

DYSMECH COMPETENCY SERVICES PVT. LTD.
PRODUCT DEVELOPMENT AT INVERTIS UNIVERSITY
SMART 3PH ENERGY METER

ABOUT DYSMECH

Dysmech Competency Services Pvt. Ltd. (DCS) founded in 2000, bags to its name a charismatic aggregation of professionals from diverse verticals, excelling the four Pillars that help flourishing business and taking it to newer horizons. Beneath the advisory ship of Mr. Vijay Kumar, a prominent IIT (Kharagpur) alumnus possessing extensive exposure and experience in the industrial world, the company's management has been honoured and dignified to place the company as one of the leading consultants in India with its nationwide presence in more than 15 cities.

The company pursues, as its aim to use the experience gained by its personnel & skilled experts to service clients maintaining high standards of quality while respecting time schedules.

Company Website: <http://dysmech.com/>

PRODUCT DEVELOPMENT INVITATION LETTER

Dear Students,

We are pleased to invite you to participate in an interdisciplinary Product Development Program focused on the development of a Smart 3-Phase Industrial Energy Meter. This initiative provides hands-on exposure to industrial energy monitoring, predictive maintenance, and IoT-based power management, preparing students for careers in smart manufacturing, industrial automation, and energy analytics.

With increasing emphasis on energy efficiency and power factor optimization, this project offers practical experience in designing an industrial-grade smart meter that tracks energy usage, detects anomalies, and provides real-time reports for better decision-making.

This program is open to students from various disciplines, including B.Tech, BCA, and MCA, encouraging collaboration and knowledge exchange to develop a fully functional 3-Phase Industrial Energy Meter compliant with industrial standards.

SMART 3-PHASE INDUSTRIAL ENERGY METER

1. OBJECTIVE

The Smart 3-Phase Industrial Energy Meter is designed to provide an accurate and real-time monitoring system for industrial energy management. The system is integrated with Modbus communication and IoT connectivity, ensuring industrial-standard data accuracy and remote access via cloud-based dashboards.

The project highlights energy analytics, power factor optimization, predictive maintenance, and anomaly detection to assist industries in reducing energy costs and enhancing efficiency.

2. Involvement of Different Engineering Departments

B.Tech (Engineering Branches):

1. Embedded Systems & Industrial Metering:

- 1.1. Development of Modbus-compatible multi-function meters to replace PZEM sensors.

- 1.2. Integration of voltage, current, and power factor sensors with microcontrollers for real-time monitoring.

2. Energy Management & Power Factor Optimization:

- 2.1. Implementing algorithms to track, optimize, and Alerts to correct power factor to avoid penalties.
- 2.2. Developing methods to reduce energy wastage and enhance cost savings.

B.Tech/BCA/MCA Students:

1. IoT Cloud Integration & Data Transmission:

- 1.1. Real-time data transmission using industrial IoT protocols to store and analyze energy data.
- 1.2. Developing a Things Board/Firebase-based dashboard for industrial monitoring.

2. Data Analytics & Predictive Maintenance:

- 2.1. Implementing anomaly detection to identify sudden load spikes, voltage fluctuations, and phase faults.
- 2.2. Predictive maintenance algorithms to schedule machine servicing, reducing unplanned downtime.

3. Web & Mobile Application Development:

- 3.1. Developing a dashboard for real-time energy monitoring and power factor tracking.
- 3.2. Custom reporting tools for daily, weekly, and monthly energy usage insights.

3. Students' Learning Outcomes

By participating in this program, students will gain expertise in:

1. Industrial IoT & Embedded Systems Development:

- 1.1. Understanding 3-phase energy meter architecture and sensor integration.
- 1.2. Implementing Modbus-based industrial data communication.

2. **Energy Analytics & Cost Optimization:**

- 2.1. Applying power factor correction techniques to reduce energy costs and prevent penalties.
- 2.2. Analyzing industrial energy consumption trends for efficiency improvement.

