

DEPARTMENT OF COGNITIVE SCIENCE

INDIAN INSTITUTE OF TECHNOLOGY, KANPUR



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"The question is not whether intelligent machines can have any emotions, but whether machines can be intelligent without any emotions."

— Marvin Minsky, Cognitive & Computer Scientist and AI Pioneer

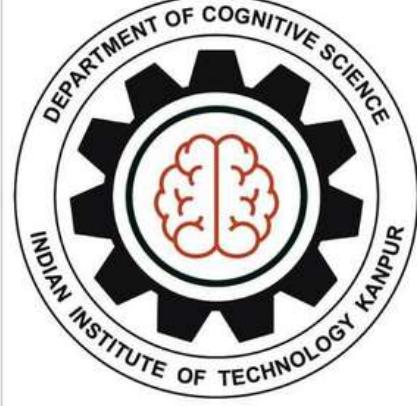
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PLACEMENT BROCHURE

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RECRUITER'S GUIDE
STUDENTS' PLACEMENT
OFFICE

SESSION 2024-2025



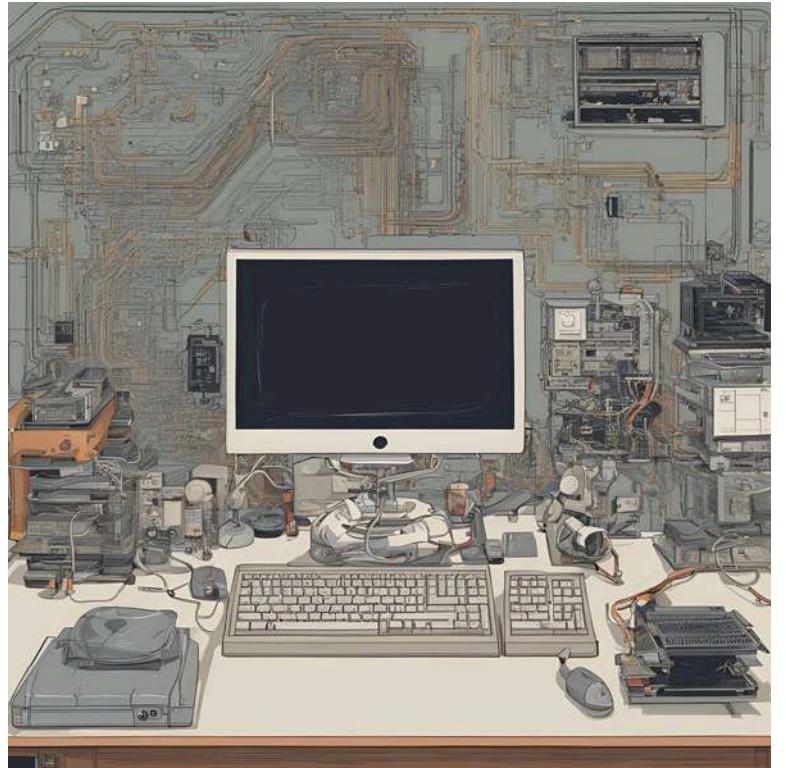
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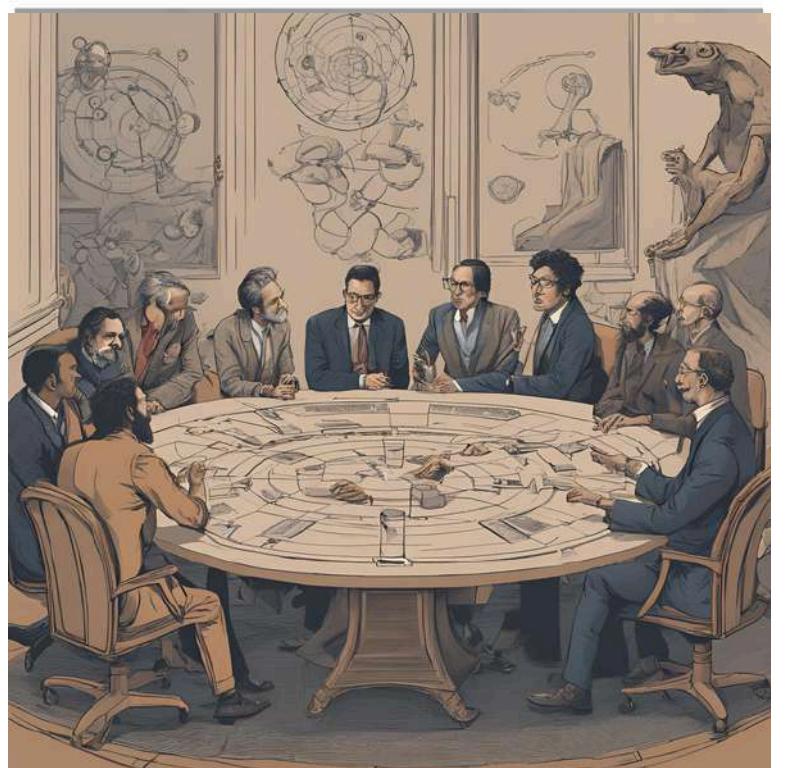
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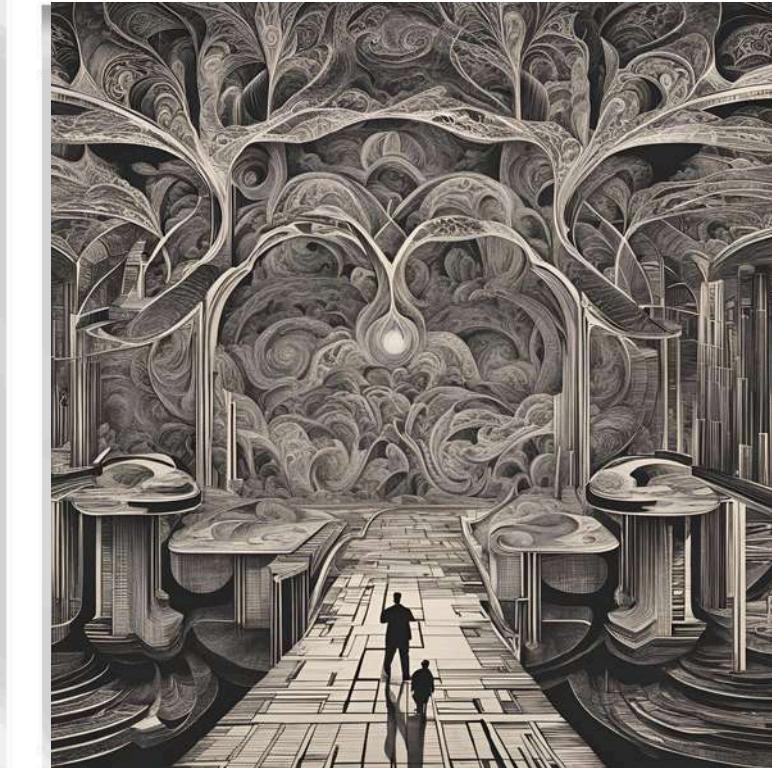
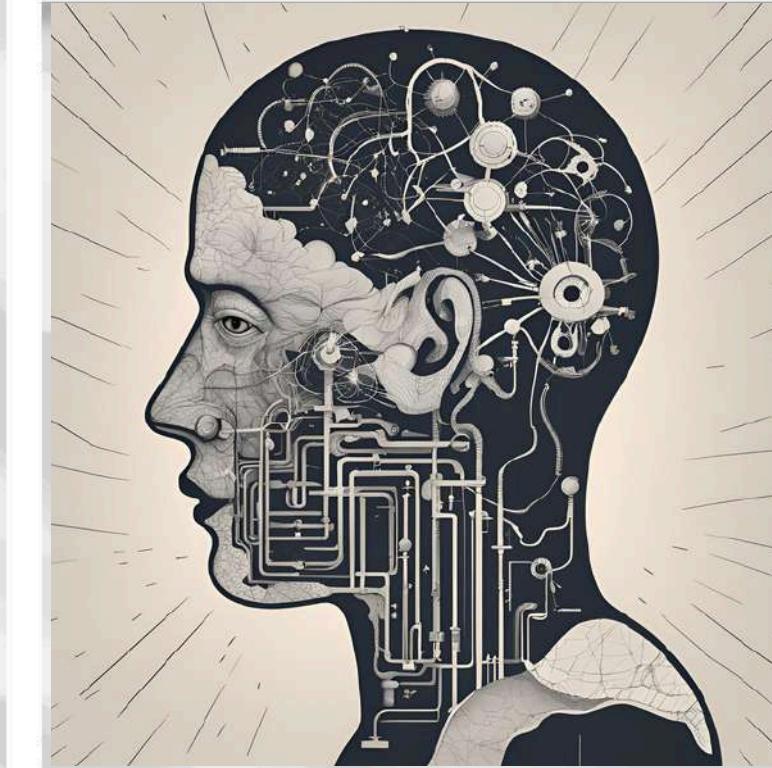
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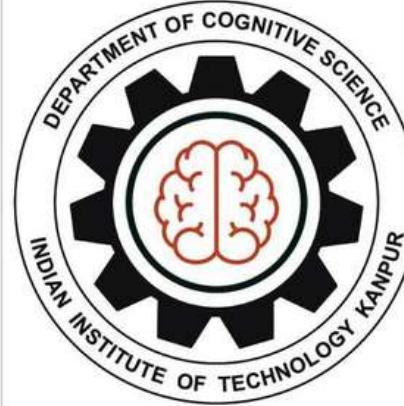
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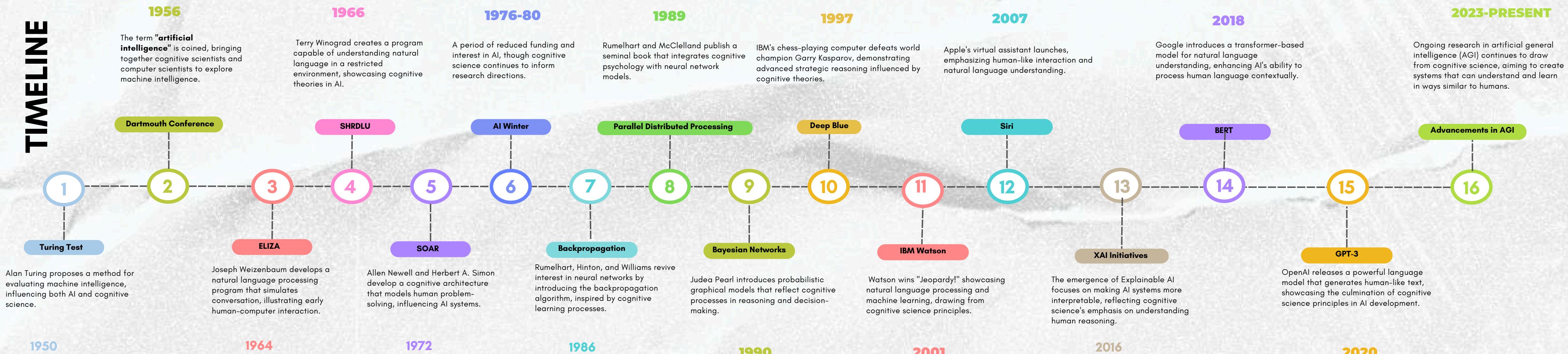


