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DYSMECH COMPETENCY SERVICES PVT. LTD.

PRODUCT DEVELOPMENT AT INVERTIS UNIVERSITY

SMART GENSET

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 excited to announce an opportunity for you to participate in an innovative Product Development Program focused on the creation of a Smart Genset Monitoring System. This program will provide you with hands-on experience working with advanced technologies, including Embedded Systems, IoT Cloud Connectivity, Data Analytics, Machine Learning (ML), and Full-Stack Web and Mobile Application Development.

This initiative is designed to engage students from B.Tech, BCA, and MCA, fostering cross-disciplinary collaboration to successfully develop the Smart Genset Monitoring System. With the increasing demand for smart systems in energy and industry, this program will equip you with relevant industry skills and prepare you for career opportunities in IoT, data science, and software development.

We invite enthusiastic and talented students to take part in this project, where you will have the chance to solve real-world engineering problems, develop innovative solutions, and collaborate with peers to bring this system to life.

SMART GENSET MONITORING SYSTEM PRODUCT DEVELOPMENT

1. OBJECTIVE

The primary objective of this Product Development Program is to provide students with hands-on experience in designing, developing, and deploying a commercial-grade Smart Genset Monitoring System. Participants will build skills in Embedded Systems, IoT Cloud Connectivity, Data Analytics, Machine Learning (ML), and Full-Stack Web and Mobile Application Development. Students will work on real-world problems and gain exposure to industry-standard technologies, preparing them for future roles in engineering, data science, AI, and software development.

2. SCOPE OF THE PROGRAM

The Product Development Program is divided into various departments, allowing students to focus on their areas of interest while contributing to the overall project:

1. **Embedded Coding & Hardware Development**
   1.1. Design hardware circuits, integrate sensors, and develop firmware for real-time monitoring of engine parameters.

2. **IoT Cloud Connectivity Management**
   2.1. Develop IoT solutions to collect real-time data from gensets and transmit it to the cloud using secure, efficient connectivity protocols.

3. **Data Collection & Data Analytics**
   3.1. Gather, clean, and structure data from genset sensors and use analytics tools to generate insights based on real-time and historical data.

4. **Machine Learning (ML)**
   4.1. Develop ML models for predictive maintenance, fuel consumption optimization, and anomaly detection, and train models using real-world data.

5. **ML/DA Models Deployment**
   5.1. Deploy machine learning models in a production environment and integrate them with the cloud-based monitoring platform.

6. **Web and Mobile App Development**
   6.1. Design user-friendly web and mobile applications to monitor genset performance, visualize data, and send alerts, focusing on UI/UX and real-time data integration.

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3. STUDENTS' LEARNING OUTCOMES

Upon successful completion of this Product Development Program, students will achieve the following outcomes:

1. **Embedded Systems & Hardware Development**
   1.1. Design and develop embedded firmware to interface with sensors and hardware components.
   1.2. Build and troubleshoot electronic circuits for real-time monitoring and control.

2. **IoT Cloud Connectivity**
   2.1. Develop systems that connect embedded devices to cloud platforms, enabling real-time data transmission and handling using secure communication protocols (e.g., MQTT, HTTPS).

3. **Data Analytics & Machine Learning**
   3.1. Clean and analyze real-world data to generate insights on genset performance and efficiency.
   3.2. Develop and deploy machine learning models for predictive maintenance, anomaly detection, and optimization.

4. **Web & Mobile Development**
   4.1. Design and develop full-stack applications that provide real-time data visualization and control.
   4.2. Work with cloud APIs and real-time data streams to ensure dynamic and interactive app functionality.

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4. RELEVANCE WITH PLACEMENTS

This Product Development Program is designed to align with key industries and job roles, enhancing the employability of students in the following domains:

1. **Embedded Systems Engineer**
   1.1. Knowledge of sensor integration, hardware interfacing, and embedded coding prepares students for roles in embedded systems engineering.

2. **IoT Engineer**
   2.1. Expertise in cloud connectivity, real-time data transmission, and IoT platforms will be relevant for jobs in IoT development and smart device management.

3. **Data Analyst/Data Scientist**
   3.1. Students gain practical experience in data collection, cleaning, and analysis, key for data analyst roles. Experience with machine learning models for predictive analytics also aligns with data science careers.

4. **Software Developer (Web/Mobile)**
   4.1. Skills in web and mobile development will make students eligible for software development roles, especially in IoT and real-time systems.

