intel.

Intel® Unnati

Data-Centric Labs in Emerging Technologies

Adapting to Your Needs

Multidisciplinary Labs

Intel® Unnati
Data-Centric Labs in Emerging Technologies

Give Your Students the Intel Edge.

intel.

Today, there is a wide, and growing, skill gap between technical graduates and IT industry expectations. **To propel India's digital economy transformation, it is imperative that the higher education system in the country bridges this gap by developing new curricula and offering courses in emerging technologies.** The National Education Policy 2020[1] recognises this, and stresses the need for greater industry-academic linkages, and for higher education institutions to focus on research and innovation.

With the **Intel® Unnati Program**, you can keep pace with fast changing industry needs and expectations. It will help you:

Equip your students with industry relevant data-centric skills

In this age of data explosion, there is immense opportunity. Give your students the edge by equipping them with data-centric skills that will help them glean better insights and develop high-value solutions.

Unleash your students' creative potential

We, in India, have an incredible opportunity to unleash the creative potential of the largest student population in the world by training them in the right skills to drive India's digital transformation.

Build a strong reputation

With an Intel co-branded lab, you can be recognised as an institute that is committed to train your students in the latest technology to prepare them for industry, and focus on faculty development.

Build capability for the long term

Establish and maintain your leadership with the help of our **System Integrator Associates**. From Intel's recommendations for end-to-end Technology Labs set up and course content to training, customisations of your lab set up, or your maintenance and support requests, you can rely on them for all your needs.

[1]Ministry of Human Resource Development, Government of India, National Education Policy 2020, *https://static.pib.gov.in/WriteReadData/userfiles/NEP_Final_English_0.pdf*

Winning with the Intel® Unnati Community

With an Intel® Unnati Lab, you—and your faculty and students—become part of the **Intel® Unnati Community**, and get exclusive benefits:

- **Intel® Unnati Grand Challenge** and **Intel® Unnati Rapid Challenge**, where your students solve industry relevant, high impact problems through technology, with cash awards and the opportunity to be evaluated for internships at Intel
- **Intel® Unnati Ignite** workshops that offer hands-on experience with Intel technologies
- **Intel® Unnati Catalyst** sponsorships for select tech contests and events that you conduct, that encourage the use of new technologies
- **Intel® Unnati Research Launchpad**, which offers grants to your faculty members for original research in new and emerging technologies

Towards a Digital Economy Powered by Data-Centric Skills

India aims to become a $1 trillion digital economy by 2025, and this requires significant investment in 21st century infrastructure and software capabilities.[2]

The value pool is fundamentally shifting away from legacy technologies and towards digital—automation, cloud, cybersecurity, mobile, artificial intelligence (AI), 3-D printing, internet of things (IoT), big data analytics, and social media—at a pace even faster than anticipated just a few years ago. To emerge as an Information Technology and Business-Process Management (IT-BPM) leader, India needs to prepare people to develop advanced capabilities in these technologies.[2]

Enhancing the curriculum in higher education so that students and faculty are equipped with these data-centric skills is an important foundational element to make progress on this digital transformation journey.

[2]*https://meity.gov.in/writereaddata/files/india_trillion-dollar_digital_opportunity.pdf*

Customised Lab Deployments to Suit Your Needs

Intel® Unnati Labs are currently available for Artificial Intelligence (AI), FPGA Solutions, High Performance Computing (HPC) and Smart Mobility; more technologies will be added in line with industry trends and needs.

For each of these new and emerging technologies, **you can choose from lab configurations that align to your needs**—whether you are catering to students who are just getting started with these new technologies or students and researchers with more sophisticated, high-end requirements.

That's not all: **once you deploy an Intel® Unnati Lab for a particular technology, you can not only upgrade the lab for the same technology as your needs evolve, you can also adapt the same infrastructure to deploy any of the other technologies we offer**.

Such Intel® Unnati Multidisciplinary Labs will result in considerable savings in cost and time for you. Rather than investing in altogether different infrastructure for a separate lab for a new technology, all that you need to make are incremental investments in appropriate hardware and software to align your lab with the requirements of the technology.

Cobranded Collateral Support

When you set up an Intel® Unnati Lab in your institution, we will provide you designs for cobranded collateral that have your logo alongside the Intel logo. These include nameboards or plaques for display at the lab as well as certificates for students who successfully complete the assigned curriculum for a particular technology.

(Left) Cobranded plaque at an Intel® Unnati Lab; and (right) course completion certificates for students

Intel® Unnati
Artificial Intelligence

Build a Strong Foundation in AI

Understand Machine Learning (ML) and Deep Learning (DL) concepts from the ground up. Work through an end to end workflow to get practical understanding of what to expect when building AI solutions.