ABOUT COGNITIVE SCIENCE

01

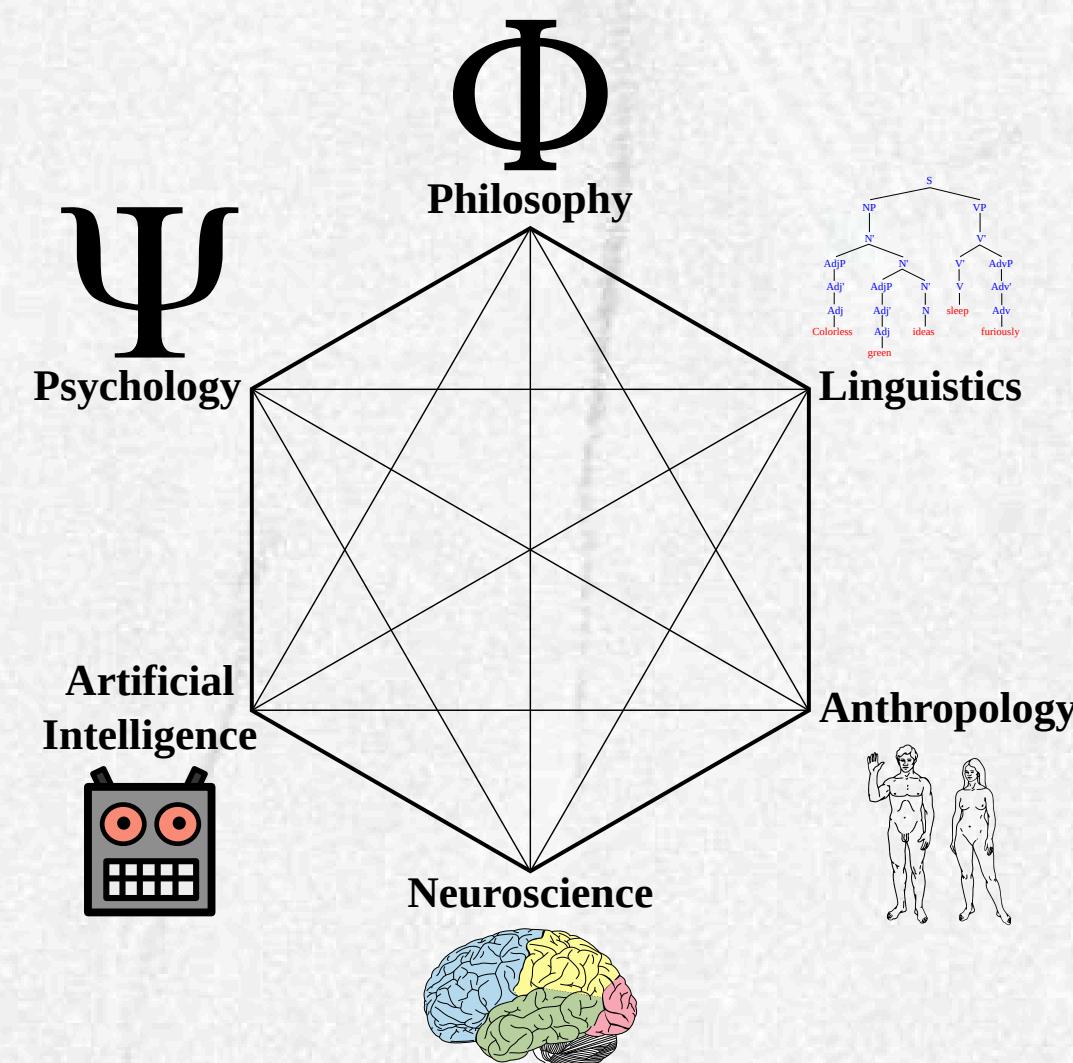
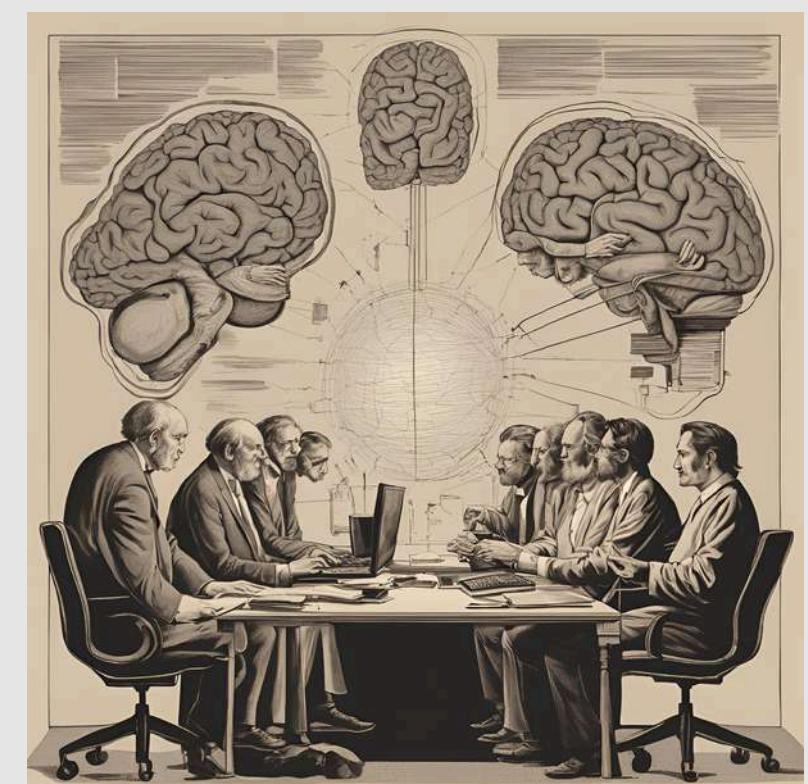
"Cognitive Science and AI: A Symbiotic Journey"

