility	Low



#### Concept of the Entire System



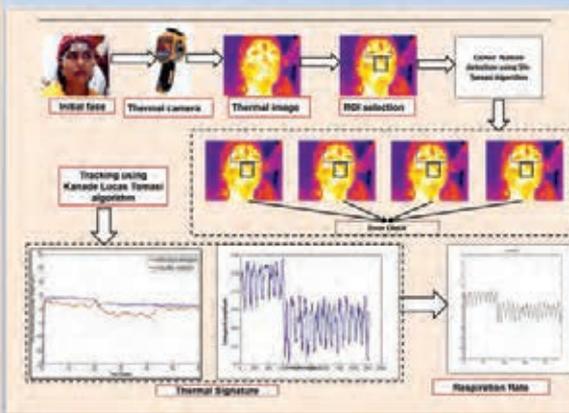
#### The Hardware

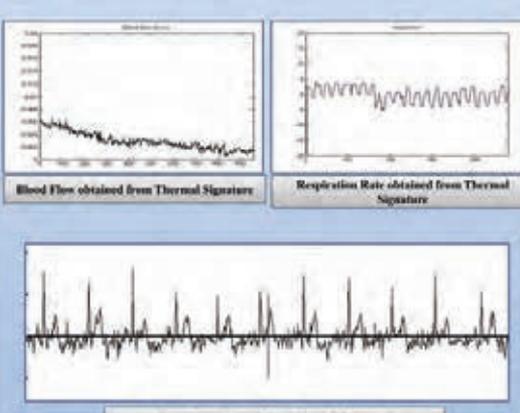


Specification of the board	
Basic Size	85mm x 56mm
Processor	700 MHz
RAM	512 MB
Power Connector	microUSB (5V)



### Physiological signals obtained through the proposed technique









**Old Age Homes in Varanasi:  
Exploring a rapid Sustainable and  
integrated Financial Model:  
Case of 2-3 organization/ ashrams  
(Kedar to Dasawsamedh)**

**To Improve End-of-Life Care by  
Reconfiguring Old Age Homes (OAHs)  
in Varanasi  
(case of 2-3 Ashrams augmentation)**

**Dasashwamedh Ghat**  
The facade of the Haridwar Ghat (the complex of ghats with staircases and parapets) is in a poor state of conservation.

**Prachin Dasashwamedh Ghat**  
The lack of basic amenities like toilets and health care is a major concern. The upper floors of the Ramesh Mahesh Ghat are in a poor state of conservation which require immediate attention to the public health.

**Holkar Ghat**  
Due to improper fencing the steps of Chhoteswami Ghat are deteriorating and require immediate restoration. Unplanned development is badly affecting the historic and authentic identity and character of the river edge. The Dasashwamedh Ghat is in a state of collapse and requires immediate attention.

**Durgawadee Ghat**  
The underutilized corner space of the Digwari Ghat is used as a garbage dump or for cremating and can be a potential soft spot for land-use development.

**Phoolwari Ghat**  
Lack of maintenance and conservation resulting into deterioration of historic property, requires immediate consideration.

**River Ganga**



Chapter-1: A concise treatment of all ancient Meditation techniques of India including, Kriya Yoga, Hatha Yoga etc.  
 Chapter-2: Account of all the celebrated saints and sages like, Santha Tulasi Das, Santha Kabir, Trailanga Swami, Shyama Charan Lahiri, Acharya Shankara  
 Chapter-3: The traditional rituals of Varanasi  
 Chapter-4: The ancient Kriya Yoga Paramarah as propounded by Yograj Shyama Charan Lahiri  
 Chapter-5: Vipassana, the Buddhist Meditation technique  
 Chapter-6: An account of all historical religious shrines of Varanasi  
 Chapter-7: Contains the activities at the Ghats throughout the day starting in the early morning till the late night  
 Chapter-8: A comprehensive review on the books on Varanasi  
 Chapter-9: An interesting chapter citing the research and research groups working with various aspects of Varanasi  
 Chapter-10: The Spirit of Varanasi: The pros and cons of modernization, the traditional and modern amalgamation, what needs to be done by the people, administration and researchers, Is it a place for Mokhsya any more? Swachh Bharat, Cleanliness is Godliness, answering critical questions as Banaras.

**KRIYA YOGA**

Chapter-1: Traditional Meditation Techniques: Paramahansa Premananda  
 Chapter-2: Saints and Sages of Varanasi: Swami Shuddhananda Giri  
 Chapter-3: The Rituals of Varanasi: Swami Sanatananda Giri  
 Chapter-4: Kriya Yoga Paramarah at Varanasi: Swami Shuddhananda Giri  
 Chapter-5: Vipassana and Varanasi: Dr P. Pattnaik  
 Chapter-6: Religious Shrines of Varanasi: Dr Joy Sen  
 Chapter-7: Relaxation at Varanasi Ghats : Dr Amrita and Dr Swami  
 Chapter-8: Book Review on Varanasi: Dr Manorama and Dr Rashmi  
 Chapter-9: The Spirit of Varanasi: Dr Amrita and Dr Swami  
 Chapter-10: Research Review on Varanasi : Dr Rashmi and Dr Manorama



**"Upon the dissolution of the mind consciousness begins"**

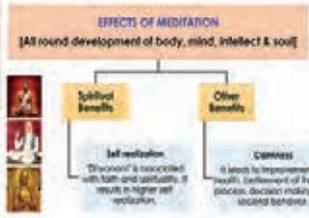
**TRADITIONAL CONCEPT**  
Dhyana is considered to be a state achieved through repeated and prolonged practice of seated, well defined physical and mental processes. The outcome of this process is a state of mind where it is believed that thoughts are almost nonexistent.

**MODERN CONCEPT**  
The contemporary scientific definition of meditation is a practice (process) in which an individual trains one's mind or induces modes of consciousness in order to achieve some psycho-psychological benefits.

**जगत्सर्वं व्यतीतं च तस्मिन् एव। तदा जयिष्यमाणं च परमार्थं विविचि।।**  
At Carajah disappears in the, & peak soft in water, so the mind united with the **self** losing its identity

**MEDITATION: THE PROCESS**

**ब्रह्म नियंत्रणं च स्व-नियंत्रणं (Mind control),  
ब्रह्म नियंत्रणं च स्व-नियंत्रणं (Mind control),  
ब्रह्म नियंत्रणं च स्व-नियंत्रणं (Mind control),  
ब्रह्म नियंत्रणं च स्व-नियंत्रणं (Mind control)**



**OVERALL BENEFITS**

- Stress reduction
- Improved focus
- Better sleep
- Enhanced creativity
- Improved memory
- Better decision making
- Improved social behavior
- Better health

**Neurochemistry and Meditation**

Brain & Neurochemistry: Neurotransmitters, hormones, and other chemical messengers that regulate brain function.

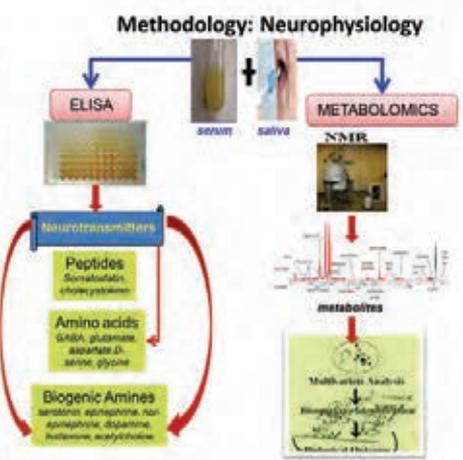
**Neurotransmitters**

- Acetylcholine
- Dopamine
- Gamma-aminobutyric acid (GABA)
- Glutamate
- Histamine
- Norepinephrine
- Serotonin
- Synaptic vesicles
- Thyroid hormone
- Uric acid
- Vitamin B12
- Zinc

**Hormones**

- Adrenaline
- Cortisol
- Estrogen
- Insulin
- Progesterone
- Testosterone
- Thyroid hormone
- Vitamin D

- Issues in Research on Meditation**
1. Design of experiments [Recruiting good subjects, more number of subjects]
  2. Maintaining the quality of meditation.
  3. Interference of experiments with meditation.
  4. Creating a conducive environment for the experiments.
  5. Intra-subject variation is too much.
  6. Capturing the eye saccades during meditation.
  7. Money for compensation and equipment



**Effects of Different Meditation Traditions**

Tradition	Effects
Mindfulness Meditation	Reduces executive function, or control by ACC, and increases alpha coherence with associated mood changes. More responsive to positive events in right frontal lobe, whereas more sensitive to left for the negative events.
Qi-gong	The electromagnetic activity and thermal processes increases, accompanied by global alpha rhythm.
Transcendental Meditation	Significant increase in brain stimulation in alpha-theta region in prefrontal, parietal, and temporal lobes.
Indic Meditations (Sahaja Yoga, SKY)	Not possible detection of theta in treatment of meditators, in effort in prefrontal cortex and associated with frontal activation and emotional activation.



**Saccade & Alertness**

Quick, involuntary movements of both eyes in the same direction. Once saccades are underway, they cannot be interrupted.

**Alertness**

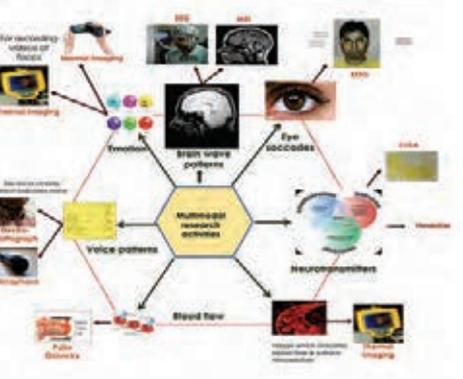
Abolition & Attention

The position of head

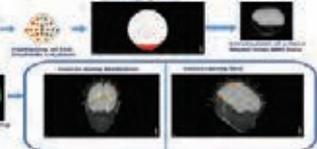
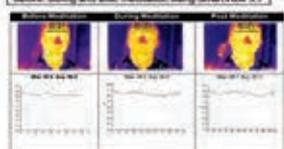
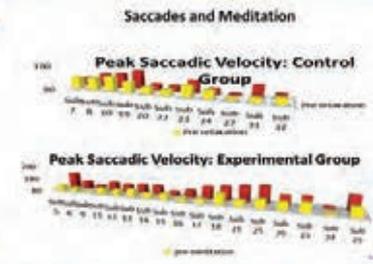
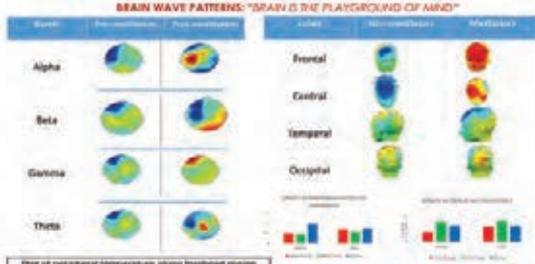
- Eliminates the head-trait, thereby proprioceptive-direction.
- Eliminates the sensory perception, and meditation (being present).
- Compare results among male and female.
- Conduct the subject for non-meditation based with some pigment tests.

