TATA

TATA CONSULTANCY SERVICES
Experience certainty.

TCS Research

Innovation

www.tcs.com

Today's business landscape is marked not just by digital disruptions, but also technological breakthroughs – all achieved through extensive research efforts and collaborative innovation. Research in particular plays an important role in the information technology (IT) domain. In fact, IT has – and will continue to – digitally transformed the way we live, interact, and even how we industrialize software.

As technology evolves and becomes increasingly complex, Tata Consultancy Services Limited (TCS) will continue to explore emerging solutions with a scientific spirit of enquiry. At TCS Research, our aim is to not just advance capabilities and knowledge, but also harness the same to foster customer-focused, domain-specific innovation.

Overview

So far, digitization has upended traditional processes and operations – effectively blurring industry boundaries. On the one hand, we find banking and insurance enterprises offering retail-like simplified transactions and experiences. On the other, telecom providers are developing offerings that provide entertainment content and innovative payment facilities to their customers.

Enterprises, both in the business-to-business (B2B) and business-to-business-to-consumer (B2B2C) segments, now need next-generation systems and channels to engage with modern, tech-savvy consumers. To create true differentiators and stay ahead, both research and innovation need to be focused and rapid.

TCS Research provides the capabilities to actively explore and gain knowledge on emerging technologies that can help build breakthrough solutions across industries. Our research areas cover behavioral and social sciences, computing systems, embedded systems and robotics, deep learning, life sciences, and more – enabling companies to ride each wave of digital transformation successfully.

Our Research Focus

TCS invests in research areas that cover:

- **Behavioral, Business, and Social Sciences:** With specific focus on wellness, norm-compliance, and entertainment, we explore human-centric systems that also include behavior modelling and simulation, purposeful games for behavior study and change, behavior-driven service design, and applications of behavior science and artificial intelligence (AI) in entertainment
- **Computing Systems:** Our core focus being next-gen computing architectures, TCS Research covers AI and machine learning systems, special purpose hardware-based computing (FGPA), performance modeling and optimization, and quantum computing exploration
- **Cybersecurity and Privacy:** Specifically focused on security and privacy by design, we cover access control, authentication and authorization, cyber physical system security, data management, internal threat management, and so on
- **Data and Decision Sciences:** With emphasis on autonomous intelligent systems and knowledge systems, TCS' research areas include planning and control, knowledge extraction, data mining, text mining and speech, natural language processing (NLP), micro-work and active learning, energy analytics and management mechanisms, intelligent transportation, cyber physical systems' verification and validation, and compliance
- **Deep Learning and AI:** Keeping human agents in the loop, our research areas cover program synthesis, negotiations through dialogue-based agents, deep vision, augmented reality (AR), deep sensor analytics, and deep computing architectures
- **Embedded Systems and Robotics:** Focusing on phygital solutions, our research in embedded systems encompasses embedded sensors and devices, network embedded infrastructure, signals and systems, machine vision, and robotic platforms and systems
- **Physical Sciences:** With keen focus on computational materials engineering and a vision to advance production processes, we research in areas ranging from biometric (digital twins of biological systems) and integrated computational materials engineering (ICME), to materials informatics and material development and deployment

- **Life Sciences:** TCS' core focus being computational genomics, we work across human genome and epigenome analysis, metagenomics, computations structural biology, and model-informed drug discovery and development
- **Software Systems and Services:** Emphasizing on model-based software systems, our research covers automated regulatory compliance, decision space exploration, knowledge delivery systems, business system transformation, enterprise simulation, model-driven adaptive enterprise, request for proposal (RFP) platforms, and bridge robots
- **Media and Advertising:** This group conducts applied research in technologies that enable the understanding and composition of entertainment media and advertising. Our research deals with cognitive and affective understanding of media and advertising, and aims at assisting personalized, ubiquitous, and monetized entertainment, as well as effective advertising at scale
- **Foundations of Computing:** We apply the fundamental concepts of computer science - such as logic, formal methods, and artificial intelligence - to the development of complex dependable systems. This group will develop tools and technologies that help in the development and analysis of complex intelligent systems. Such systems will also be aligned with modern agile development methodologies

At TCS, we measure the outcomes of our research based on new intellectual properties developed by our in-house scientists. The research data feeds into 'programs' – drawing knowledge generated from TCS' own research. The insights gleaned are applied to enterprise-specific problems for developing innovative solutions within specified timelines. We not only explore emerging technologies to drive future capabilities, but also aim to create real-world impact for enterprises and the society at large.

The TCS Advantage

Since the establishment of our first lab in 1981 at Pune, India, TCS has invested in multiple research areas for over three decades. Equipped with these innovation labs, we have co-created numerous tools and frameworks for software development – delivering large and complex projects for global enterprises. More importantly, this has paved the way for a rapidly growing research ecosystem that connects stakeholders from across industries, organizations, and academia to collaborate and innovate.

- **Powered by Human Intellect:** Our rich and diverse research and innovation ecosystem comprises researchers and scholars from various global institutions, ensuring our Research Leads have a notable H index. Currently, TCS has over 110 PhD-qualified experts from different computing domains working on cross-functional research on complex (and emerging) technologies. Every year, our researchers publish around 300 papers for Tier 1 conferences. TCS has also filed over 3,500 patents.
- **A culture of Innovation:** TCS provides a nurturing environment for research to progress, with a dedicated unit headed by the Chief Technology Officer. We also have established partnerships with leading universities that are noted for their technological and research capabilities. TCS believes in the free exchange of ideas to ensure creativity and scientific breakthroughs. We also encourage both internships and sabbaticals to stimulate constant growth.

TATA CONSULTANCY SERVICES
Experience certainty.

Awards & Recognition

TOP 3
IT SERVICES
BRAND

To know more

Visit the **Research and Innovation** page on **tcs.com**
Email: **innovation.info@tcs.com**

About Tata Consultancy Services Ltd (TCS)

Tata Consultancy Services is an IT services, consulting and business solutions organization that delivers real results to global business, ensuring a level of certainty no other firm can match. TCS offers a consulting-led, integrated portfolio of IT and IT-enabled infrastructure, engineering and assurance services. This is delivered through its unique Global Network Delivery Model™, recognized as the benchmark of excellence in software development. A part of the Tata Group, India's largest industrial conglomerate, TCS has a global footprint and is listed on the National Stock Exchange and Bombay Stock Exchange in India.

For more information, visit us at **www.tcs.com**

IT Services
Business Solutions
Consulting

All content / information present here is the exclusive property of Tata Consultancy Services Limited (TCS). The content / information contained here is correct at the time of publishing. No material from here may be copied, modified, reproduced, republished, uploaded, transmitted, posted or distributed in any form without prior written permission from TCS. Unauthorized use of the content / information appearing here may violate copyright, trademark and other applicable laws, and could result in criminal or civil penalties.

Copyright © 2019 Tata Consultancy Services Limited

TCS Design Services | M | 06 | 19