TIMELINE



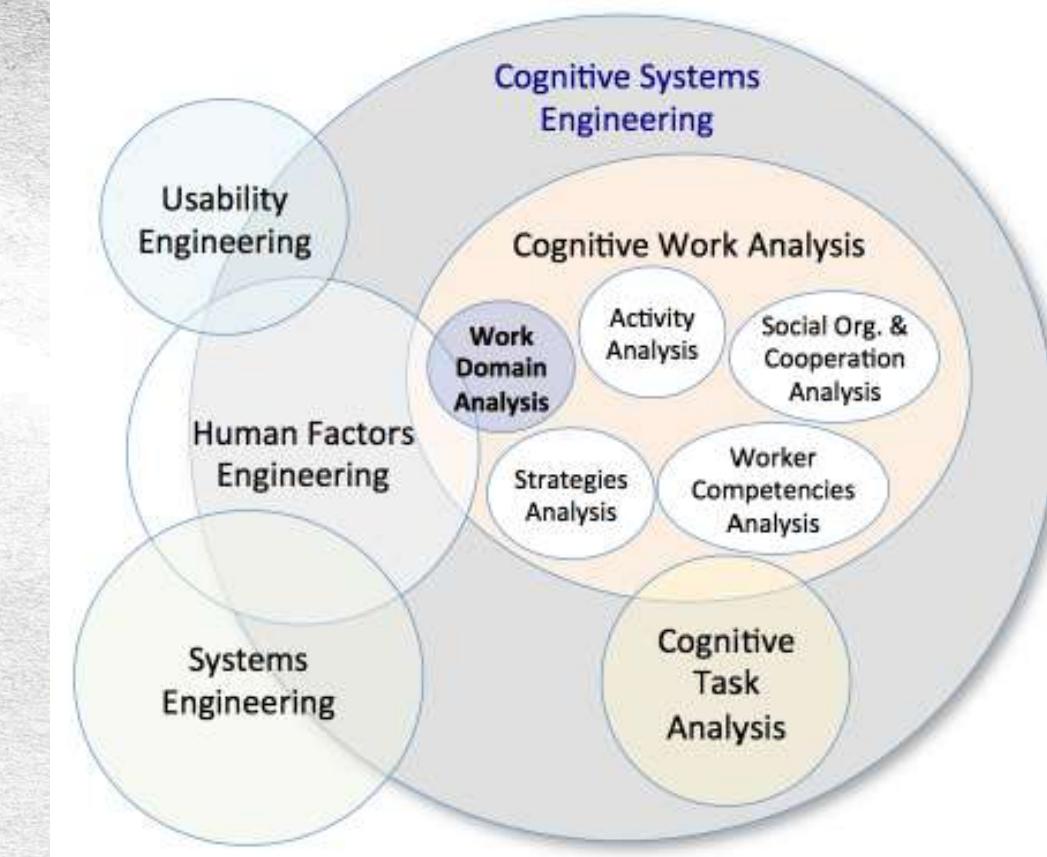
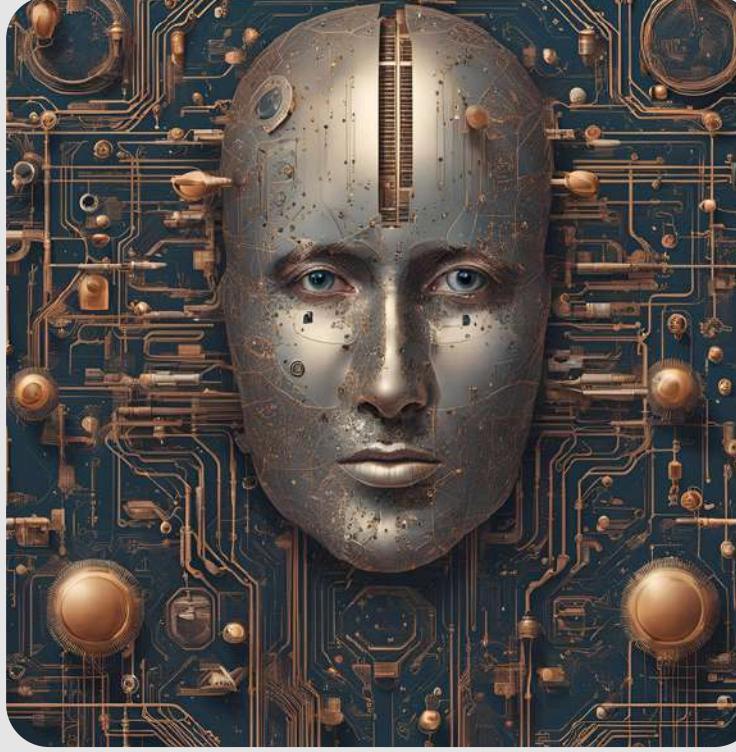
What is Cognitive Science?