**Activations during Different Meditation Traditions**

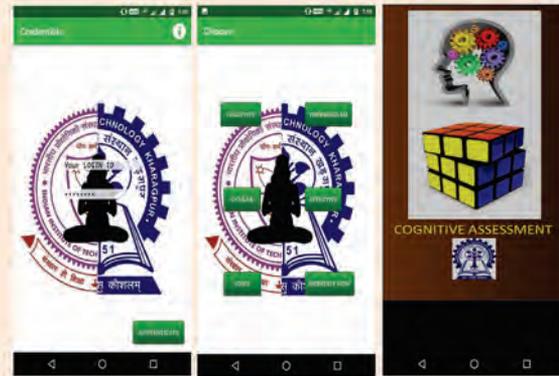
Tradition	ERP changes	Wave changes	Area
Mindfulness Meditation	ERP has larger amplitude in frontal-central region	Alpha-theta coherence in frontal-central region	Frontal
Qi-gong in Thinking of Breathing	NA	Alpha-theta coherence in frontal-central region	Central
Transcendental Meditation	Peak latency with non-changing amplitude, increase of age-related reduction	Alpha-theta coherence in frontal-central region	Temporal
Indic Meditations (Sahaja Yoga, SKY)	NA	Alpha-theta coherence in frontal-central region	Occipital



**Analytics with Short term meditation**



## Android Apps for Meditation



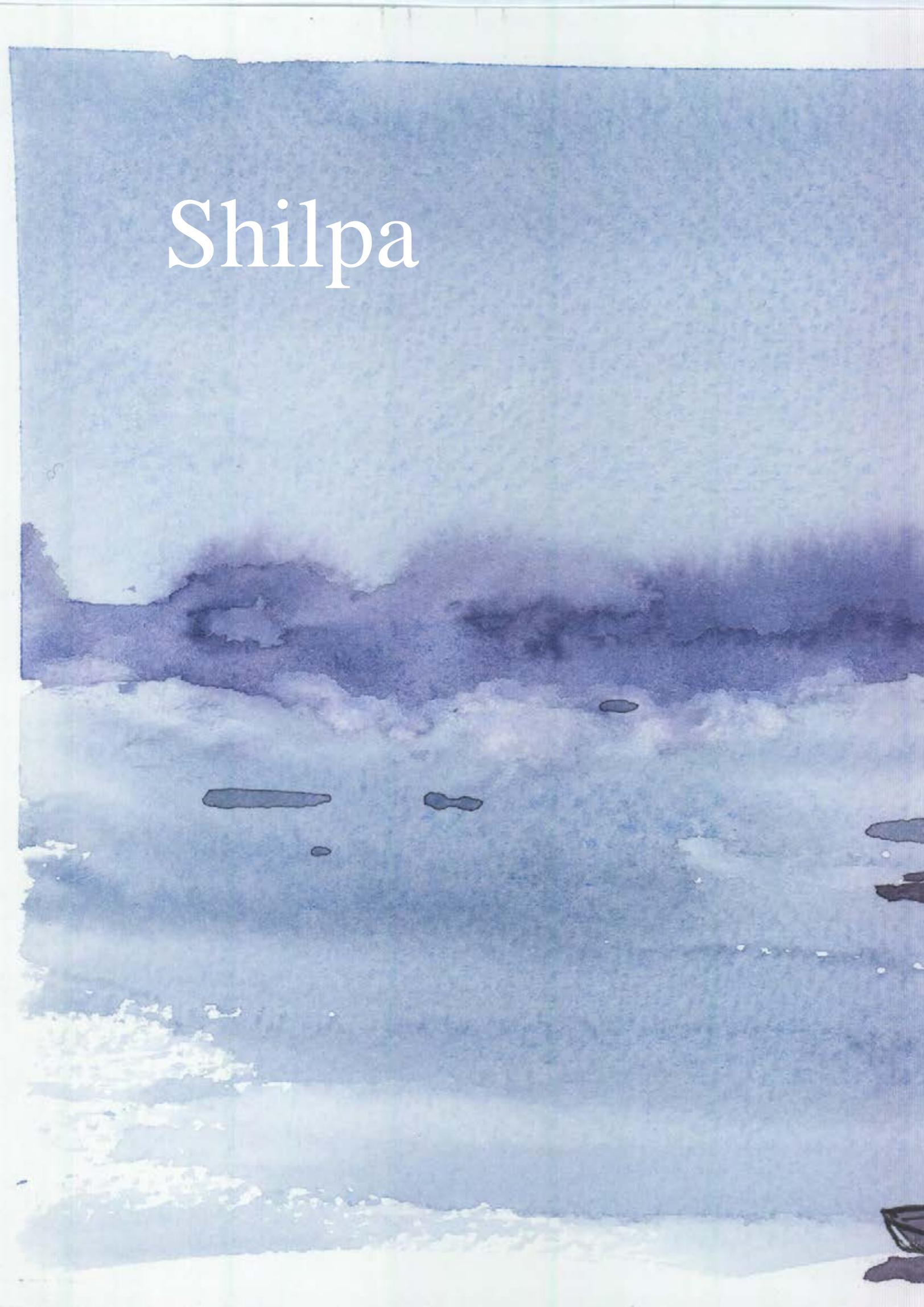
## Smart Yoga Mat (SYM)



**What is SYM?**  
A smart instructive yoga system with suggestive feedback  
Uses camera to check for correct posture

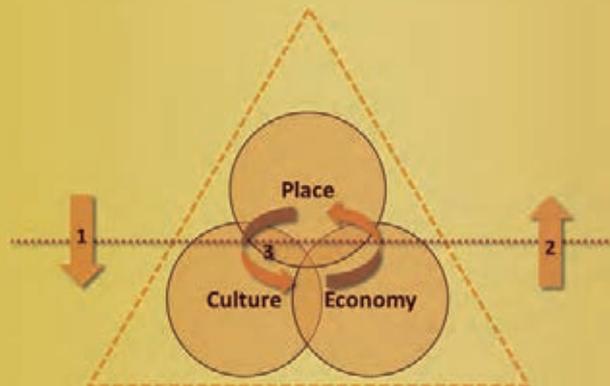


# Shilpa





An assessment of the **complementarities** between **place and traditional cultural industries** in an Indian heritage city: Case of handloom weaving industry in **Varanasi, India**



**Aim**

To assess the complementarities between place and traditional cultural industries in an Indian heritage city.

**Objectives**

- 1 To assess the contribution of place towards sustenance of traditional cultural industries
- 2 To assess the contribution of traditional cultural industries towards local development of place
- 3 To assess the strength of complementarity between place and traditional cultural industries



RS Deepanjan Saha, ARP, IIT Kharagpur

## *Appropriate skill up-gradation of design and technology for Indian Crafts*



### **Thinking through crafts: Traditional problem solving techniques**

Crafts have flourished with the risk-taking ability of small time entrepreneurs, locally available resources and hand skills in the absence of any formal structure for training, up-gradation or support. Sennett (2009: 101-110) describes craftsmanship as a basic human impulse to do a job well for its own sake; where the focus is not the individual but craftsmanship itself. He discusses material consciousness as an attribute of any work that is built on the curiosity of the material in hand; therefrom suggesting that even a surgeon is a craftsman. Craft, here is understood as a dynamic process of knowing and learning through material (Gray& Burnett, 2009: 51). Further implying that the process of making material objects by hand is one of the ways of thinking intellectually (Sennett, 2008: 149-153); thus connoting that craftsman is a reflective practitioner (Schon, 1983: 79).

Interestingly, such craftsmanship displays not only a practiced skill but also the ability to improvise decisions in an unpredictable circumstance, on the floor of the factory itself. While craftwork is often repetitious, it also regularly involves unanticipated problem solving, lacking fore-planning. If something does not work as expected, the craftsman has to make adjustments on the fly. (Kritzer, 2007:328) Consequently, problem finding and problem solving become closely related in craftsmanship, which often turns mistakes into opportunities (Sennet, 2008: 9). Rigid traditions and immediate actions go hand in hand while making an artefact, leading to a self-adjusting process. This process has an inherent equilibrium that leads even the most aimless changes into well-fitting forms (Alexander, 1964:52). Therefore, despite rudimentary technology, material-specific skills, low literacy and an absence of fore planning on the drawing board, craft thinking still produces an astonishingly well-balanced result and a close fit to the needs of the user (Jones, 1970:15, Balaram, 2011:135). This may explain the re-emergence of craft, craftsman and his methods of craftsmanship in contemporary discussion as an alternate method of thinking and visualization rather than an anthropological subject matter or a historical vestige for archiving (Adamson, 2007:3-4; Ferris, 2009:i; Sennett, 2009:9; Reitan, 2006:71-72; Wenger, 2000: 229).

*Varanasi the oldest living city in the world. Where spirituality and culture find shelter on the banks of the Ganga. Where the essence of India lives and breathes in a million heartbeats. And where Jnana-Pravaha is headquartered, overlooking the majestic Ramnagar Fort across the holy river. Less than a kilometer south of Samne Ghat, and two kilometers east of the famous Banaras Hindu University. Situated in an environment that is an oasis of peace, learning and reverence.*

## *Ashtadhatu Sculptures*

*Founded in 1997 by Smt. Bimla Poddar and Sri Suresh Neotia and nurtured by its Director, Late Prof. R. C. Sharma, Former Director General / Vice Chancellor of National Museum / Institute, New Delhi, Jnana-Pravaha today is a Centre of Excellence. It promotes, supports and propagates Indian Culture in its quintessence. And, when need arises, confers stipends and scholarships to serious students on research projects pertaining to Indian art and culture. Jnana-Pravaha, registered as a Trust on June 26, 1997, is a non-profit organization and exempted from Income Tax under Section 80G.*



Vat-Krishna  
(Krishna on Leaf)



Krishna



Buddha



Buddha



Dancing Ganesha



Surya

## *Repousse Work*

*'Repousse' is a traditional technique in which a malleable metal is raised up from the surface by hammering from the reverse to create a raised design on the front. 'Chasing' is the opposite technique to repousse, i.e. the metal is pushed down into it from the front to refine the design on the front. Both are used in conjunction to create a finished piece. It is also known as 'Embossing'. The techniques of repousse and chasing utilize the plasticity of metal, forming shapes by degrees. There is no loss of metal in the process, as it is stretched locally and the surface remains continuous. The process is relatively slow, but a maximum of form is achieved with one continuous surface of metal sheet of essentially the same thickness. Direct contact of the tools used is usually visible in the result, a condition not always apparent in other techniques, where all evidences of the working method are eliminated.*



Photo Frame



Plate



Jewel Box



Basket



Gulab Pash  
(Rose-water Sprinkler)