3. **IoT Cloud Connectivity & Remote Monitoring:**

- 3.1. Developing cloud-based energy tracking systems with real-time updates.
- 3.2. Implementing remote control for machine shutdown and energy management.

4. **Anomaly Detection & Predictive Analytics:**

- 4.1. Using data science techniques to detect abnormal energy consumption.
- 4.2. Implementing predictive maintenance to reduce industrial downtime.

5. **Industrial Dashboard & Report Generation:**

- 5.1. Designing custom reports for daily, weekly, and monthly energy insights.
 - 5.2. Enabling industries to track power factor trends and optimize energy use.
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4. **Relevance with Industry & Job Opportunities**

This Product Development Program will prepare students for high-demand roles in:

1. **Industrial Energy Management & Smart Grid Solutions:**

- 1.1. Careers in industrial energy analytics, smart metering, and power monitoring.

2. **IoT & Embedded Systems for Industrial Applications:**

- 2.1. Roles in industrial IoT development, Modbus-based automation, and sensor integration.

3. **Data Science & AI for Energy Optimization:**

- 3.1. Opportunities in AI-driven power management, predictive maintenance, and machine learning for industrial energy analysis.

4. **Software & Dashboard Development for Smart Industries:**

- 4.1. Web and mobile app development for real-time industrial monitoring and report automation.
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5. Challenges & Benefits of Power Factor in MSME Industries

Challenges:

1. **Low Power Factor Penalties:** Industries face increased electricity costs due to low power factor penalties from electricity providers.
2. **Higher Energy Costs:** Poor power factor leads to higher apparent power demand, increasing bills.
3. **Equipment Wear & Tear:** Motors and transformers with poor power factor suffer from overheating and inefficiencies.
4. **Voltage Drops:** A poor power factor affects the performance of sensitive industrial equipment.
5. **Initial Investment in Power Factor Correction:** Industries may need to invest in capacitors or APFC controllers.

Benefits:

1. **Cost Reduction & Incentives:** Optimized power factor lowers electricity costs and prevents penalties.
 2. **Improved Machine Efficiency:** Enhanced power factor reduces energy waste, improving equipment lifespan.
 3. **Better Load Management:** Capacity utilization increases, enabling additional load support without infrastructure upgrades.
 4. **Reduced Transmission Losses:** Lower reactive power results in less energy loss in transformers and cables.
 5. **Environmental Sustainability:** Reduced energy wastage leads to lower carbon emissions.
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6. Conclusion

The Smart 3-Phase Industrial Energy Meter Product Development Program is designed to provide students with hands-on experience in industrial energy monitoring, IoT analytics, and predictive maintenance. By participating, students will gain valuable insights into smart energy management, industrial automation, and power optimization.

We invite you to be a part of this cutting-edge initiative and contribute to the future of smart industrial energy solutions.

Join us in shaping the future of industrial power management!

7. Revenue Potential

The product developed through this project could generate billings of approximately ₹ 9,00,000.00 to ₹ 10,00,000.00 for Invertis University.