Cognitive science serves as an interdisciplinary field that unites philosophers, psychologists, anthropologists, computer scientists, linguists, and neuroscientists. Through their collective endeavors, these experts strive to unravel the intricate workings of the human mind, acknowledged as one of the most enigmatic facets of human life.



What are Cognitive Systems?

Put the cognitive scientists and the AI gurus together, and you get cognitive systems - the dynamic duo that's trying to make machines that can think, learn, and interact just like humans. It's akin to building robot versions of ourselves, except (hopefully) without the tendency to spill coffee on our laptops. The goal is to create intelligent machines that can lend a hand with all sorts of tasks, from decision-making to problem-solving. And who knows, maybe one day they'll even be able to help us find our car keys.



The enchantment of custom social media promos, made-for-you tunes, shopping tips, Elon Musk's out-of-this-world Teslas, and our chatty pals Alexa, Siri, and Google Assistant are just a taste of the mind-blowing wizardry in smart Cognitive tech!



The Cognitive Science Interdisciplinary Programme at IIT Kanpur is like a brainy potluck dinner where faculty from various departments bring their favorite dishes of knowledge to the table, all in the name of figuring out how our minds work—without anyone actually losing their minds in the process! Launched in 2017, this program is one of the first of its kind in India. You've got engineers, psychologists, and linguists all working together, trying to decode the human brain while also figuring out why we can never remember where we parked our cars. In December 2020, the program officially became the Department of Cognitive Science, proving that we were serious about this whole "understanding the mind" thing.. Graduates from this department can do everything from academic research to working in industries, which means they can either ponder the mysteries of consciousness or help design the next big app that reminds you to drink water—because let's face it, we all need that reminder! So, if you're looking for a place where you can study the quirks of the human mind while also having a shot at a career that doesn't involve wearing a lab coat all day, IIT Kanpur's Cognitive Science program might just be your ticket to a future where you can finally understand why your friend insists on using "literally" incorrectly!



WELCOME MESSAGE

The cognitive science department is a collective of visionary students who realize that outstanding problems require interdisciplinary thought and application. We believe in a multidimensional outlook: with access to insights from various fields, our students are poised to build more realistic models of human behaviour that are fine-tuned to accommodate real world causal relations. With use cases in almost every imaginable field, ranging from neuromarketing, data visualisation, and UX/VR environment design to development of emotionally intelligent and trustworthy AI systems, we host a protean bunch ready to revolutionize our rapidly evolving society.



Dr.Devpriya Kumar
Head of the Department



Dr.Nisheeth Srivastava
Faculty Placement Advisor

Students in the Cognitive Science program at IIT Kanpur are trained at the interface between technology, science and the humanities. They are capable of building complex programming artifacts, translating scientific discoveries into impactful products, and think deeply about the impact they produce. Alumni from our courses have gone on to be successful in a variety of roles in companies big and small.

DEGREE PROGRAMS OFFERED

MTech IN COGNITIVE SYSTEMS

2 YEAR PROGRAM

Comprises of rigorous coursework followed by a year of research. Courses often include advanced-level group projects and /or individual project

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PhD IN COGNITIVE SCIENCE

5 YEAR PROGRAM

Highest degree awarded by the department for students interested in research careers. Its focus, unlike other degrees, is more towards generating new knowledge than learning extant knowledge

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M.S(BY RESEARCH) IN COGNITIVE SCIENCE

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Curriculum](#)



2-3 YEAR PROGRAM

Similar to the M.Tech Program, with more emphasis on research. Involves fewer course credits and more research/thesis credits. Besides fundamental research, students work on many challenging industry-oriented projects

LAB FACILITIES



ACTION LAB

We have a 2d projector-based setup ,an Oculus Rift S HMD based setup along with Ultra leap motion sensors for hand tracking and a Kinect sensor for face tracking. Currently the lab is running experiments on action and agency, information integration across multiple modalities in action planning and execution and experiments on dynamic facial expression recognition.



ATTENTION AND EYE MOVEMENT LAB

The lab houses a Tobii fusion eye tracker having a high sampling rate of 250Hz, capable of pupillometry. The eye-tracker system is coupled with high refresh rate display and a head rest. The lab focuses on understanding mechanisms of visual attention using psychophysics.



BIO SIGNAL LAB

Simultaneous recording of physiological signals (including heart rate, respiration, electrodermal activity and electromyography) from more than one individual.