Pen Holder





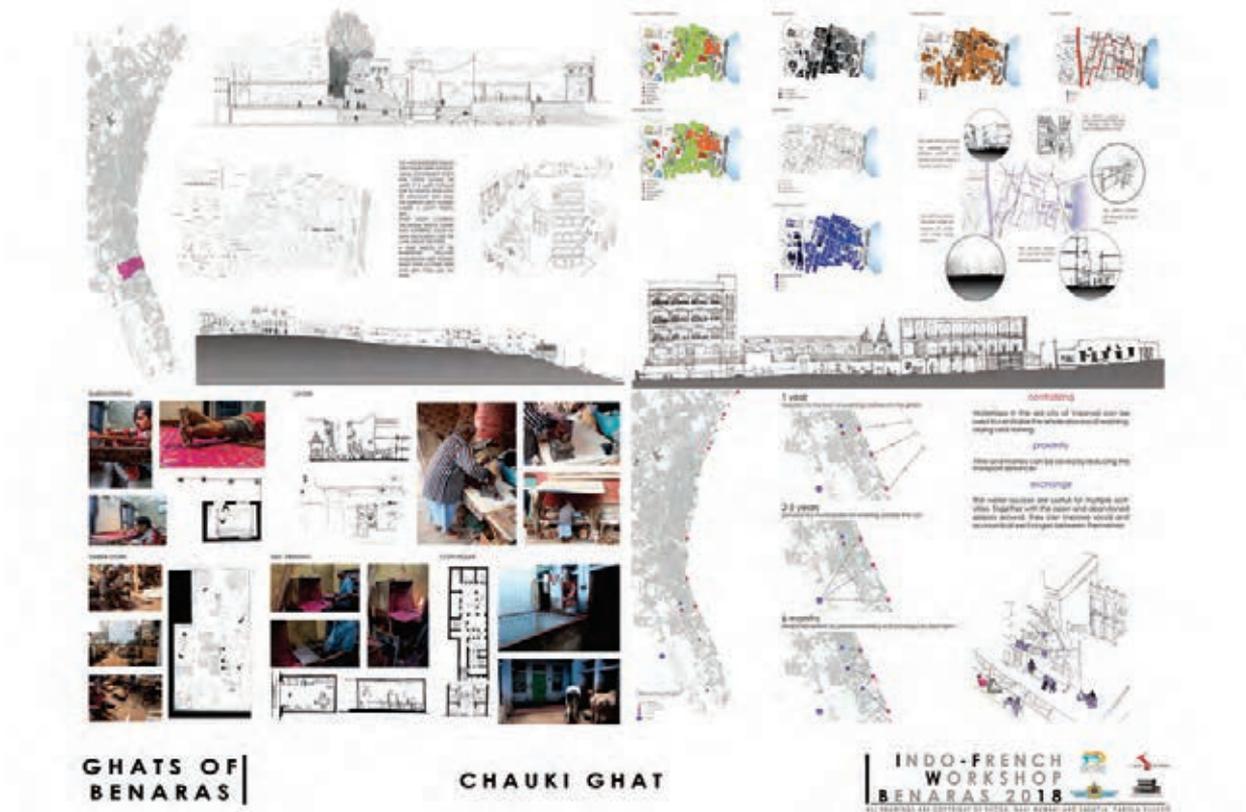
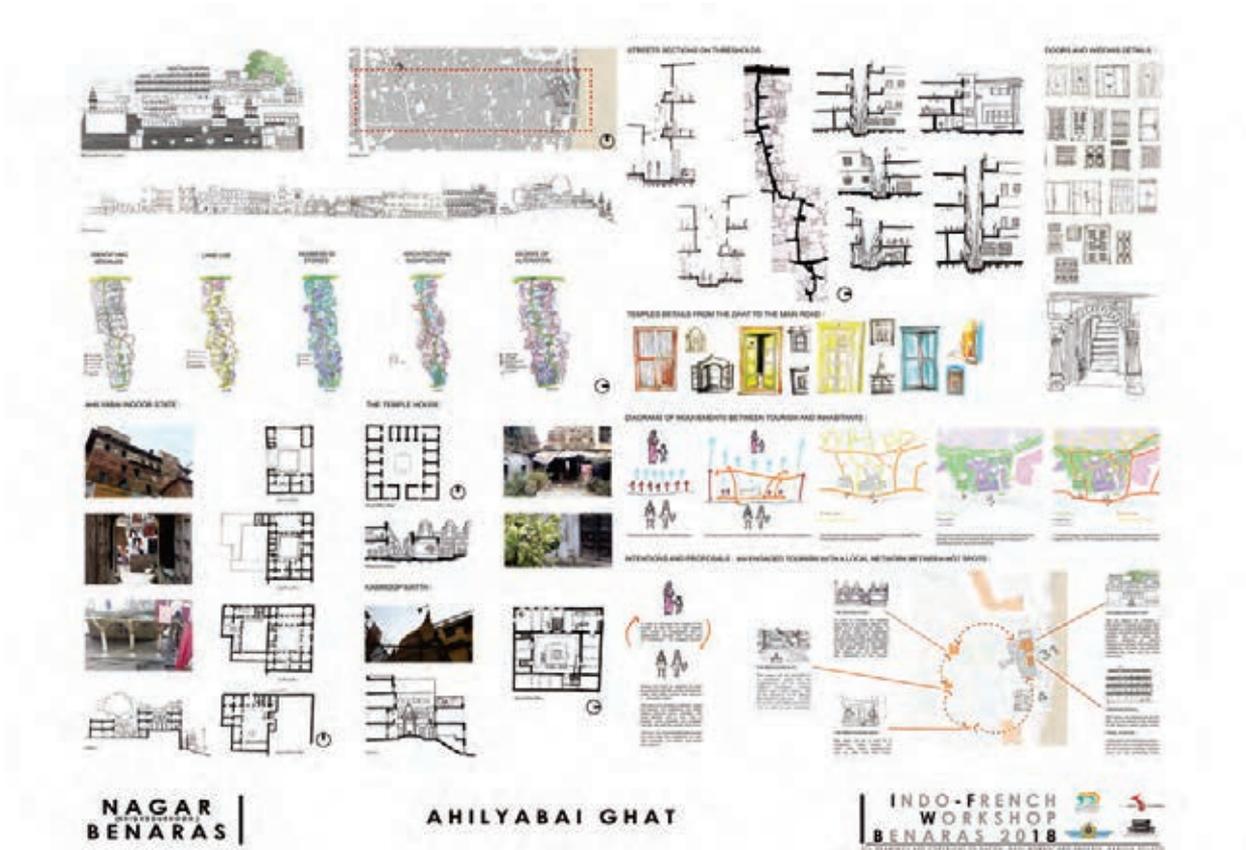
# INDO-FRENCH WORKSHOP

Contributors: Bharati Vidyapeeth College of  
Architecture, Navi Mumbai



“ Non-existence can never be the cause of what exists. Something cannot come out of nothing. That the law of causation is omnipotent and knows no time or place when it did not exist is a doctrine as old as the Aryan race, sung by its ancient poet-seers, formulated by its philosophers, and made the corner-stone upon which the Indian man even of today builds his whole scheme of life. ”

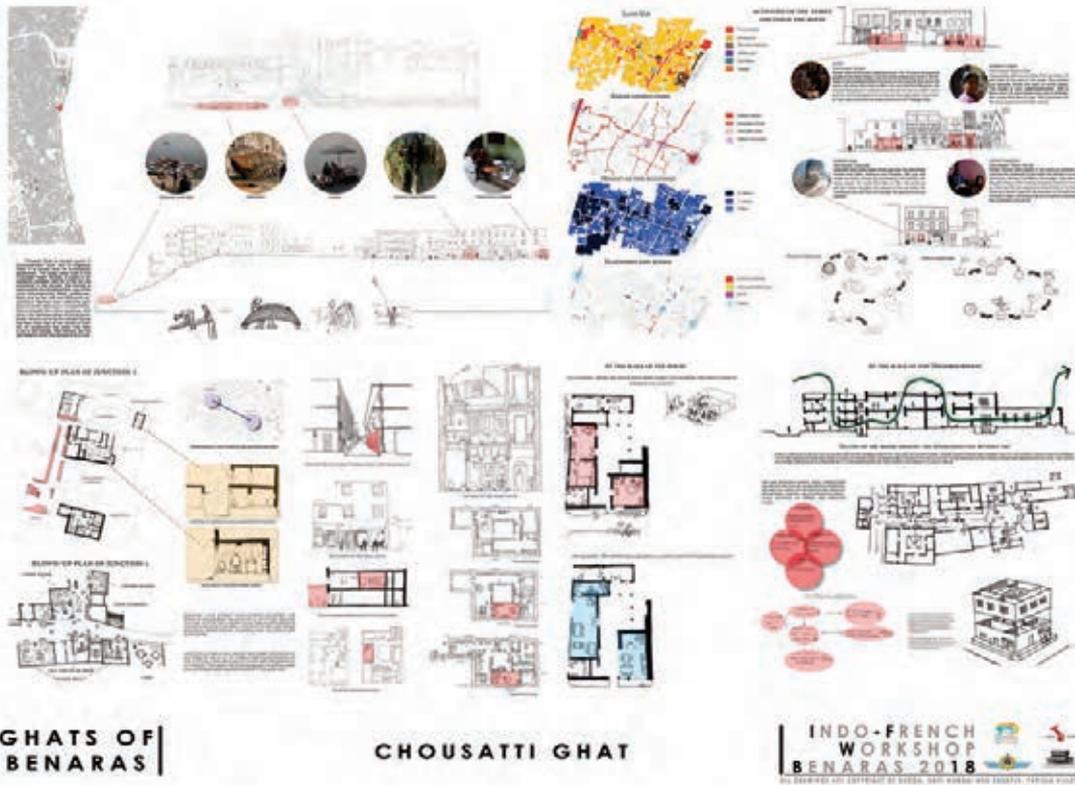
— Swami Vivekananda





“Guenon explains these two opposite directions as ‘the world’s rotation seen from one or other of the poles’ the poles in question being human and celestial, rather than the poles of the terrestrial globe.”