Get Ready for Edge Computing

Students learn how to deploy models targeting CPU, Integrated GPU, VPU, and FPGA, and to use pretrained models to accelerate development time.

Student-Centric UX

Students get a consistent learning experience no matter where they are, and can easily execute course exercises by connecting to their lab network using any PC—they just need a modern browser.

High Level Design

This design of the Intel® Unnati AI Lab applies to the HPC Lab as well; and, with minor modifications, to the FPGA Solutions and Smart Mobility Labs. In the former case, an FPGA node has to be added, while the Smart Mobility Lab requires in-vehicle modules that link to this on-premise infrastructure.
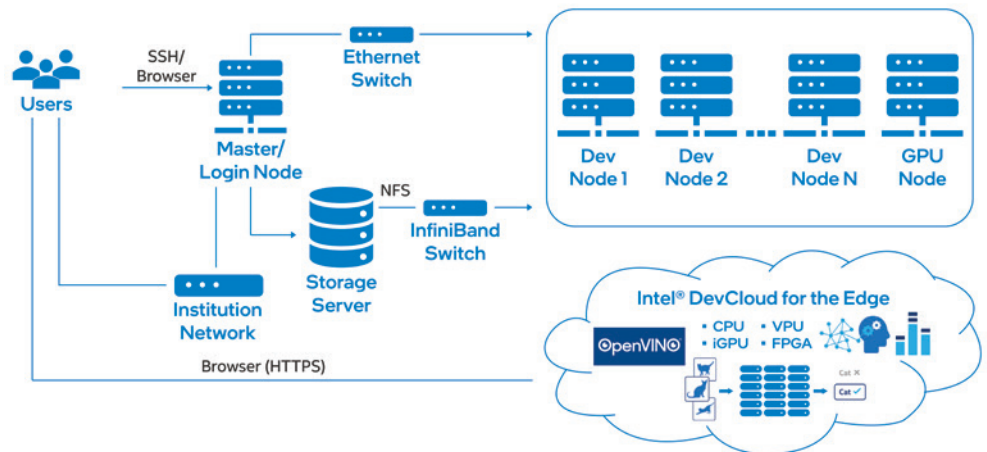
Showcase New Skills

Students are awarded an Intel co-branded certificate at the completion of their course.

Coursework that Enables Learning by Doing

With an emphasis on hands-on exercises, the course covers Machine Learning, Deep Learning, and Deploying Models using Intel Distribution of OpenVino™ toolkit on modern Intel® architecture.

Custom Lab Deployments

The Intel® Unnati AI Lab is available in two recommended configurations, **AI Builder** and **AI Research**. Our System Integrator associates will assist you for further custom-isations to your lab setup and training content to suit your needs.

Intel AI

Artificial Intelligence has unleashed a new era of creativity and ingenuity. Today, Intel® technologies power some of the most promising AI use cases in business, society, and research. From massive cloud to tiny device, Intel turns the promise of a transformative AI model into a global-scale reality.

Intel's portfolio of Xeon® scalable processors, combined with AI-optimised FPGAs, VPUs, memory and storage technologies, and software solutions ease the process for deploying AI and data analytics in real-world applications.

Intel is committed to unlocking the promise of AI. To drive AI innovation, Intel is making strategic investments spanning R&D, technology, and partnerships with business, government, academia and community groups.

Intel® Unnati
FPGA Solutions

FPGAs: Innovation for the Data Era

Field Programmable Gate Arrays (FPGAs) provide benefits to designers of many types of electronic equipment, from smart energy grids, aircraft navigation, automotive driver's assistance, medical ultrasounds, data centre search engines—just to name a few.

Student or Researcher – We've Got Them Covered!

A student or researcher can gain knowledge on creating complex FPGA designs as a hardware engineer, writing software for an embedded processor, modeling and implementing deep learning algorithms, and managing large amounts of data for high-speed communication.

Coursework that Builds FPGA Expertise

Quickly build practical expertise with hands on labs using our FPGA courses focused on Digital Design, Computer Organisation, Embedded Systems, AI and FPGA Acceleration, High Speed Communication and Data Acquisition.

Remote Access

Remote access infrastructure is available for FPGA boards with documentation for easy setup.

FPGA Acceleration from Edge to Cloud

Students learn how to combine Intel FPGA hardware and software to efficiently accelerate workloads for processor intensive tasks.

Industry Leading Design Software

With industry leading Intel® Quartus® Prime Design Software and Intel® oneAPI Toolkits, get optimised performance from your Intel hardware.

