Train the Trainer Programme

open source initiative®

open source hardware

Industrial Automation

Smart Agriculture

Mobility & Transportation
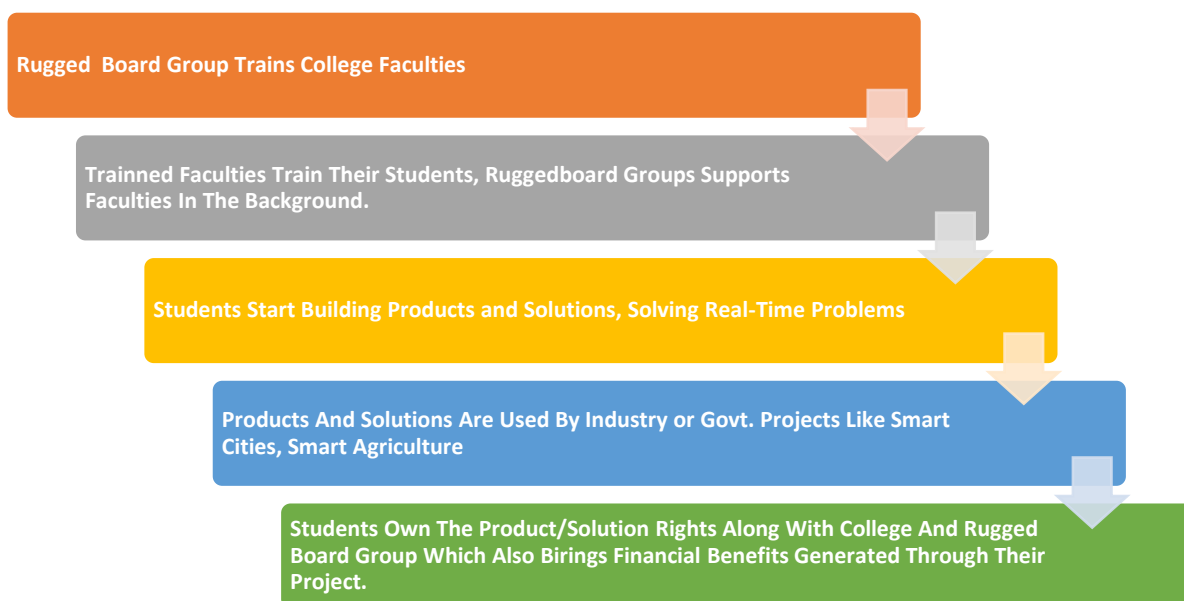
Medical & HealthCare
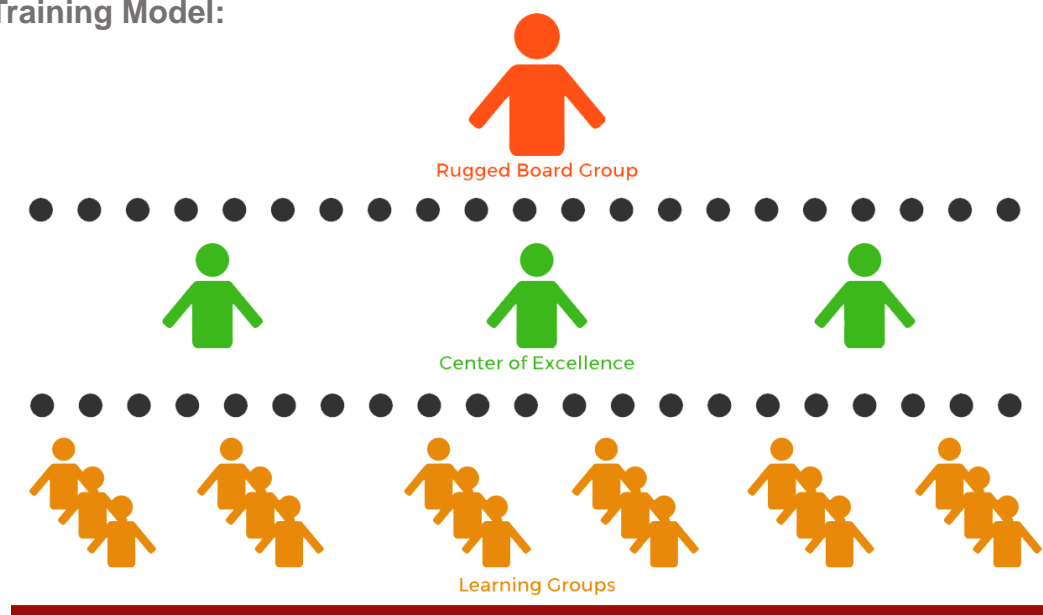
Smart City Applications