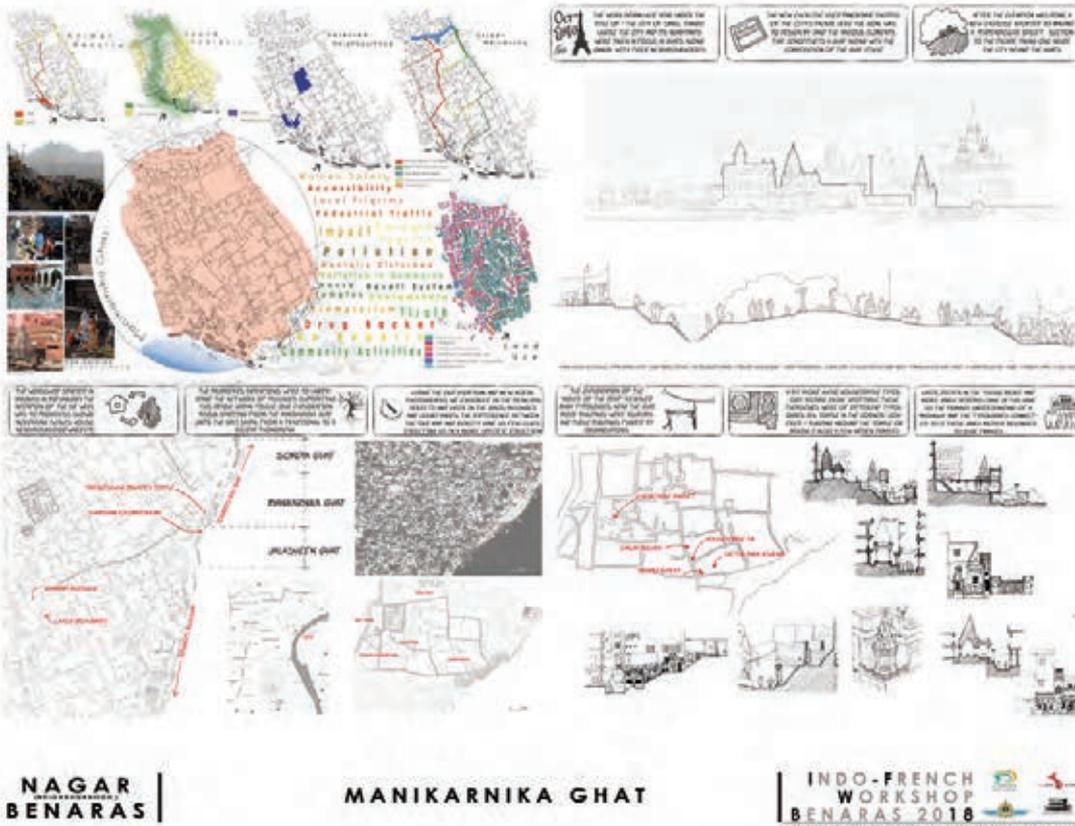
— *The Penguin Dictionary of Symbols*



**GHATS OF  
BENARAS**

**CHOUSATTI GHAT**

**INDO-FRENCH  
WORKSHOP  
BENARAS 2018**



**NAGAR  
BENARAS**

**MANIKARNIKA GHAT**

**INDO-FRENCH  
WORKSHOP  
BENARAS 2018**

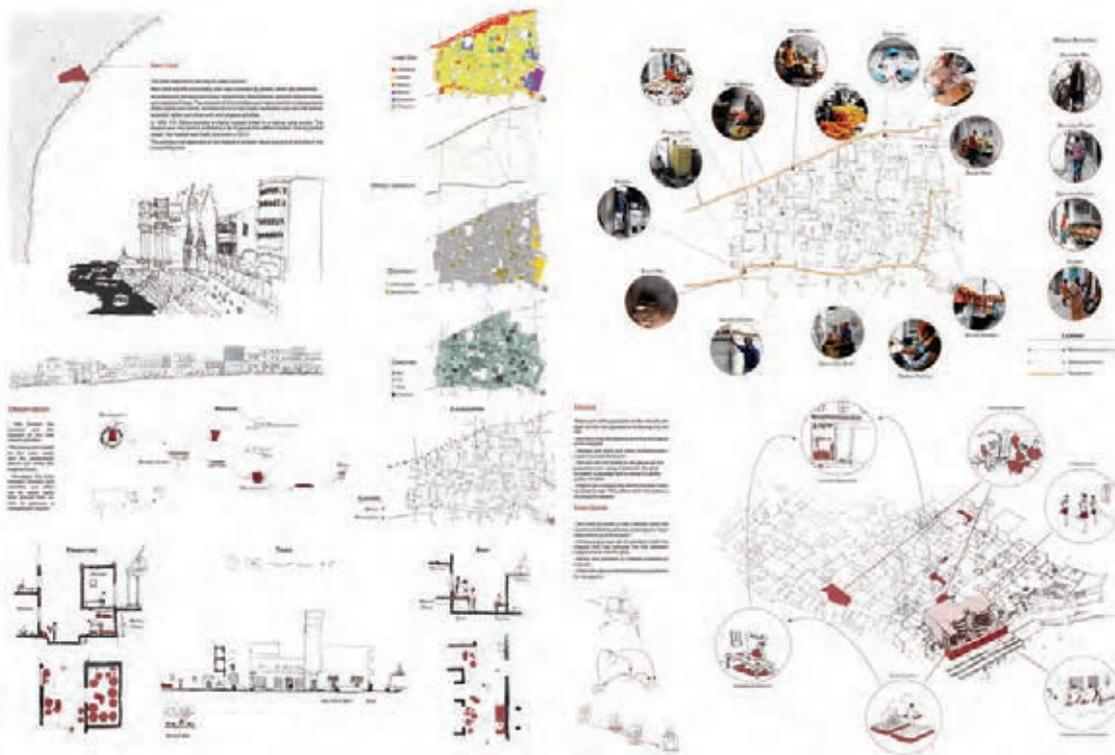


“

*Guenon explains these two opposite directions as ‘the world’s rotation seen from one or other of the poles’ the poles in question being human and celestial, rather than the poles of the terrestrial globe.*

*— The Penguin Dictionary of Symbols*

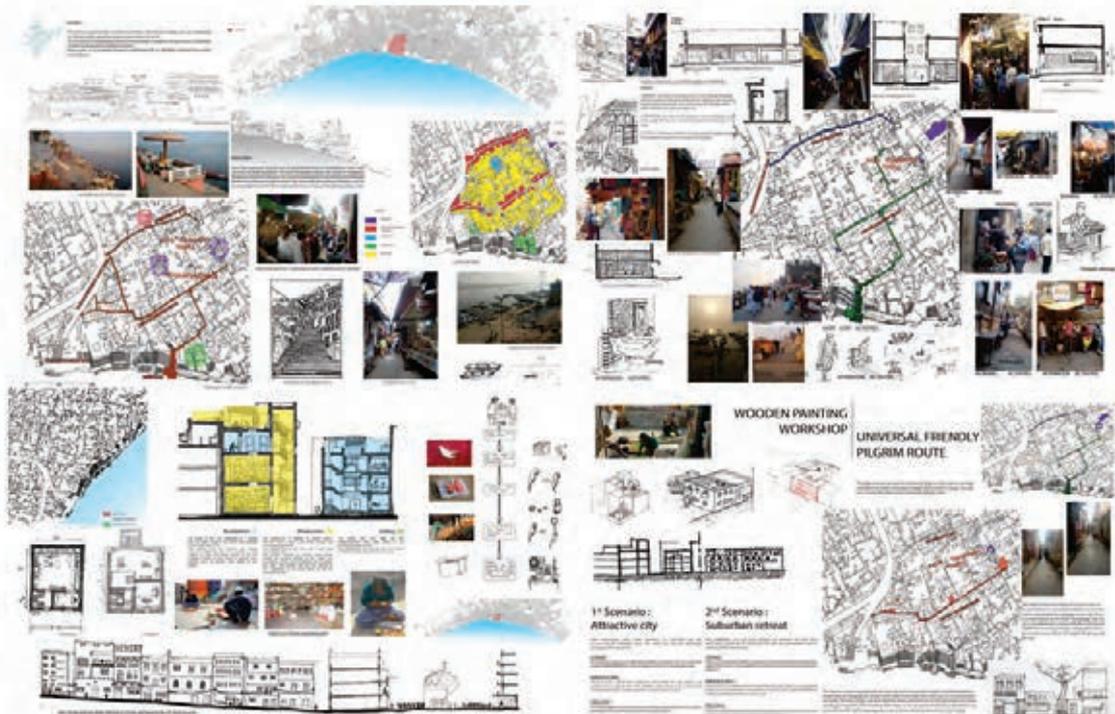
”



SHILPA  
BENARAS

RAM GHAT

INDO-FRENCH  
WORKSHOP  
BENARAS 2018



SHILPA  
BENARAS

SANKATHA GHAT

INDO-FRENCH  
WORKSHOP  
BENARAS 2018



## **COLLABORATION STUDIO 1 (2018)**

With Graduate School of Architecture, Preservation and  
Planning (GSAPP), Columbia University, New York City, USA

*In association with*

**IIT (BHU), Varanasi & Jnana Pravaha, Varanasi**



Varanasi got its name from the rivers Varuna and Assi within which the city thrived along the holy river Ganga. The rural setting with urban facilities is what sets this transect along the Varuna apart from other parts of Varanasi. The Varuna which was once the life source for the surrounding villages has now become a narrow canal affected with polluted waters. The main aim of this study is to make the river a part of people's life and appreciating an amalgamation of rural and urban lifestyle rather than changing them.

## Objective

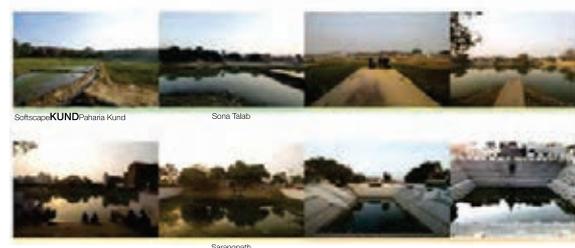
The journey throughout the given transect was a series of transition from city to village, farmland to built structure to riverbeds, softscape to hardscape & temporal to static. We started our journey from the Adi Keshav Ghat into Saray Mohana village, to the various kunds across the several bridges that came along the aforementioned transect

- To stop making assumption of an urban/rural divide and embrace a gradient of productive & material landscape
- To make Varuna River a stewardship system and an ecological infrastructure

## Methodology

1	2	3	4
<p>Briefing about the Transect.</p> <p>Marking all the Kunds.</p> <p>Identifying the Socio-Economic and Spatial Fabric of the area.</p>	<p>Documenting the Kunds and finding out their inter relationship.</p> <p>Photographic and videographic documentation of different types of activities along the transect, interaction with the communities working there and documenting their activities in relation to the larger context of the city.</p>	<p>Site Visit and Observing the spatial nature of the context.</p> <p>Documenting Adi Keshav as a space in transition through observation and personal interviews of the surrounding villages.</p>	<p>Contemplation on the collected data and coming up with a broader theme of flow, flux and temporality that may help shape future design activities.</p>

## Timeline of the field studio



Indian Institute of Technology Kharagpur

In association with:

Graduate School of Architecture, Planning and Preservation (GSAPP), Columbia University, NYC, USA

Indian Institute of Technology (BHU), Varanasi, India



*There was an inquisitiveness in the race to start with, which very soon developed into bold analysis, and though, in the first attempt, the work turned out might be like the attempts with shaky hands of the future master-sculptor, it very soon gave way to strict science, bold attempts, and startling results. Its boldness made these men search every brick of their sacrificial altars; scan, cement, and pulverise every word of their scriptures; arrange, re-arrange, doubt, deny, or explain the ceremonies.*

**— Swami Vivekananda**

## PRACTICE POCKETS

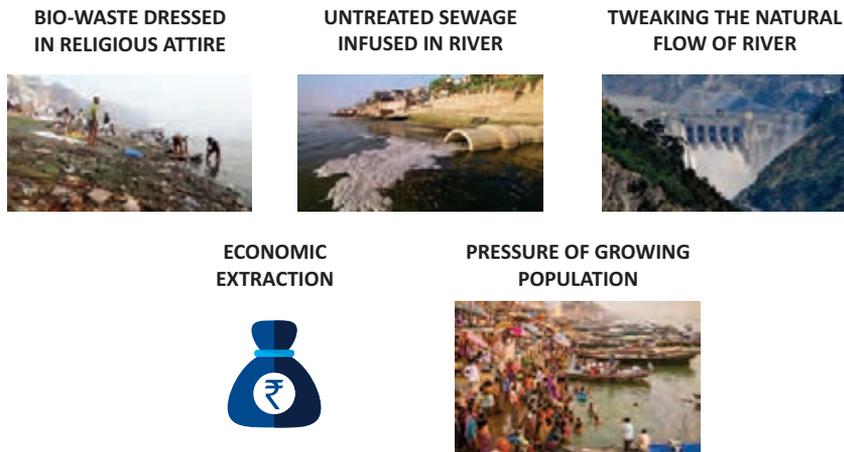


**WATER**  
(cultural associations)

### REASONS FOR DETACHMENT



### EXTRACTION – EXPLOITATION (Loss of Cultural Essence)



### Framework of Analysis

Indian Institute of Technology Kharagpur

In association with:

Graduate School of Architecture, Planning and Preservation (GSAPP), Columbia University, NYC, USA

Indian Institute of Technology (BHU), Varanasi, India



“ *India of the ages is not dead nor has She spoken her last creative word; She lives and has still something to do for herself and the human peoples. And that which must seek now to awake is not an Anglicized oriental people, docile pupil of the West and doomed to repeat the cycle of the Occident's success and failure, but still the ancient immemorial Shakti recovering Her deepest self, lifting Her head higher toward the supreme source of light and strength and turning to discover the complete meaning and a vaster form of her Dharma.* ”

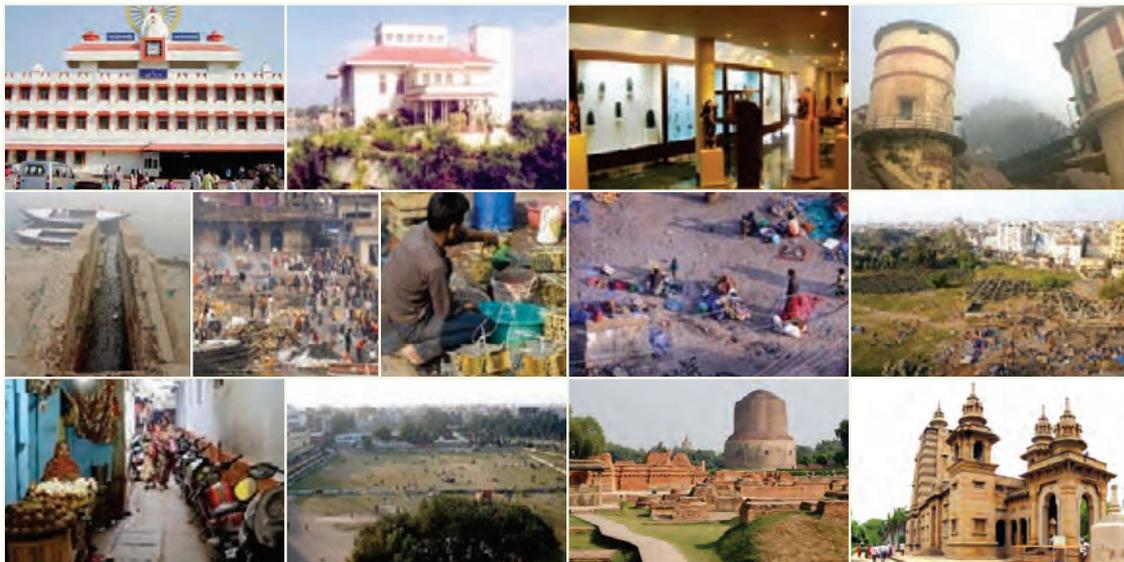
— **Shri Aurobindo**



Location of transect: ManiKarnika Ghat to Beniya Bagh; Source: Google Earth

ManiKarnika, the burning ghat as it is popularly known, is a bridge between life and moksha where death reigns. The magnificence of the charred facade housing the eternal fire welcomes visitors of this ghat to a spectacle of death. Here, incessant smoldering turns mortal remains into ashes that thereby flow into the holy Ganga. The Ganga is an outlet for the ghat where the last remains (ashes and other puja paraphernalia) flows down along with beliefs that the deceased are relieved from the cycle of birth. Fire and water are celebrated as an event in this ManiKarnika Ghat. Here, the dynamic flowing Ganga is at its epitome of piousness that goes beyond the confines of the Ghats to embrace the entire city and near and far regions. Dialectically, the same Ganga and the ManiKarnika Ghat situated on it also acts as an inlet of belief, livelihood, politics, exchange and interaction spanning across political boundaries, both national and international.