Custom Lab Deployments

You can choose any of three configurations: **Digital Logic and Embedded Systems**, **FPGA Acceleration and Artificial Intelligence**, and **Communication and High Speed Data Acquisition**. Our System Integrator

Benefits of FPGAs

Flexibility: FPGA functionality can change upon every power-up of the device. When a design engineer wants to make a change, he or she can simply download a new configuration file and try out the change.

Acceleration: Get products to market quicker and/or increase your system performance. FPGAs provide off-load and acceleration functions to CPUs, effectively speeding up the entire system performance.

Integration: Today's FPGAs include on-die processors, transceiver I/Os at 116 Gbps (or faster), RAM blocks, DSP engines, and more. More functions within the FPGA mean fewer devices on the circuit board, increasing reliability by reducing the number of device failures.

Total Cost of Ownership (TCO): While ASICs may cost less per unit than an equivalent FPGA, building them requires a non-recurring expense (NRE), expensive software tools, specialised design teams, and long manufacturing cycles. Intel FPGAs support long life-cycles (15 years or more), thereby avoiding the cost of redesigning and requalifying OEM production equipment if one of the electronic devices onboard goes end of life (EOL).

https://www.intel.com/content/www/us/en/products/programmable/fpga/new-to-fpgas/resource-center/overview.html

associates will assist you for further customisations to your lab setup and training content to suit your needs.

Showcase New Skills

Students are awarded an Intel co-branded certificate at the completion of their course.
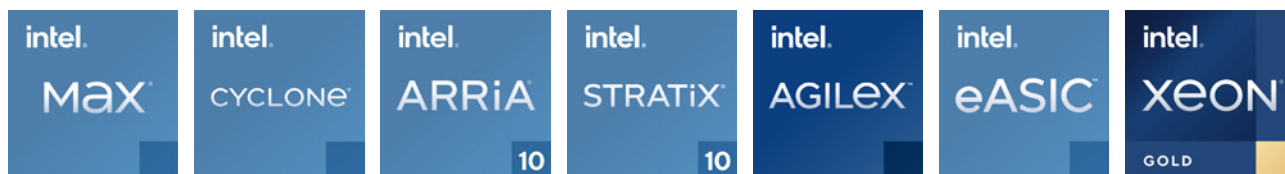
Intel® Unnati
High Performance Computing

What is High Performance Computing?

High performance computing (HPC) is a class of applications and workloads that perform computationally intensive operations across multiple resources, and has been key to research and innovation in both academia and industry for several years. HPC is fueling breakthroughs in areas like autonomous driving, climate change, seismic engineering, oil and gas production, precision medicine, and financial risk assessment.
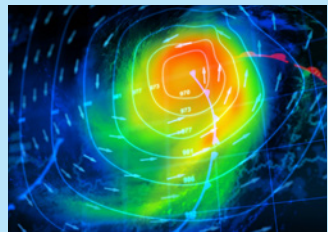
HPC at Work

(Clockwise from top left) Weather Forecasting; Automotive Industry; Genetic Engineering; and Aerospace

HPC and AI: A Powerful Combination

- The architecture required for HPC has many similarities with AI implementations. Both use high levels of compute and storage, large memory capacity, and high-bandwidth fabrics to achieve results—typically by processing massive data sets of increasing size.

- The promise of AI in HPC is that AI models can augment expert analysis of data sets to produce results faster at the same level of accuracy.

- On the other hand, HPC can help address the challenges of AI at scale, such as the need for more parallelism, fast I/O for massive data sets, and efficient navigation of distributed computing environments.

of the hardware. The Intel® oneAPI toolkits, targeting Intel CPUs and accelerators, provides this balance between optimal use of underlying hardware features and code that is portable, easily maintainable, and power-efficient.

HPC Made Simple

Students will be introduced to key foundational HPC concepts, parallel programming, software frameworks and toolkits, that simplify implementation of HPC applications on Intel® XPUs and accelerators with Intel's industry-leading compiler technology and libraries.

While HPC can be run on a single system, its real power comes from connecting multiple HPC nodes in a cluster. This provides the capabilities to compute large-scale simulations that are not feasible on a single system.

Parallel Programming

Modern HPC clusters can include various nodes that contain multi-core processors and include accelerators such as GPUs and FPGAs. To take full advantage of these compute resources, parallel programming is required.

In parallel programming, a complex problem is first broken down into smaller tasks that can be run at the same time using multiple compute resources. While there is initial effort required to set up this parallelism, the benefits in speed and performance are usually significantly higher, justifying the investment.