RuggedBoard is an Industrial grade IoT board developed by PHYTEC Embedded Pvt. Ltd Make In INDIA with German Quality. It is the first of its kind Industrial IoT Single Board Computer with multiple interfaces required for IIoT applications in Industry-4.0, Smart Cities, Smart Transportation, Smart Energy & Smart Agriculture. This IoT project would build big Hardware eco-system in INDIA and support Industries to develop their own IoT products & manufacture in INDIA with ease.

To promote MAKE IN INDIA & Aatmanirbhar Bharat by developing Products & Technology IP's in INDIA and bringing in University partners to hold major role in research & development, PHYTEC team would like to share the technical expertise with Trainer members from University & together solve real-time industry problems and also bring in more innovations with latest technologies from University Labs.

Stages of Learning & Development:

Rugged Board Group Trains College Faculties

Trainned Faculties Train Their Students, Ruggedboard Groups Supports Faculties In The Background.

Students Start Building Products and Solutions, Solving Real-Time Problems

Products And Solutions Are Used By Industry or Govt. Projects Like Smart Cities, Smart Agriculture

Students Own The Product/Solution Rights Along With College And Rugged Board Group Which Also Birings Financial Benefits Generated Through Their Project.

Layered Training Model:

Rugged Board Group

Center of Excellence

Learning Groups

Level-1 Train the Trainer Programme
Building Embedded Linux System

Module-1: Linux Basics & Programming (2 Days)

Linux Intro & Installation	- What is Linux, how it has been evolved, GNU License, Kernel - How Linux was designed, - Sub systems of Linux [Scheduler, Process, Memory Mgmt, File System, Device Mgmt] - Ways to Install Linux [1. Dual Boot, 2. Within Windows, 3. Using Virtual Machine] - How to update Linux and install required packages
Linux Shell Commands	- Basic Commands - Dir & File Commands - System Commands - Misc Commands
C Programming in Linux	- Writing C program on Linux - Compiling and executing Linux - Linux Executable format info & tools - Debugging C application on Linux using GDB - MQTT Experiments
Make Files	- Understanding Make files - Writing Make files - Compiling Multiple src Dir using Make file - Advanced methods used in writing Make files

Module-2:   eLinux Porting (3 Days)

Introduction, Setup & Hardware	- Introduction to Embedded Linux - ARM Processor Basics & Families - ARM Board Details and Schematic Overview - Boot Process - Host PC Setup for eLinux Development
Bootloader U-Boot Porting	- Toolchain and its components - Introduction to Bootloader - Compiling Bootloader - How to port Bootloader on ARM Based Hardware
Kernel Porting & Compilation	- Introduction to Linux Kernel Arch - Kernel Dir Structure - Kernel Build System (KConfig) - How to configure and compile for ARM Hardware - How to port Kernel on New ARM Hardware
Root File-System	- Components of RootFS -Types of RootFS -Different types of Flash Device (SDCARD / NOR) - Test Your First Application - " Hello world " in SBC.