MOVEMENT LAB

The movement lab houses a VR treadmill, Virtualizer Elite 2, and a HTC Vive Pro eye HMD display with inbuilt eye-tracker. The setup allows investigation into coupling between eye-movement, head movement, limb movement and torso movement as well as enable study of movement based paradigms in a controlled setup.

HIGH DENSITY EEG LAB

We have 128 Electrode High Density electroencephalogram, and a 8 channel electrogastrogram, to study brain cognition and its coupling to gut and body signals.



LANGUAGE AND EYE-MOVEMENT LAB

We are using the Eyelink 1000 plus system, which can sample at a rate of up to 2000 Hz. The system can be used for fixation and saccade analyses, smooth pursuit studies, and gaze-contingent display applications. The eye camera enables binocular tracking, and correction for small head movements during experiments. For example, we are currently investigating detailed millisecond-by-millisecond processes involved in reading linguistic stimuli in both native and non-native speakers.



MULTI PC LAB

Our Language and Cognition Group investigates language and visual word recognition in adults, including offline and online behavioural methods (e.g., eye tracking, reading times) as well as computational modelling. Facilities to support this include eye tracking systems. We also have several systems for on-site computer-based research, each complete with desktop computers and a range of experimental software including PsychoPy, OpenSesame and MATLAB .



THE JAY PULLUR NONINVASIVE BRAIN STIMULATION LAB

The Jay Pullur Noninvasive Brain Stimulation Laboratory currently has a MagVenture R30 TMS + Magoption setup, and is capable of running Burst Stimulation, Paired pulse protocols. with a Figure of 8 (infinity shaped) coil. We also have a Neural Navigation system to precisely map the brain areas and locate the stimulation with the help of individual MRI data.



FACULTY:THE BACK BONE

THE CORE



Dr.Narayanan Srinivasan Professor
PHD,PSYCHOLOGY,
UNIVERSITY OF GEORGIA

Specialization

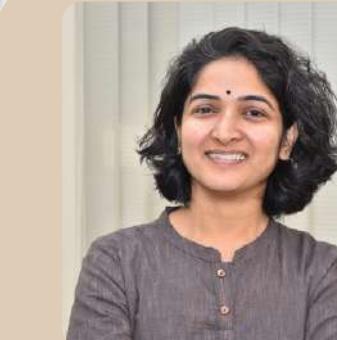
CONSCIOUSNESS,
ATTENTION,EMOTIONS,
DECISION MAKING



Dr.Pragathi P. Balasubramani Assistant Professor
PHD, COMPUTATIONAL NEUROSCIENCE,
IIT MADRAS

Specialization

COMPUTATIONAL
NEUROSCIENCE,
BRAIN COMPUTER
INTERFACE,DECISION
MAKING



Dr.K. M. Sharika Assistant Professor
PHD , NEUROSCIENCE,
NATIONAL BRAIN RESEARCH CENTRE

Specialization

NEUROSCIENCE,SOCIAL
COGNITION,EMOTIONS



Dr.Nisheeth Srivastava Associate Professor
PHD, COMPUTER SCIENCE,
UNIVERSITY OF MINNESOTA

Specialization

COMPUTATIONAL COGNITIVE
SCIENCE, PSYCHOLOGY &
ECONOMICS; APPLICATIONS TO
MACHINE LEARNING, ML FOR
DIGITAL GOVERNANCE



Dr.Devpriya Kumar Associate Professor
PHD,COGNITIVE SCIENCE,
CENTRE OF BEHAVIOURAL AND
COGNITIVE SCIENCES

Specialization

SENSE OF SELF, AGENCY,
PERCEPTION & ACTION,
EMOTION PERCEPTION,
INTENTIONALITY, CONTROL
SYSTEM APPROACH TO
COGNITION, COMPLEX
SYSTEMS, MOTOR CONTROL,
ATTENTION CONTROL.



Dr.Anveshna Srivastava Assistant Professor
PHD, COMPUTATIONAL NEUROSCIENCE,
IIT MADRAS

Specialization

LEARNING ,PROCESS
ANALYSIS,EDUCATIONAL
TECHNOLOGY,REASONING,
STEAM EDUCATION



Dr.Himanshu Yadav Assistant Professor
PHD,COGNITIVE SCIENCE,
UNIVERSITY OF POTSDAM

Specialization

HUMAN SENTENCE
COMPREHENSION, WORKING
MEMORY, INDIVIDUAL
DIFFERENCES, LANGUAGE
EVOLUTION, QUANTITATIVE
STRUCTURAL COMPLEXITY OF
LANGUAGES, INTERPRETABLE AI,
COGNITIVE MODELING,
STATISTICAL METHODS IN
COGNITIVE SCIENCES



Dr.Ark Verma Associate Professor
PHD , PSYCHOLOGY,
UNIVERSITEIT GENT

Specialization

LATERALISATION OF COGNITIVE
FUNCTIONS, VISUAL WORD
RECOGNITION, SOCIAL
COGNITION AND BILINGUALISM

THE ADJUNCT



Dr.Arjun Ramakrishnan Assistant Professor
PHD , NEUROSCIENCE,
NATIONAL BRAIN RESEARCH CENTRE