Heterogenous Computing and Intel® oneAPI

The increasingly heterogenous HPC compute environment requires a standard, simplified programming model that can run seamlessly across architectures while getting the maximum available performance out

Suitable for Students and Researchers

With two available configurations, the lab can be designed to cater to students who are just getting started in HPC as well as students and researchers who require a powerful compute cluster for advanced HPC workloads.

Learn the toolkits the industry uses for building and analysing HPC workloads

Students will learn about and use the Intel® oneAPI HPC Toolkit, used by developers the world over to build, analyse, optimise, and scale HPC applications.

Taking on the world's biggest challenges through HPC and AI

The combination of HPC and AI is being increasingly used to work on some of the world's biggest challenges. Deep learning is a great match for problems addressed by HPC that involve very large, multidimensional data sets. Provide your institution with the infrastructure to enable your students and researchers take the first steps towards making a strong impact.

Intel® Unnati
Smart Mobility

Why Smart Mobility?

The pressures of growing populations, increasing vehicle volume, and aging, physically constrained transportation infrastructure are creating an urban gridlock that impacts productivity, public safety, and public health.

Cities are using technology to improve traffic flow and public safety on existing roadways and extracting insights that are informing traffic engineering and infrastructure improvements.

Road Safety in the Indian Context

Per the Government of India's MyGov website[1], India still ranks first in the number of road accident deaths across 199 countries, and accounts for almost 11% of all accident-related deaths in the world. The Government is taking road safety as a top priority and is endeavouring to reduce road accidents by 50% by

2024; and it sees significant opportunities for the application of AI-driven technologies to remove human interference and the possibility of errors, thereby improving efficiencies and safety in traffic movement.

Advanced Driver Assistance Systems (ADAS)

ADAS systems are electronic systems that use AI and other advanced technologies to assist the driver. With features such as Collision Warning, Pedestrian Detection and Lane Departure Warning among others, these systems minimise human error and reduce road fatalities. With a vision of fewer crashes and mobility for all, Intel is developing ADAS systems as the building blocks for the future of autonomous driving

[1]https://www.mygov.in/campaigns/national-road-safety/
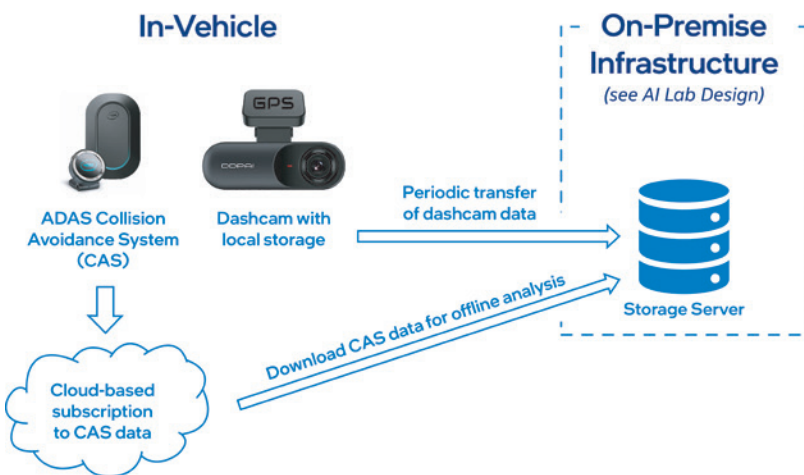
- Exercises will be offered as Jupyter* notebooks
- Logins can be setup by the System Integrator (SI)
- OpenVINO™ Labs can be run on Intel® DevCloud for the Edge
- Job scheduling, if needed, will be setup by the SI during deployment using PBS*/Slurm*/Kubernetes*

Key Benefits

For Institutions

- Build hands-on exposure to AI technologies driving Smart Mobility and next generation AI-based Mobility solutions
- Leverage Smart Mobility infrastructure across multiple engineering disciplines
- Learn about Indian datasets for AI and challenges in data collection
- Contribute to building India-specific datasets for Smarter and Safer Mobility (e.g., GreySpot map for India)

For Students

- How modern AI techniques are driving next generation vehicles
- How infrastructure safety can become more predictive with data
- How India can lead the world with unique AI datasets and applications

The Power of Intel® Xeon® Scalable Processors

Intel® Unnati Data-Centric Labs are built around 3rd Gen Intel® Xeon® Scalable processors, which offer a balanced architecture that delivers built-in AI acceleration and advanced security capabilities. This allows you to place your workloads where they perform best —from edge to cloud.

Supported by close partnerships with the world's software leaders and solution providers, the 3rd Gen Intel® Xeon® Scalable processors are optimised for many workload types and performance levels, all with the consistent, open, Intel® architecture you know and trust.

To know more about how your institution can benefit from the Intel® Unnati Program, please contact:

Intel_Unnati_ML_Oct 2022