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**SMART 3PH ENERGY METER
PRODUCT DEVELOPMENT ROAD MAP**

INVERTIS CSED SMART 3PH ENERGY METER

PRODUCT DEVELOPMENT ROAD MAP

DCS Mentor : Mr. NAZMUL ARIFEN

Approximate Product Timeline : 90 Working Days

TASK	LINE OF ACTION	ORGANISER	ASSIGNED DAYS
1	Team Discussion – Industry Standard Product Development & Applications Meeting – CSED Management, Assigned Invertis Staff & DCS Mentors	Talha Khan	1
2	List of Students Interested to Join	Talha Khan	7
3	Team Formation Meeting – Students, Assigned Invertis Staff & DCS Mentors	Avadhesh Sharma	2
4	Web Research & Practical Visit to Industrial Power Distribution Panels & their Bills, Access to College Power Panels & Electric Bills - To Study & Understand User Challenges and Smart Requirements	Talha Khan	3
5	Smart 3PH Energy Meter – Market Standards, Requirements, Product Design & Smart Features	Mani Shankar (DCS)	2
6	Smart 3PH Energy Meter – Research on Required Hardware Materials	Nazmul (DCS)	2
7	Smart 3PH Energy Meter - Product Development Planning, Road Map, Task Breakup & Timeline Sheet (Meeting with Team)	Mani Shankar (DCS)	3
8	Smart Energy Meter – Data Science Model Building – Analytics on Collected Sensors Data, Generate Visual Reports, Trigger Alerts, predict trends & suggest automation responses.	Mr Kuldeep Verma / Hitesh (DCS)	15
9	Permission to Work on Campus Buildings Power Panels/Industrial Power Distribution Boards (Need Electrician Help) - Feasibility Study, Install IoT Devices in Power Distribution Boards, Provide Wi-Fi Range to IoT Device.	Talha Khan	2

10	Compose Hardware & Software Requirements BOM	Mani Shankar (DCS)	1
11	Invertis CSED - BOM Approval - Place Order	Avadhesh Sharma	1
12	Hardware BOM – Delivery to Invertis Campus	Avadhesh Sharma	15
13	Phase 1 (IoT & Data Science) Task & Timeline Execution	Avadhesh Sharma/ Nazmul (DCS)	30
14	Device Enclosures & Mechanical Fixtures - 3D Design & Manufacturing	Sandeep (DCS)	10
15	Install IoT Smart 3ph Energy Meter inside Campus/Industrial Power Distribution Panels, Testing, Validation & Documentation Industrial Electricians Requirement – Invertis CSED Need to Arrange	Nazmul (DCS)	10
16	Team Discussion on Mobile Application Features Meeting – Students, Assigned Invertis Staff & DCS Mentors	Chaudhary Ravi Singh	2
17	Mobile/Web application Requirements, Task Breakup & Timeline	Mani Shankar (DCS)	4
18	Compose App Development Software & Paid Subscriptions Budgeting	Rushikesh Pande (DCS)	2
19	Invertis CSED - Purchase Approval - Place Order	Chaudhary Ravi Singh	1
20	Phase 2 (Mobile App) Task & Timeline Execution	Chaudhary Ravi Singh/ Rushikesh Pande (DCS)	45
21	Final Product Testing – Industrial Application Need Management Help to Access Industrial Panels	Rahul Chaple (DCS)	6
22	Product Validation	Mani Shankar (DCS)	2

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SMART 3PH ENERGY METER

TEAM FORMATION

**INVERTIS CSED SMART 3PH ENERGY METER
PRODUCT DEVELOPMENT
TEAM FORMATION**

Sr. No	PRODUCT DEVELOPMENT STAGES	STUDENTS		STUDENTS	MENTORS
		BRANCH	CSED PREREQUISITE		
1	IOT APPLICATION DEVELOPMENT	B. Tech (EE, ETC)	IT_1	5	DCS MENTOR MR. RAHUL CHAPLE INVERTIS Mr. Ratnesh Pandey, CSE Department
2	DEVICE ENCLOSURE – DESIGN & MANUFACTURING	B. Tech (Mech)	Module 1 & 2	5	
3	DATA SCIENCE MODEL DEVELOPMENT	B. Tech, BCA	IT_5 & IT_6	5	
4	APPLICATION DEVELOPMENT	B. Tech, BCA, MCA	IT_5	5	

1. IOT APPLICATION DEVELOPMENT

Sr. No	STUDENT NAME	BATCH	CONTACT
1			
2			
3			
4			
5			

2. DEVICE ENCLOSURE – DESIGN & MANUFACTURING

Sr. No	STUDENT NAME	BATCH	CONTACT
1			
2			
3			
4			
5			

3. DATA SCIENCE MODEL DEVELOPMENT

Sr. No	STUDENT NAME	BATCH	CONTACT
1			
2			
3			
4			
5			

4. APPLICATION DEVELOPMENT

Sr. No	STUDENT NAME	BATCH	CONTACT
1			
2			
3			
4			
5			