Specialization

NEUROSCIENCE,
DECISION MAKING



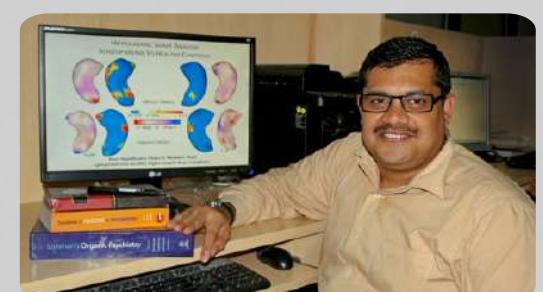
Dr.Sruti Srinivasa Ragavan Assistant Professor
PHD , COMPUTER SCIENCE,
OREGON STATE UNIVERSITY

Specialization

HUMAN COMPUTER
INTERACTION,
SOFTWARE ENGINEERING,
COMPUTING EDUCATION



Dr.Harish Karnick
Honorary Professor



Dr. Ganesan Venkatasubramanian
Distinguished Visiting
Professor

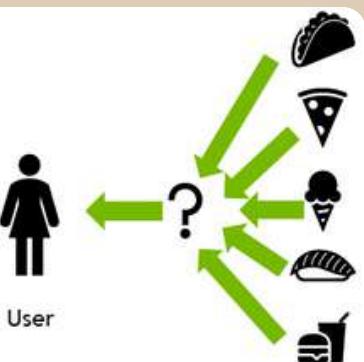
THE SUPPORT

STATISTICS AND DATA ANALYSIS



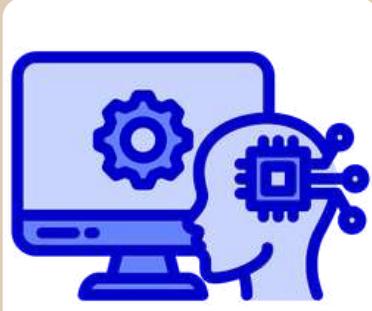
Make sense of complex information by identifying patterns, trends, and relationships within data and make informed decisions and predictions based on empirical evidence rather than guesswork. Mastering the formulation of null and alternative hypotheses, conducting tests (e.g., t-tests, chi-square tests), and interpreting p-values to determine statistical significance.

HUMAN CENTRED COMPUTING



Classical and contextual search, topic modeling, and data discovery, recommender systems, collaborative filtering, validation metrics, recommendation diversity, emotion theories, sentiment analysis, affect measurement using computer vision, surveys, and Brain-Computer Interfaces (BCI).

HUMAN-COMPUTER INTERACTION



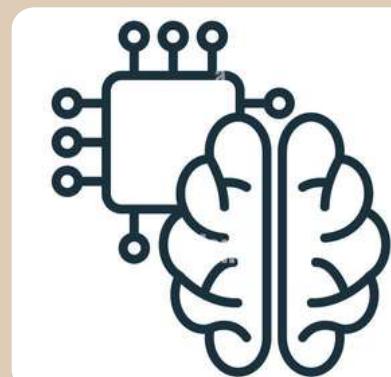
Equipped with foundational aspects of HCI, which involves studying how people interact with computers in specific contexts, identifying opportunities for improvement, and systematically designing systems for optimal user experience. It draws from various disciplines such as psychology, computer science, design, sociology, and anthropology. By gaining knowledge in this interdisciplinary field, students are equipped with valuable methods and theories applicable in numerous contexts as well explore challenging interaction contexts and open problems in the field.

SIGNAL PROCESSING



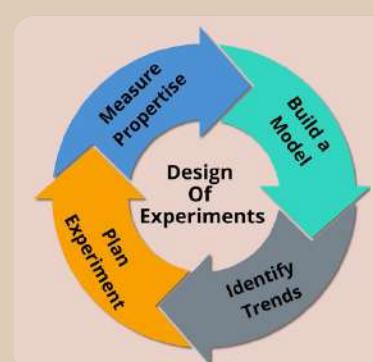
Skills in processing and analyzing electrophysiological signals and time-series data, using tools and libraries like SciPy, NumPy and MATLAB.

MACHINE LEARNING AND AI



Designing and implementing predictive models for applications such as treatment outcomes, seizure prediction, and mental overload detection. Experience with machine learning frameworks and libraries like TensorFlow, PyTorch, Scikit-learn, and Keras. Developing models for prediction, classification, and parameter estimation. Applying NLP techniques to analyze textual data and extract meaningful insights.

EXPERIMENTAL DESIGN AND BEHAVIORAL TESTING



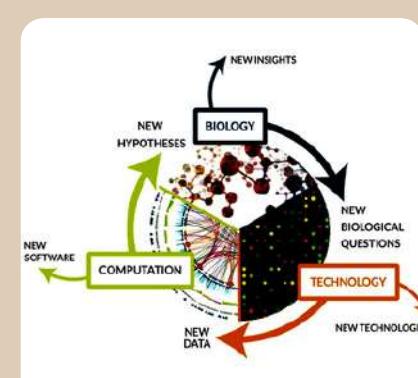
- Experimental Research: Designing and conducting experiments, such as self-paced reading and eye-tracking studies.
- Behavioral Data Collection: Collecting and analyzing data from behavioral tests to identify patterns and individual differences.

UX/UI DESIGN



Enhance the customer experience, students conduct user research to understand customer needs and behaviors. They use prototyping tools to create interactive mockups and focus on graphic design, integrating interactive design and information architecture to ensure a seamless and engaging customer experience.