**Timeline of the field studio**



Activity	Communication	Cremation ground	Eternal fire	Ancillary shops	Residence and commercial	Road	Bagh
Driving force	Belief	Belief	Belief	Burning paraphernalia	Conduit	Functional linkage	Community belief
Community	Boatman	Dom	Dom's family	Locals	Locals		Locals, nomads
Elements material	Water, ash, flowers, clothes	Fire	Eternal fire	Wood, shroud, sandal wood, ghee	Miscellaneous		'Rudraksh' (i.e. bead for rituals) and 'kasturi' (musk)
Space	Flowing, Outlet, inlet, Purification, pollution, livelihood	Everyone is turned to ashes. Livelihood, belief.	Belief, livelihood, culture	End point of materials (wood, shroud). The point that interconnects livelihood	Interconnection, exchange. Very different in character from the spaces it connects	Flow of people and material	Compartmentalized by activities, belief. Appropriated space
Flows	Belief, ashes, corpse, sewage and garbage	Corpse, people	Belief	Material used in burial process (in and out)	Goods, locals, tourists, information	People, material	Nomads, locals, material-rudraksh, kasturi, activities

**Indian Institute of Technology Kharagpur**

*In association with:*

**Graduate School of Architecture, Planning and Preservation (GSAPP), Columbia University, NYC, USA**

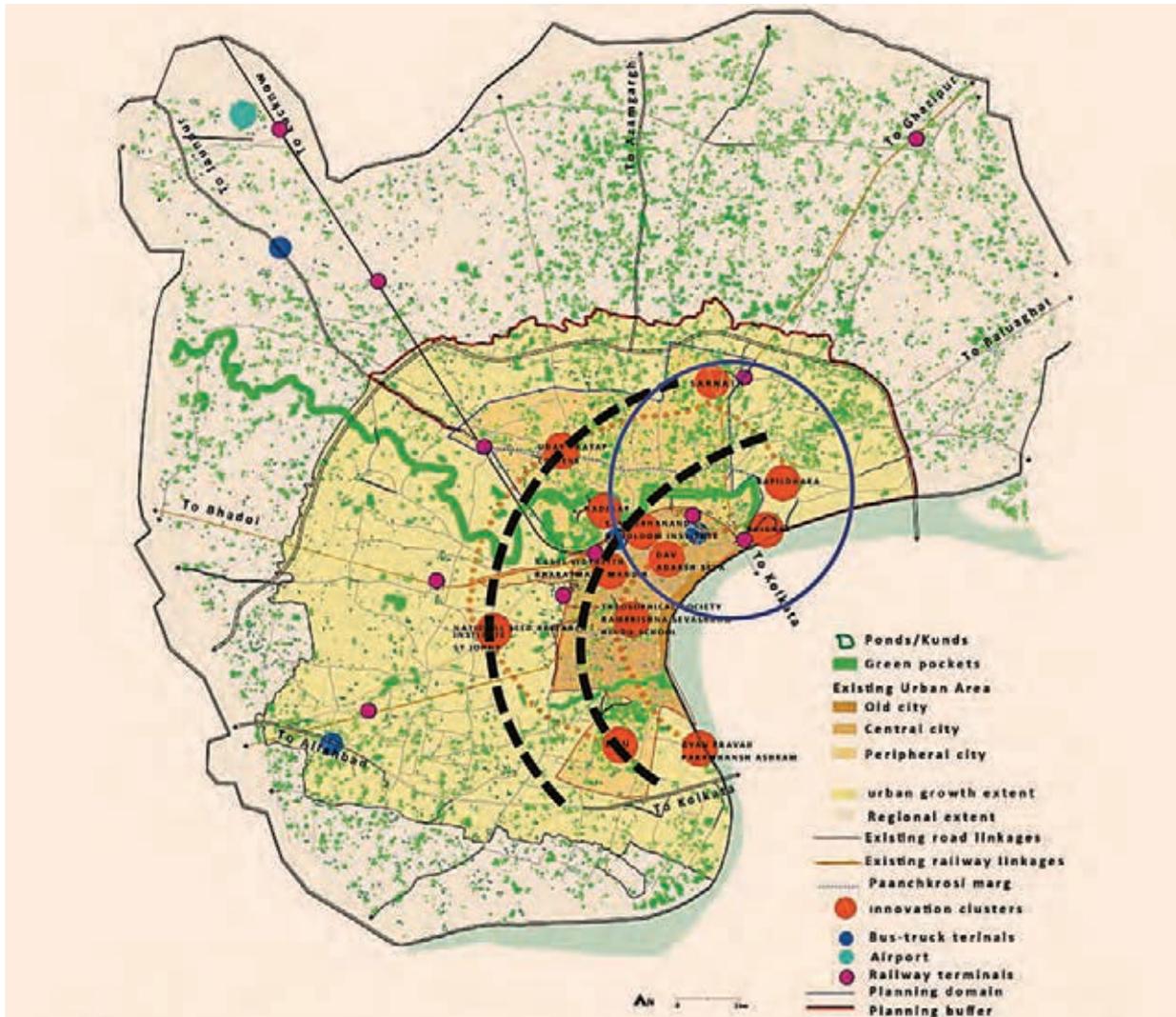
**Indian Institute of Technology (BHU), Varanasi, India**



“ In the first place, we have to understand a little about our scriptures. Two ideals of truth are in our scriptures; the one is, what we call the eternal, and the other is not so authoritative, yet binding under particular circumstances, times, and places. The eternal relations which deal with the nature of the soul, and of God, and the relations between souls and God are embodied in what we call the Shrutis, the Vedas. The next set of truths is what we call the Smritis, as embodied in the words of Manu. Yâjñavalkya, and other writers and also in the Purânas, down to the Tantras. The second class of books and teachings is subordinate to the Shrutis, inasmuch as whenever any one of these contradicts anything in the Shrutis, the Shrutis must prevail. This is the law. ”

— Swami Vivekananda

## Livable land-use planning & efficient-infrastructure



- |          |   |          |   |
|----------|---|----------|---|
| <b>1</b> | Activation of Heritage trail, Varanasi - Case of 500 meters, Panch Ganga Ghat         | <b>5</b> | Innovative Exhibition in IIT BHU campus based on Iconography & Epigraphic studies |
| <b>2</b> | Augmentation of NODE 1, Urban Ecosystem Innovation, Case of Raj Ghat trail            | <b>6</b> | Old Age Homes in Varanasi: Exploring a Sustainable and integrated Financial Model |
| <b>3</b> | Meditation App Development using Feedback from Various Varanasi Meditation Traditions | <b>7</b> | Developing a Pedestrian Master Plan for the City of Varanasi: Piloting a stretch  |
| <b>4</b> | Urban Creative Cluster augmentation in Varanasi                                       | <b>8</b> | To Improve End-of-Life Care by Reconfiguring Old Age Homes (OAHs) in Varanasi     |

# VARANASI

A celebration of Creativity and Freedom

## PRESENTATION AT INDIAN CONSULATE, NYC, USA, May 2018



*Surveys and Workshops in Varanasi  
in association with IIT (BHU) & Jnana  
Pravaha, Varanasi*

**VARANASI**

A celebration of Creativity and Freedom



Expected future collaboration  
**Project Varanasi Phase II (2019-20)**

Georgia Institute of Technology, Atlanta, USA

Jnana Pravaha, Varanasi

IIT Kharagpur & IIT (BHU) Varanasi





## **COLLABORATION STUDIO 2 (2019)**

With School of Urban and Regional  
Planning, Georgia Institute of Technology, Atlanta, GA, USA

*In association with*

**IIT (BHU), Varanasi & Jnana Pravaha, Varanasi**



*We are symbols, and inhabit symbols.*

**- Ralph Waldo Emerson**

# Assi Ghat

## *Introduction*

Amidst the chaos of the traffic and the congestion of the city, the ghats of Varanasi offer serenity with the banks of mother Ganges, the ancient temples and the beautiful visitors who come in search of spiritualism, culture and history. Assi Ghat lies at the confluence of the rivers Ganges and Assi, becoming the southern boundary of the city.

The Assi Ghat study area extends from Manmandir Ghat in the north to Assi Ghat in the south which is approximately 3-3.5km in stretch and inland it reaches up to 500m from the Ganges. The activities in the study area are mainly related to recreational, shopping and hotel facilities.

The area was selected for the study because of the speculated increase in pressure over the region due to tourism, congestion in residential areas and inefficient transportation facilities, which if not planned ahead will lead to stagnation of the liveliest hub of the city.

This area mainly serves as the confluence of the community and the culture of the city with the pilgrims flow in and out of Ghats, worshipping at the temples and bathing in Ganges throughout the day. The primary objective here is to highlight the problems



Figure 1: Study area

related to accessibility to the Ghats and the pollution of water bodies (kunds and river) in this area. This is followed by some recommendations to preserve the purity of the water bodies and improve the pedestrian accessibility to the Ghats in this area.

## *Observations*



Figure 2: Garbage thrown on roads



Figure 3: Assi nala



Figure 4: Broken sewage pipes

environment were surveyed during the field visit, which are air quality, solid waste management, sewage disposal system, availability of green areas, condition of surface water bodies and noise level. Air quality was found to be relatively better than the railway station and its adjacent areas. The visibility was high and the residents did not complain about any health issues related to it. Sufficient green areas, in the form of local parks, trees along road sides and inside house courtyards were spotted. Solid waste management was recognized as a major concern of the area. Lack of infrastructure have led people to throw their garbage on streets causing road blockage, foul odor and risk of diseases. The collection of solid waste is not daily which make the surrounding of dumping areas extremely unpleasant. Due to insufficient garbage disposal points in the city, the edge of the Assi nala is used for dumping which has constricted its flow. The condition of the Assi nala reveals the condition of the surface water in the area. Sewage pipes are directly drained into the nala, which ultimately drains directly into the Ganges. This makes the entire stretch

along the nala very unhygienic. The drainage and sewage pipes of the area were installed around thirty years ago and lack of proper maintenance has caused breakage of the pipes at several points, spilling all the sewage on the roads. Excess noise level was a concern near the ghat areas due to traffic congestion, whereas, the residential areas were found to be a lot peaceful. Parks (including Sant Ravidas Smarak Park, Ratnakar, Dumraon, Desbandhu Chitranjan Das Park), water bodies (including Pushkar Talab, Kurukshetra Pokhra and kunds like Durga, Kreem, Lolark) and other attractions (including Chet Singh Fort, Rishi Ashram, Kushmanda Durga, Tulsi Manas, Shri Jagannath Mandir, Keenaram Ashram and Manmahal observatory) are some of the tourist spots in this area. The strength in this sector was that it already had some existing tourist information facility. However, the concern here was the lack of knowledge about several ancient temples and other potential attractions unknown to the tourists. The area lacked in terms of signage and wayfinding methods to guide the visitors.

