Technical Proposal

Intel® Unnati
Smart Mobility Lab

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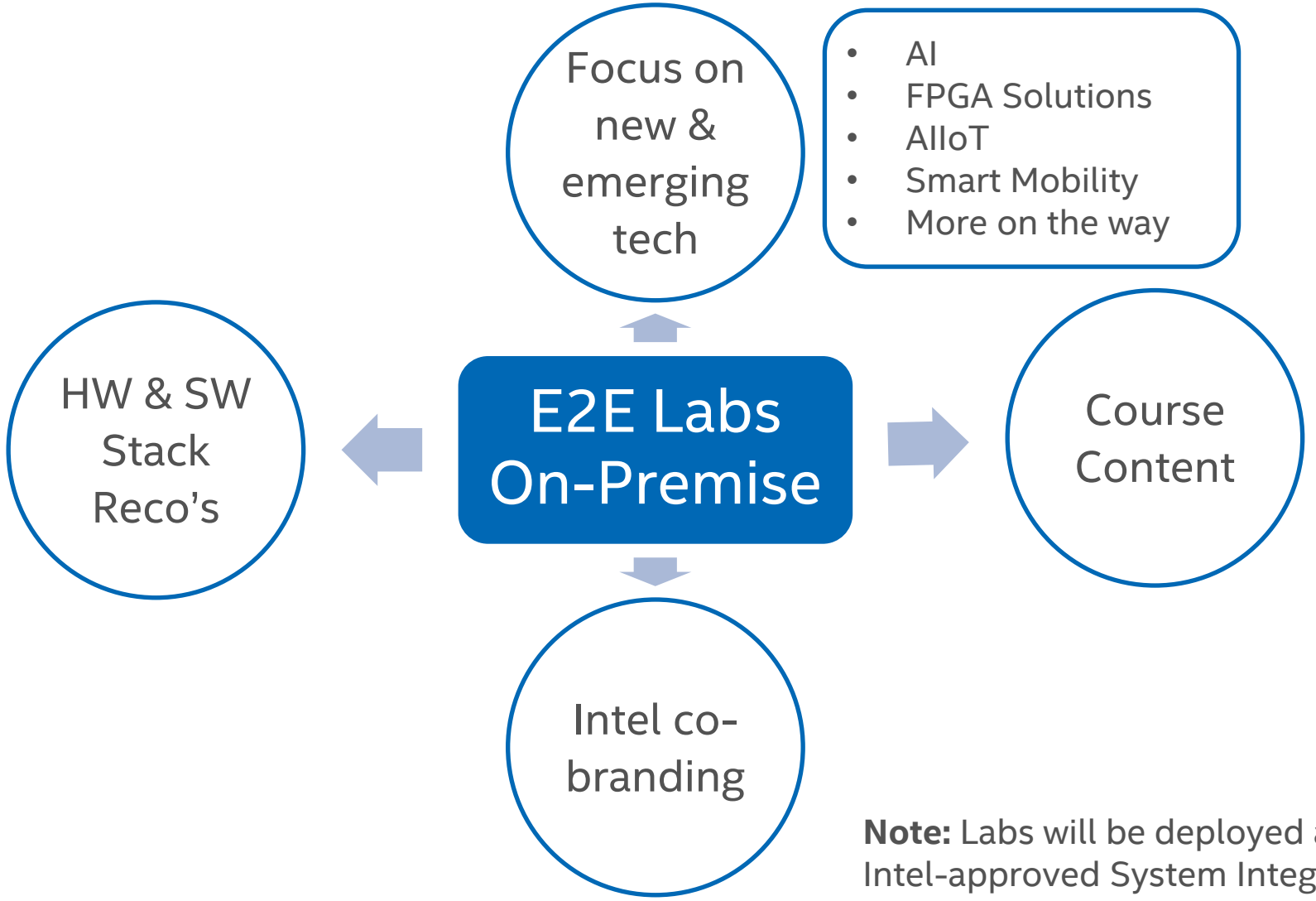
Intel® Unnati - Data-Centric Labs in Emerging Technologies



Note: Labs will be deployed and supported by Intel-approved System Integrators

Intel® Unnati - Data-Centric Labs in Emerging Technologies



Equip your students with industry relevant data-centric skills

Give your students the edge by equipping them with skills that will help them be better prepared for industry and develop high-value solutions.



Unleash your students' creative potential

India has the largest student population in the world. Let tech uncover their potential and help bring their next big idea to life!



Build a strong reputation

With an **Intel co-branded lab**, be recognised as an institute committed to train your students in the latest technology, and focus on faculty development

Leverage our System Integrator Network - Be it training, customisations of your lab set up, or maintenance and support requests, you can rely on our network of System Integrator associates

Smart Mobility Lab

AI is revolutionizing Mobility systems and transforming many traditional industries.