COMPUTATIONAL MODELLING



Developing computational models to simulate complex processes is useful in areas such as system design, optimization, and cognitive neuroscience. Familiarity with computational neuroscience principles and their application to IT problems.

CODING AND ALGORITHM DEVELOPMENT



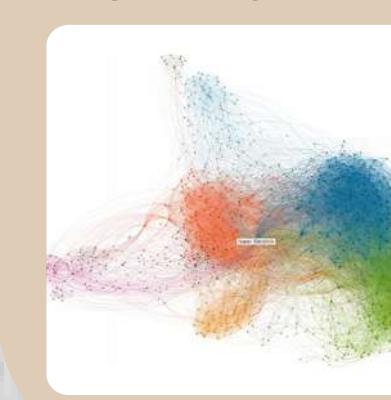
Proficiency in programming languages such as Python, R, MATLAB, and data analysis libraries (Pandas, NumPy, Scikit-learn). Designing algorithms to solve specific problems, such as mental overload detection and cognitive coupling effects. Implementing efficient algorithms in programming languages like Python.

GAME DEVELOPMENT AND XR



Utilize cognitive science principles to design lifelike AI for non-player characters (NPCs) and improve user interfaces for easy gameplay. In extended reality (XR), develop immersive experiences by creating adaptive systems that lessen cognitive strain and improve navigation. Incorporate sensory feedback mechanisms such as haptic feedback and spatial audio to enhance realism. Their thorough understanding of user experience ensures that both games and XR applications are captivating, user-friendly, and accessible, ultimately enhancing the overall user experience.

BIG DATA VISUALISATION

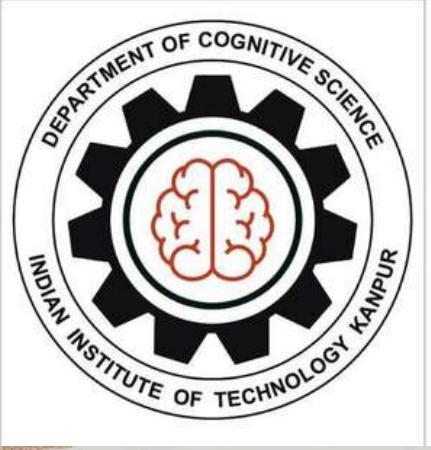


Data visualization techniques for big data include theory, hands-on exercises, scientific and information visualization, data compression, statistical techniques, high-dimensional visualization, modern machine learning, deep learning for big data visual analytics, Exascale computing, in situ analysis, and future paradigms.

NEUROMARKETING



Analyzing consumer behavior using neuroscientific methods. Involves utilizing physiological measurements to understand consumer responses.



COURSES THAT WE UNDERTAKE

09

Basic Statistics, Data Analysis & Inference

Computational Tools for Cognitive Science

Eye-Tracking and VR

Foundations of Cognitive Science

Mind: Philosophical Investigations

Neurobiology of Affect & Motivation

Probabilistic Machine Learning

Human-Centered Computing

Machine Learning

Human-Computer Interaction

Statistical Natural Language Processing

Bayesian Models & Data Analysis

Computational Cognitive Science

Big Data Visual Analytics

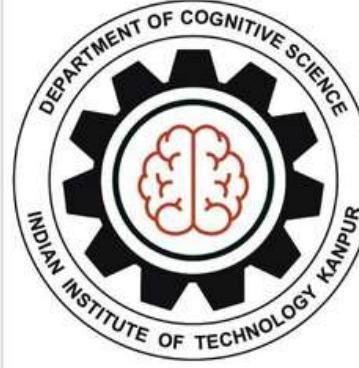
Cognitive Neuroscience

Experiment Design and Analysis

Basics of Psychophysics

Topics in Translational Neuroscience

Basics of EEG



List of funded projects :

- **Designing a Predominantly Auditory Recommendation System**
- **Testing the Explanatory Limits of Limited Value Representations**
- **Improving Software for Grain Analysis**
- **Analyzing Grievances Data Using Artificial Intelligence**
- **Assessment and Extension of Subsumption Architecture in the Context of Adaptive Shielding of Mobile Assets Using a Multi-Robot System**
- **Information Management System for Grievance Portal for PMO, Government of India**
- **Anomaly Detection in Exam Logs**
- **Digitizing and Automating PLI Information Management Systems**
- **Upgrading DARPG Information Systems with AI Capabilities**
- **Enabling Intelligent and Interactive Grievance Analysis at the Ministry of Defence**
- **Characterizing the Evolution of Naming Conventions in India**
- **Role of Painkiller Acetaminophen in Valence-Based Decision-Making**
- **Using Gut-Brain Coupling for Holistic Characterization of Neurocognitive States and Development of Treatment Strategies in Depression**
- **Design of VR environment for schools and meditation centres.**
- **Enhance user experience in VR environments by manipulating visual feedback using anticipatory control**
- **Surveying the parameters of trust in Human-Machine Interaction to ensure maintenance of optimal trust in the artificial agent**
- **Automated Question paper generation and answer evaluation using NLP**
- **Temporal profile of thoughts using Houdini and Unity interchangeably**
- **Investigate the action monitoring function of our intentions, following a dynamic hierarchical model of intentions.**

OUR PEOPLE WORK AT:





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