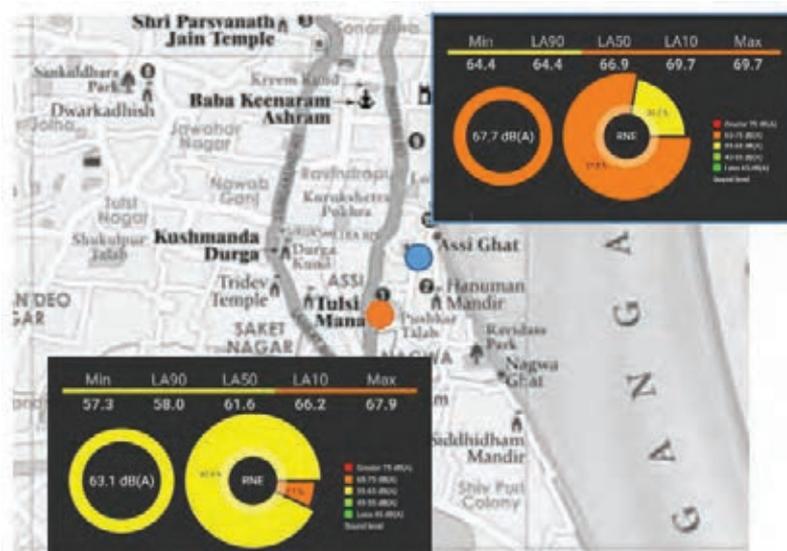


Figure 5: Noise levels at residential and ghat area

Congestion and lack of proper parking facility in this zone force tourists to walk along the busy roads. The area also lacks in designated drop-off zones resulting traffic blockage. The right of way of most of the roads in this area does not have dedicated lanes for different modes of transport resulting in mixed traffic and difficulty in movement. Presence of vendor on sidewalks, lack of amenities like benches, food vendor zones also add to the pedestrian inconvenience.



Figure 6: Recommended pedestrian walkways and drop off zones

### **Recommendations**

Nevertheless, several opportunities were identified which guided the team for proposing recommendations. There was a walking trail along the Assi nala which is hardly used because of the unpleasant environment. If the Assi river is revitalized, it can become a beautiful trail connecting the residential areas to the ghats. Waste management system can be improved by providing proper infrastructure. Drainage nets can be installed at intervals to collect the solid particles from the water and sewage should be treated before being discharged into the Ganges. Landfill sites should be constructed within the city reach.

Also, to fight the heat during summers, green infrastructures like cool roofs and green walls should be actualized.

Two drop off zones (parking) can be designated and connected to Tulsi Ghat and Assi Ghat with pedestrian walkways to avoid the traffic approaching the Ghats. Realizing the high pedestrian traffic of the city, continuous sidewalks should be provided along the roads.

A proper signage system can be installed for directing tourists along the trail and to the ghats. These signage should be understandable by anyone, like in form of pictures, etc. Tourists should be provided with maps indicating location of tourist attractions at tourist information centers. It should also be ensured that temples and other potential attractions do not mind influx of tourists.

The lack of awareness of people regarding the issues was a matter of worry. Therefore, it should be a prime agenda to spread awareness towards the existing issues and promote them for a better quality of life.

### **Way Forward**

Integration of multiple institutions like Nigam, transportation authority, private agencies, etc. is suggested which will help the planners coordinate the different projects and proposals and come up with a holistic development plan of the city. A rigorous perception study should be executed for understanding the willingness and behavioral change towards the technological and social interventions. Data should be collected at different times for expressing the city dynamics during the entire year. A more detailed traffic impact analysis of proposed drop off zones can be done. Any intervention by the government should be directed from people's movement.



*Transformation of the Assi River into a nallah (drain) at the Assi Ghat area*



*Dumpyard site adjacent to Assi Nallah*



*Discharging wastes directly into Assi Nallah*



*Checking the feasibility of a walking trail*



*Interviewing a resident living adjacent to Assi Nallah*



*Walking Trail around Sant Ravidas Park*



*Poor Condition of the Sant Ravidas park walking trail*



*Sri Jagannath Temple - a forgotten heritage at Assi*



*Sant Ravidas Park Ghat*



*Interviewing international tourists at Assi Ghat*



*Lanes at Assi for everyone*



*Discussing with the Jagannath Temple priests and caretakers*



*Assi Nallah just before it joins flows into Ganga*

# Railway Station – Bus Station

## *Introduction*

Varanasi attracts millions of visitors due to its rich ancient heritage sites dispersed in and around the city. Tourist from all around the world pours in Varanasi by air, train, or road routes. One of the prominent modes of transportation to reach Varanasi is train, which connects Varanasi to the national capital 'New Delhi' and also from other parts of the country. While the railway caters to the tourist and visitors from long distance within the country, the Uttar Pradesh State-run bus service caters to the people from within and near by states. For the people coming to Varanasi, the area surrounding the Varanasi Cantonment railway station and the Chaudhari Charan Singh bus station serve as the gateway to the ancient city. In this respect, a planning exercise was undertaken to look closely at the problems and recommend first-hand solutions for the improvement of the area.

## *Site Visit & Observations*

The station area of Varanasi can be characterized by its vibrancy in terms of huge crowd, honking vehicles, street activities, and chaos resulting from all these. In addition to the inherent problems of the area, the ongoing

construction of the fly-over bridge just outside the station area has resulted acute congestion and pollution. The first encounter of tourist and visitors with the city in this chaotic place, gives the city a pretty bad impression. Apart from the lack of aesthetics of the area, the issues of traffic congestion and pollution are creating a severe dent on the health threat and affeding the overall economy of the place. An initial traffic count survey was conducted at strategic entry and exit points to the area (see figure a) for two peak periods throughout three days. The average fifteen-minute peak volume on weekdays indicates that the four-lane Varanasi Cantonment Road (access road to the railway and bus stations) is extremely busy (see figure b). This, coupled with the debris caused by ongoing construction of a flyover caused bading to both congestion and air pollution. The issues in the area could be outlined as—(a) vehicular congestion; (b) air pollution impacts due to both vehicular emission and construction; (c) noise pollution of vehicular-honking; (d) complete absence of any infrastructure facilitating pedestrian movement; (e) encroachment due to on-street parking and street vendors and (f) enforcement issues on the part of authorities



Figure a: Traffic survey location

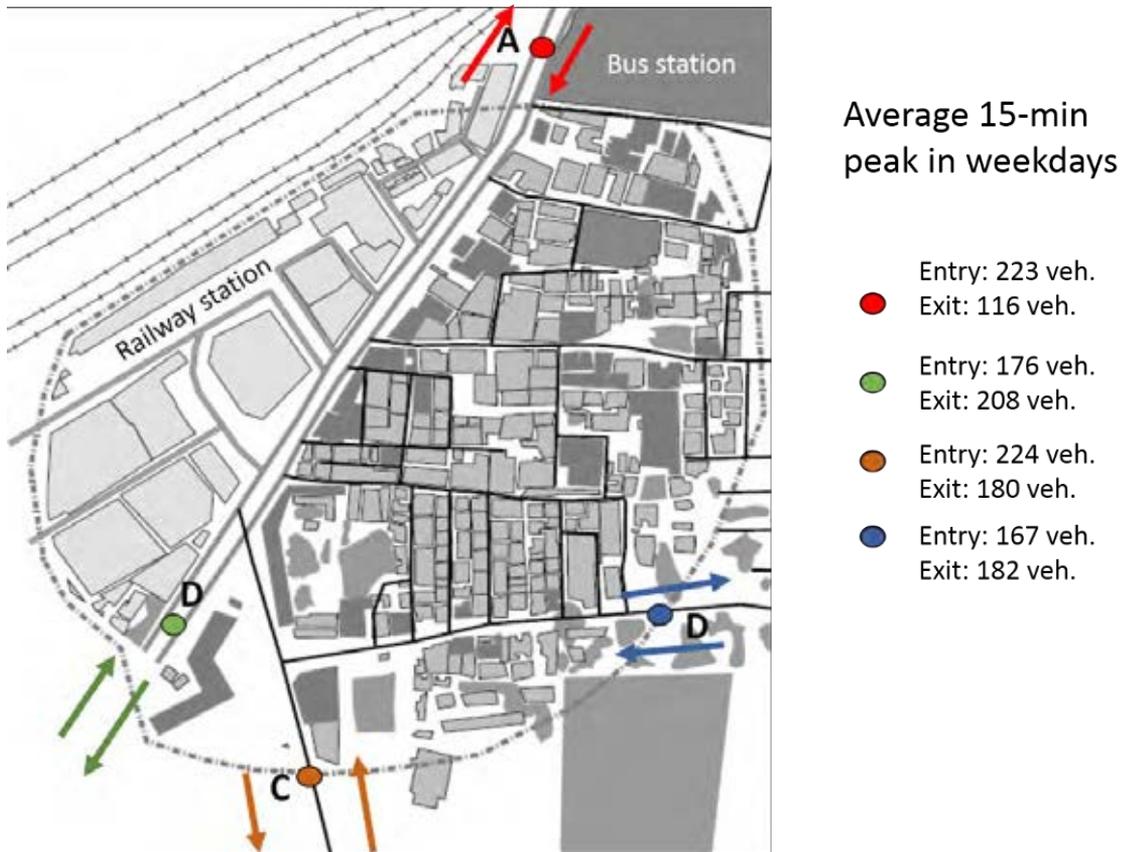


Figure b: Average 15-minute peak volumes at the four locations

Among the tourists arriving in Varanasi while a substantial share is of pilgrim or leisure tourism, there are visitors for other purposes like medical, educational, judicial, commercial, transit, and home-based. A tourist information centre was found at the railway station which was not easy to locate if a tourist is exiting from the station. It has a lot of well-developed maps of the city but these were not in enough quantity and not much information on display was available. No such facility was found at the bus station. Also a severe lack of directional signages at sites was observed. A number of hotels near the station area were also surveyed and it was found that the majority of the hotels were either low-budget or budget hotels. Only few 3-4 star hotels were found. Also, a stark difference was observed on the two exits of the

railway station. While the city area was more crowded and congested, the cantonment area was greener and cleaner with a range of high-end hotels. However, the railway station exit towards the cantonment was only accessible to military.

### ***Suggestions and way forward***

The station area has a huge potential for improvement in view of certain geographical and social characteristics. The area encompassing railway station and bus station within it are in close vicinity of each other, merely 500 m. The proximity favours the pedestrian movement between the two location and also the vicinity of the area. This was evident when a large number of pedestrians walking in that area was observed. Developing a multimodal hub (see

figure c) between railway station and bus stand can facilitate less transfers between both the stations and also have facilities for parking of auto rickshaw which are currently parked on street, creating traffic chaos. This multi-nodal hub can have common ticketing system for railway station and bus stand so that passengers can easily take transfers.

There also exists good potential to develop the area focusing on green mobility by retaining the existing share of pedestrian movement.