Cognitive capabilities and predictive insights enabled by AI are making mobility systems smarter and safer

Smart Mobility Lab will introduce students to:

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

Value proposition of Smart Mobility Lab to Institutions:

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

High-Level Lab Design

On-Premise

In-Vehicle



ADAS Collision Avoidance System (CAS)



Dashcam with local storage

Cloud-based subscription to CAS data

Users

SSH / Browser (HTTPS)

Login Server

Periodic transfer of dashcam data

Storage Server

NFS

Jupyter Server

Dev Node 1

Dev Node 2

Download CAS data for offline analysis

Browser (HTTPS)

Intel DevCloud for the Edge

OpenVINO

• CPU • VPU
• iGPU • FPGA

- Exercises will be offered as Jupyter notebooks
- Logins can be setup by the 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

Proposed Lab Configuration

Infrastructure	Minimum Suggested Specifications for 30 Users	
25 x Collision Avoidance Systems (CAS) 5 x Dashcams	• Intel Onboard Smart Mobility Solution – SafetyPro – powered by Mobileye 8 Connect • DDPAI Mola N3 Car Dash Camera with GPS Bracket, 2K+ 1600P UHD, 5MP, F1.8 Aperture, 140° Wide Angle, WiFi, 1GB RAM, 128GB Storage	• Intel Onboard Cloud access for alerts • Cloud access to contribute to GreySpot Map
3 x Nodes **Note:** You could use 1 node as the Jupyter* Server	• Dual Intel® Xeon® Gold 5318Y, 24 cores, 2.1 GHz base frequency, 36 MB cache • 256GB Memory: 16 x 16GB of 2993 MHz DDR4 ECC Registered Memory • 1TB SSD	• Ubuntu* 18.04 • Intel® oneAPI Base Toolkit + Intel® AI Analytics Toolkit • Horovod + Intel® MPI (if distributed DL training w/ TensorFlow*) • IPEX (Intel Extension for PyTorch) • Intel® Distribution of OpenVINO™ Toolkit • **Note:** Check oneContainer Portal for available AI containers **Jupyter Server:** • Ubuntu* 18.04 • JupyterHub* and JupyterLab* • Keras*, ipykernel*, Seaborn* + other libs as required
1-2 x GPU card	• Kindly contact SI for GPU recommendations	
1 x Storage Server	• At least 2 TB space	
1 x Login Server	• Intel® Xeon® Silver 4310, 12 cores, 2.1 GHz,18 MB cache, 128 GB RAM, 500GB SSD	• Ubuntu* 18.04
+ Network Router with 1Gbps Ports, Network Switch, Rack Cabinet, Power Delivery Unit (PDU), Patch Cables, Power Cable		
+ Software for job scheduling and queueing if needed		
Note: OpenVino™ labs will be run on Intel® DevCloud for the Edge		

Course Outline (~40 hrs)

Machine Learning on Modern Intel Arch (Duration: Approx15hrs)

Prerequisites:	Learning Outcomes:	Lab Exercises:
• Python programming • Calculus • Linear algebra • Statistics	• Supervised learning algorithms • Key concepts like under- and over-fitting, regularization, and cross-validation • How to identify the type of problem to be solved, choose the right algorithm, tune parameters, and validate a model • Unsupervised learning	• Supervised Learning and K Nearest Neighbors • Train Test Splits, Cross Validation, and Linear Regression • Regularization and Gradient Descent • Logistic Regression and Classification Error Metrics • Clustering Methods

Deep Learning on Modern Intel Architecture (Duration: Approx18 hrs)

Prerequisites:	Learning Outcomes:	Lab Exercises:
• Python programming • Calculus • Linear algebra • Statistics • Machine Learning Course	• Techniques, terminology, and mathematics of DL • Fundamental neural network architectures, feedforward networks, convolutional networks, and recurrent networks • How to appropriately build and train models • Various deep learning applications • How to use pre-trained models for best results	• Handwritten Image Detection with Keras using MNIST data • Building a CNN to classify images in the CIFAR-10 Dataset • Transfer Learning using MNIST data • Using Pre-Trained Models • Classifying CIFAR-10 with Data Augmentation • Hands on E2E workflow using an image classification problem.

ADAS Alert Analysis using Intel Distribution of OpenVino Toolkit (Duration: Approx10 hrs)

Prerequisites:	Learning Outcomes:	Lab Exercises:
• Python programming • Calculus • Linear algebra • Statistics • Machine Learning Course • Deep Learning Course	• Learn about Intel® Distribution of OpenVino toolkit for DL inference • Collection and preparation of datasets • Data analysis	- Collect data from 25 vehicles over a period of 30 days, with CAS. Backup dataset provided. - 2 hr Industry expert talk on ADAS (Advanced Driver Assistance Systems) **Lab Exercises:** • Normalization of real-world data from sensors on field, across time • User-specific data analysis (alert types, behaviour categorization) • Population rank based on metrics • Identification of hotspots on road network, ahead of possible accidents (project) • Use AI/ML to identify near-accident events from large video footage (project - with Dashcam)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