Level-2 Train the Trainer Programme
Building Industrial IoT Applications using RuggedBOARD

Module-3: HW Interface & Sensor Programming in eLinux (5 Days)

Linux GPIO Programming	- Introduction to Linux GPIO SubSystem - Accessing GPIO using Sysfs - Programming GPIO's in C - Programming GPIO's using MRAA Lib in C - Programming GPIO's using MRAA Lib in PYTHON - LEDs, Switches Experiments - Relay Demo - Seven Segment Demo
Linux UART Programming	- Understanding Serial Port in Linux - Programming UART using C - Programming UART using MRAA Lib in C - Programming UART using MRAA Lib in PYTHON - GSM & GPS Experiments - Bluetooth Demos - RFID Card Read Demos - RS485 ModBUS RTU Demo
Linux ADC Programming	- Understanding ADC Subsystem in Linux - Accessing ADC using SysFS - Programming ADC using MRAA Lib in C - Programming ADC using MRAA Lib in PYTHON - ADC Experiments using Resistor POT. - Temperature Sensor Interfacing Experiments
Linux PWM Programming	- Understanding PWM Subsystem in Linux - Accessing PWM using SysFS - Programming PWM using MRAA Lib in C - Programming PWM using MRAA Lib in PYTHON - PWM Experiments & verify using Oscilloscope. - Stepper Motor Interfacing Experiments - LED Driver Interface Demo

Module-4: Advance Sensor Interface Programming in eLinux (5 Days)

Linux I2C Programming	- Understanding I2C Subsystem in Linux - Programming I2C using MRAA Lib in C - Programming I2C using MRAA Lib in PYTHON - I2C MEMS Temp Sensor Experiment - I2C Accelerometer Temp Sensor Experiment
Linux SPI Programming	- Understanding SPI Subsystem in Linux - Programming SPI using MRAA Lib in C - Programming SPI using MRAA Lib in PYTHON - SPI MEMS Sensor Experiment - SPI Graphic OLED Interface Demo
Linux Ethernet Socket	- Linux Network Socket Basics

Programming	- TCP Client Server Experiments
	- UDP Client Server Experiments
	- HTTP REST API Cloud Experiment
	- MQTT Cloud Experiment
Linux CAN Socket Programming	- Linux CAN Socket Basics
	- CAN Socket Programming
	- CAN to DIO Card Interface Experiment
	- EV Charger Control Card Demo

Module-5: Project-1 Guidance (5 Days)

Any one project of interest can be selected by the candidate

Smart Home Automation System
Smart Irrigation System
Smart Street Light System using LoRA
Telematic Control Unit

Module-5: Project-2 Guidance (5 Days)

Any one project of interest can be selected by the candidate

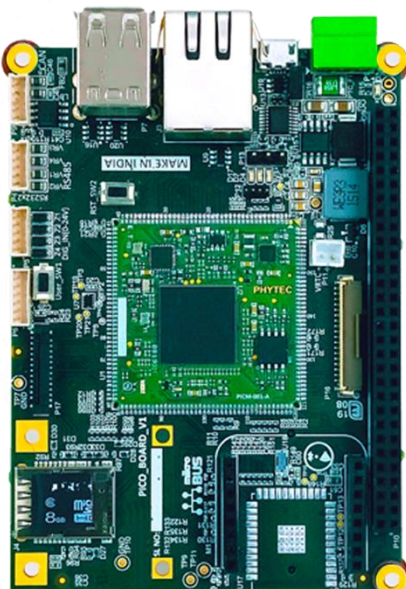| Industry-4.0 Multi-Protocol Gateway Development |
|---|
| Industrial Energy Management System Gateway Development |
| Industry-4.0 HMI Development |
| Smart City Weather Monitoring Station Development |
| Smart Patient Monitoring System |

Complete Hands-On on INDIA's First Open Source Hardware "RuggedBOARD"
Swadeshi Single Board Computer

A5D2x @500MHz
CORTEX - A5
64MB RAM
32MB FLASH

RS-232 — 2 x RS232

RS-485 — 1x RS485

CAN — 1 x CAN

1 x ETHERNET
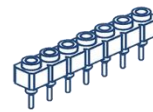
TFT & CAP TOUCH

micro — 1 x MICROSD SLOT

2 x USB

DC & USB POWER

EXPANSION HEADER

mikroBUS CONN.

mPCIe CONN.

MICRO SIM SLOT

For More details visit: https://community.ruggedboard.com