For achieving this vision of green mobility, the team has suggested the development of sidewalks, cross walks, and if required an underpass crossing to make the pedestrian feel safe while walking and attract potential pedestrians. It was observed that the places where sidewalks already exists, there is lack accessibility due to design issues like ‘too much height’. The area needs new facilities and modification of the existing pedestrian convaniance to achieve the goal of green and safe mobility. The team suggested modifying



Figure c: Proposed multi-modal terminal

the circulation pattern in the station area by making the streets one way. By doing so the traffic would be channelized smoothly and this will give a temporary but immediate relief to the congestion problem.

Also, the tourist information centre at the railway station can be made more visible and accessible. It can be larger in area and designed as a counter with a lot of important information displayed on boards. There shall be adequate signage and multi-lingual information. The station access shall also be segregated mode-wise. The transit and para-transit modes shall be regulated with fixed fares for transparency. Similar facilities shall be available at the bus station as well. Success stories from the northern states of the country like Uttarakhand and Himachal Pradesh shall be studied and replicated for advanced tourist infrastructure.

To follow up on these suggestions, a number

of surveys needs to be conducted such as pedestrian volume counts in the whole network, passenger volume being served by the bus station and the railway station, on-street parking volume and the circulation pattern of vehicles. Thereafter the next set of deliverables would rationalise the capacity of the multi-modal hub based on the passenger volume and on-street parking estimates. The circulation plan could also be designed keeping in mind the delay faced by these vehicles on the Varanasi Cant. Road, due to construction. If a diversion is proposed, alternate routes through the internal roads need to be surveyed keeping in mind their feasibility. Pedestrian infrastructure at strategic locations (such as the interchange between the bus-station and the railway station) needs to be planned keeping in mind the pedestrian volumes at such locations. Above all, the aforementioned deliverables need to be prioritised and planned phase-wise.



*Investigating the adjacent road to the railway station*



*Obstruction for pedestrians intermittently, all along stretch, towards road crossing*



*No crosswalk systems to cross wide roads*



*Bus station*



*Bus station*



*Parked right outside the bus station\_ autowallahs expecting passengers*



*Streets near station with budget hotels and restuarants*



*Varanasi Cantt. Railway station is one of the busiest station serving the city of Varanasi*



*Investigating the Railway Station area*



*Facemasks worn by a majority showing serious air pollution issues in the area*



*Interviewing the bus station authorities*



*3a. No sidewalk systems in front of the bus station area*



*Pedestrians dangerously crossing the busy road*



*Chaos on the station approach road due to construction*



*Pedestrians dangerously crossing the busy road*



*Interviewing the bus station authorities*



*Enforcement issues— An attempt to segregate pedestrians, vendors and parked vehicles. However, the system was not properly regulated*



*Bus station*

# Sarnath

## *Introduction*

Sarnath is a quaint little town, located about 10 km from Varanasi. There are many legends which have Sarnath as the main locational protagonist in their narratives. Sarnath is known as Mrigadaya (safe sanctuary for deer or deer park) in one and Rishipattana or Isipatana (a place where relics of saints fell on earth) in others. It is the place where Gautama Buddha first taught the Dharma. Also, it is here that the Buddhist Sangha came into existence through the enlightenment of Kondanna. Buddhism flourished in Sarnath due to patronage of wealthy kings and merchants residing in Varanasi and reached its peak during the Gupta reign (fourth to sixth centuries C.E.) and hence becoming one of the most important pilgrimage center for Buddhist faith.

Alexander Cunningham identified Sarnath that covers an area of about half a mile, extending from Dhamekh Stupa on the north to the Chaukundi mound on the south. Being one of the four major pilgrim spots for Buddhist faith, Sarnath is visited by a large mass every year – both by pilgrims and visitors alike. As per the ticket sales counter for the excavated site and the archaeological museum located next to the site, 2,500 to 2,700 visitors daily visit the site during the peak season (i.e. November till March), whereas the count drops to about 800 in the summer months. Pilgrims, of different nationalities, including school-students visit the site in large groups.

## *Observations*

Following observations were made by the joint study team from Georgia Tech Institute of Technology, IIT Kharagpur, and IIT (BHU), Varanasi during visit to the site on 18th March, 2019.

### **1. Untapped points of tourist interest:**

At present, the excavated ruins of the monastic complex and the archaeological museum constitute the major points of tourist interest in Sarnath. However, the area has a lot to offer more with potential points of tourist interest spread within a radius of a kilometer. These being places of worship, monasteries, and philanthropist institutions set up by Buddhist groups hailing from different imations, such as Thailand, Cambodia, and Tibet. Unfortunately, these places are little known by incoming tourists and access to these is less developed. Besides places of Buddhist faith, Sarang Nath Temple and a Jain Temple are also revered sites of the area.

**2. Lack of designated parking:** A fleet of tourist buses and hired vehicles ferry in the maximum bulk of daily tourist from Varanasi. Since these buses do not have any designated parking space, these are parked on the museum road. Additionally, visitors access the area on shared / reserved auto-rickshaws (both battery and fuel driven).

**3. Lack of visitor amenities:** Apart from visitors coming from Varanasi City (which is only 9 km away), a section of visitors, particularly pilgrims, visit sarnath by means of conducted bus-tours traveling overnight covering long distances. However, Sarnath does not have adequate amenities (i.e. rest-rooms and refreshment facilities) for such visitors.

Moreover, restaurants and food-joints in the area are inadequate both in terms of count and variety.

- 4. **Inadequate tourist assistance:** Tourist assistance and information kiosk located next to the entrance to the Archaeological Museum is extremely small in capacity considering the tourist inflow. There is an interpretation gallery inside the excavated site premise. A few meters away from the museum is the 'Modern Reception Centre' which houses the office of a tourist information officer, two handloom product sale outlets, and guest accommodation. However, the centre does not provide any information for tourists.
- 5. **Discontinuous sidewalk:** Sidewalk along the Museum Road lacks continuity, thus, negatively affecting pedestrian movement.
- 6. **Unregulated development:** Although Sarnath is part of the municipal corporation of Varanasi, delivery of municipal services w.r.t. drainage, sanitation, and solid waste

management in the area is typically underperforming.

- 7. **Unregulated trade:** A ribbon of carts selling souvenirs line up the Museum Road. However, these cart-sellers need to vacate as the stretch is cordoned off during visits by VIP; thus, affecting their sale.

**Recommendations**

Having assessed the potential of the site, following broad recommendations have been made by the joint study team.

- 1. **Tourist trail:** Designed trail in Sarnath area, connecting all the major points of tourist interest. The trail may be covered on foot, or bicycle hired from passenger-bike sharing (PBS) stations. Additionally, a hop-on-hop-off service with battery-operated carts and/or mini-bus may be proposed.

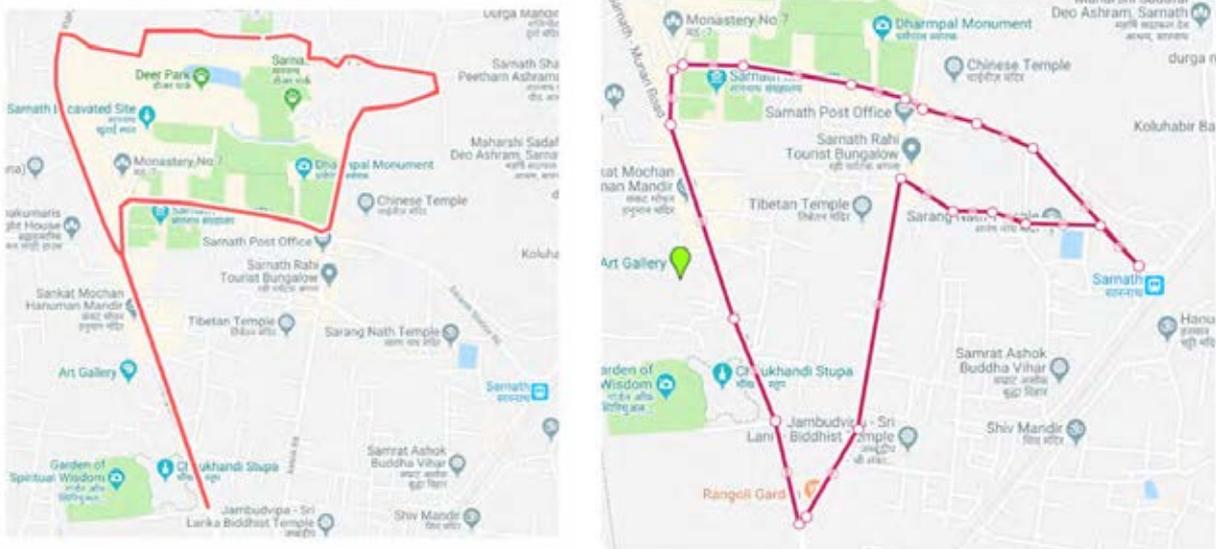


Figure 1 Bicycle and bus circuit in Sarnath



Figure 2 Battery operated cart plying outside Taj Mahal, Agra as a prototype

2. **Shuttle bus services** for tourists coming from Varanasi may be proposed, departing from Varanasi Junction railway station. The bus service may be operated by the tourism department, plying at regular intervals. This would provide both an affordable and comfortable transit option for tourists visiting Sarnath from Varanasi.
3. **Designated parking space** for tourist vehicles shall come up integrated with a visitor amenity centre which will have refreshment facility, public conveniences, and tourist information kiosks in adequate capacity.
4. **Souvenir shops** may be better integrated with the landscape.

### *Vision for Sarnath*

Sarnath is both a destination by its own worth, and a satellite tourist destination to Varanasi

City. This is why Sarnath has not developed lodging facility for tourists, yet enjoy a regular visitor flow; thus, avoiding the perils of unregulated escalation of tourism. Also, by the virtue of being a listed archaeological site, development in and around the area is regulated. The ancient Buddhist site of Sarnath is also in the tentative list of UNESCO World Heritage Sites. Moreover, the resident community in Sarnath need be considered as an important stakeholder in several development related decisions, so that potential conflicts between the host and visitor communities could be avoided, if any. Hence, the study team recommends a regulated growth of tourist infrastructure in the area, without compromising on the tranquil environment which Sarnath has to offer.



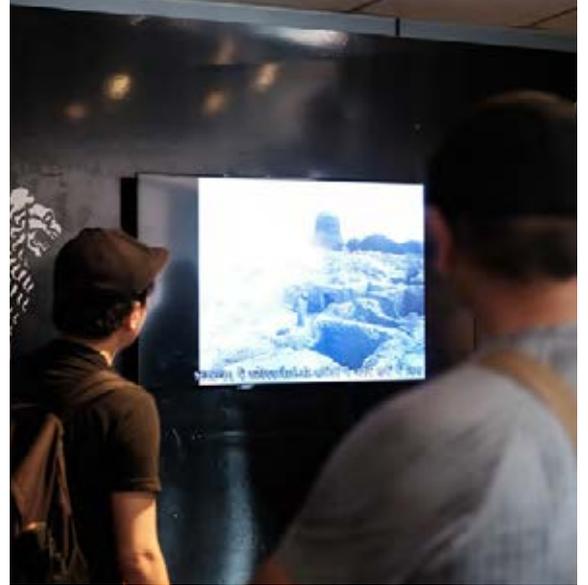
*Discussion with saree shopkeepers*



*School Children trip to the heritage city*



*Tourist Information and Facilitation Centre*



*Interpretation Centre at the heritage site*



*Discussion with the street vendors near the monument and museum*



*Interviewing Chinese tourists at the heritage site*



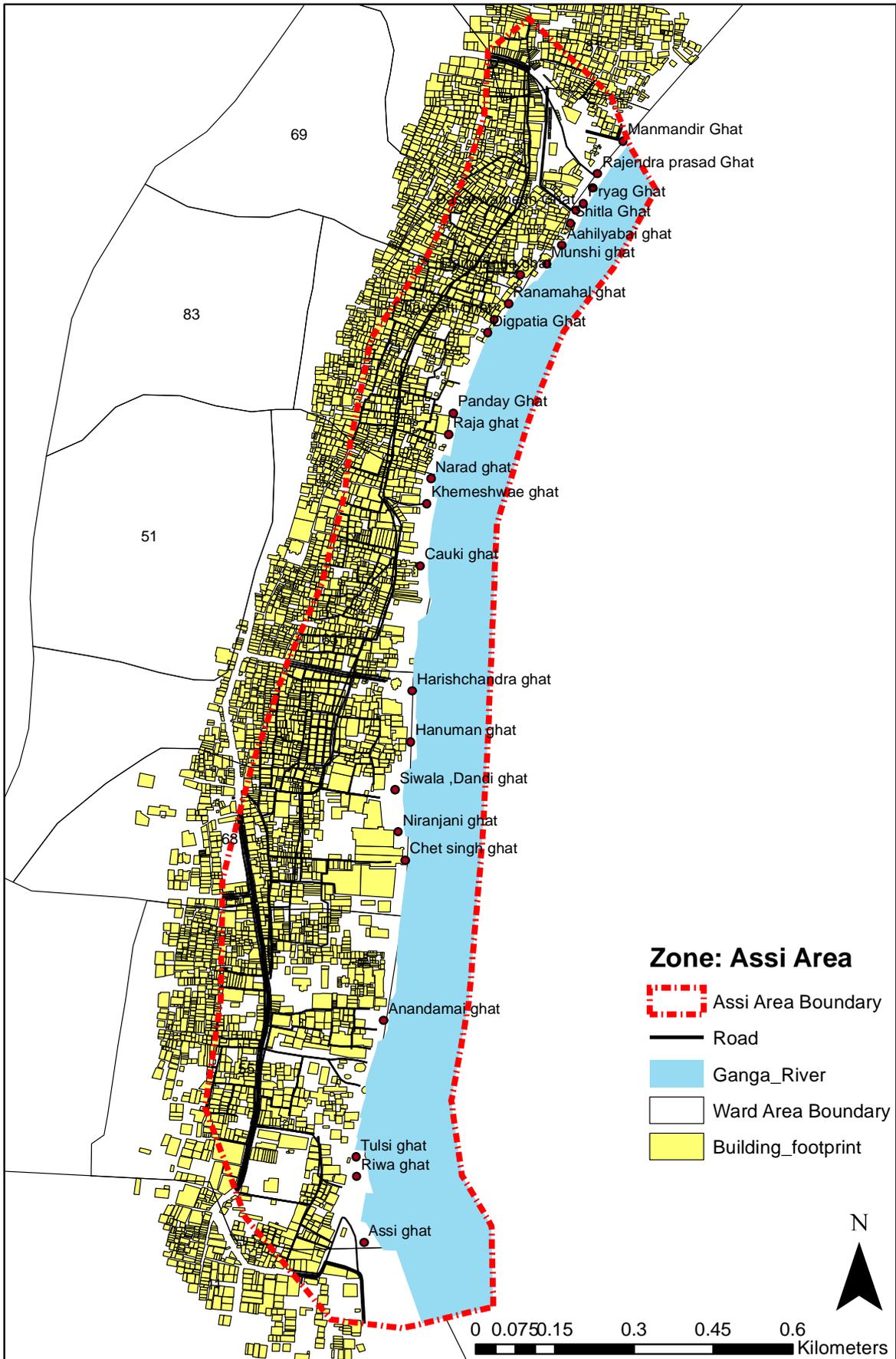
*Parking on streets and informal vendors*

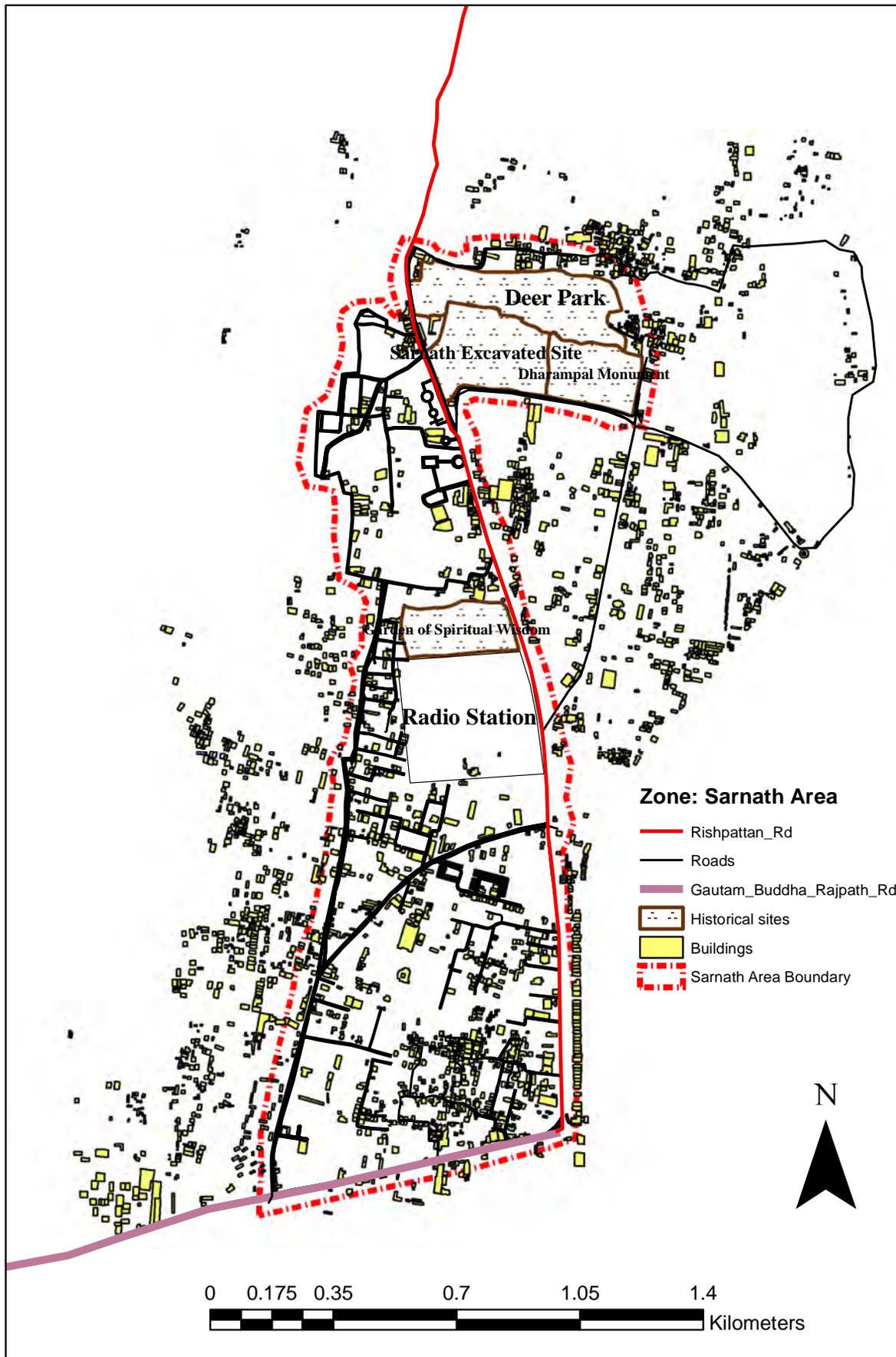


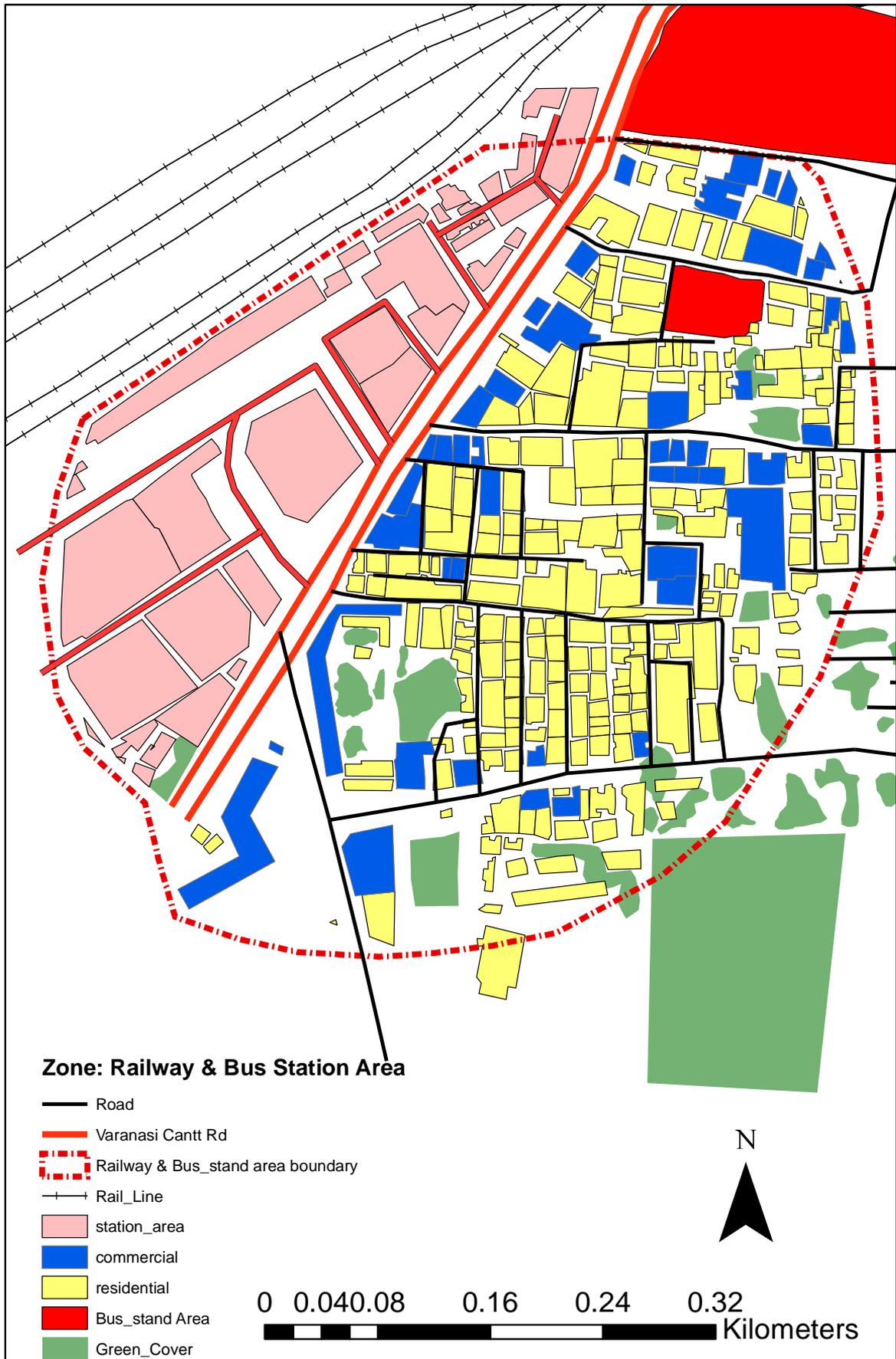
*Handloom Saree in making*



*Parking on streets and informal vendors*









“ It is India that gave us the ingenious method of expressing all numbers by means of ten symbols, each symbol receiving a value of position as well as an absolute value; a profound and important idea which appears so simple to us now that we ignore its true merit. But its very simplicity and the great ease which it has lent to computations put our arithmetic in the first rank of useful inventions; and we shall appreciate the grandeur of the achievement the more when we remember that it escaped the genius of Archimedes and Apollonius, two of the greatest men produced by antiquity. ”

– Pierre-Simon Laplace



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