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5. INDUSTRY SKILLS OUTCOME

This Product Development Program provides a solid foundation in industry-relevant skills, including:

1. **Technical Skills:**
   - 1.1. Embedded C/C++, Python for embedded programming and hardware integration.
   - 1.2. IoT Protocols such as MQTT and HTTP, and cloud platforms like Thingworx, Things Board, and Google Cloud.
   - 1.3. Data Analytics using tools like Pandas, Numpy, and data visualization libraries.
   - 1.4. Machine Learning experience with frameworks like Tensor Flow and PyTorch.
   - 1.5. Full-Stack Development skills in React, Node.js, Flutter, or other frameworks for dynamic web and mobile apps.

2. **Problem-Solving Skills:**
   - 2.1. Apply systematic thinking to resolve hardware and software integration challenges.
   - 2.2. Use real-time data to derive insights, predict failures, and optimize performance.

3. **Project Management:**
   - 3.1. Exposure to collaborative project work, code management (Git), and agile development methods.
   - 3.2. Experience designing, prototyping, testing, and deploying real-world systems.

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6. CONCLUSION

This Product Development Program provides students with hands-on experience working with cutting-edge technologies used in modern industry. By engaging with various aspects of the Smart Genset Monitoring System, students will gain valuable knowledge and skills, preparing them for in-demand jobs in Embedded Systems, IoT, Data Science, Machine Learning, and Software Development.

We invite you to join this unique program and enhance your technical and practical expertise in these growing fields.

7. Revenue Potential

With the growing demand for smart systems in energy and industry, this project has the potential to generate billings of approximately ₹ 8,00,000.00 to ₹ 9,00,000.00 for Invertis University.

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SMART GENSET – PRODUCT DEVELOPMENT ROAD MAP

INVERTIS CSED SMART GENSET KIT – PRODUCT DEVELOPMENT ROAD MAP

TASK	LINE OF ACTION	ORGANISER	ASSIGNED DAYS
1	Team Discussion Meeting with assigned staff from Invertis and DCS Mentors	Talha Khan	1
2	List of Students (Genset Internship)	Talha Khan	7
3	Meeting with students, Invertis Staff and DCS Mentors	Avadhesh Sharma	1
4	Final Product Development Planning, Task Breakup & Timeline Sheet	Mani Shankar (DCS)	1
5	INVERTIS Campus Genset Location & Permission to verify its operation - Approval	Talha Khan	1
6	INVERTIS Campus Genset Survey & Report	Rahul Chaple (DCS)	2
7	Campus Genset AMC/Vendors Contact details	Talha Khan	1
8	Discussion with Campus Genset AMC/Vendors	Talha Khan	1
9	Invertis Management Help to get Campus Genset technical details & vendor support	Talha Khan	1
10	CSED 25KW Lab Genset Upgrade Plan & Requirements	Rahul Chaple (DCS)	2
11	Share Hardware BOM to Invertis CSED management - Get Approval	Avadhesh Sharma	1

12	BOM - Place Order	Avadhesh Sharma	1
13	Hardware BOM - Delivery	Avadhesh Sharma	10
14	**Phase 1 (IoT) Timeline Execution**	Rahul Chaple/Nazmul/ Avadhesh Sharma	21
15	Get A post-paid Airtel Sim card – Device 4G Connectivity	Avadhesh Sharma	1
16	Device Enclosure - 3D Design & Manufacturing	Sandeep (DCS)	10
17	List out the final product features - Product Documentation	Mani Shankar (DCS)	2
18	Team Discussion on Mobile Application Features	Chaudhary Ravi Singh	2
19	List out the points on Mobile App UI/UX, Backend & App Pages & Flow	Mani Shankar (DCS)	3
20	**Phase 2 (Mobile App) Timeline Execution**	Chaudhary Ravi Singh/ Rushikesh Pande (DCS)	20
21	Device Testing & Data Collection	Rahul Chaple (DCS)	30
22	**Phase 3 (Data Science) Timeline Execution**	Ratnesh Pandey/ Kuldeep Verma/ Hitesh (DCS)	30+15
23	Final Product Testing	Rahul Chaple/ Mani Shankar (DCS)	2
24	Product Validation	Mani Shankar (DCS)	2

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SMART GENSET – PRODUCT DEVELOPMENT TEAM FORMATION

INVERTIS CSED SMART GENSET KIT
PRODUCT DEVELOPMENT TEAM FORMATION

Sr. No	PRODUCT DEVELOPMENT STAGES	STUDENTS		STUDENTS	MENTORS
		BRANCH	CSED PREREQUISITE		
1	IOT APPLICATION DEVELOPMENT & SENSORS DEPLOYMENT	B. Tech (EE, ETC)	IT_1	5	**DCS** MR. RAHUL CHAPLE **INVERTIS** Dr. Avadhesh Sharma
2	IOT CLOUD INTEGRATION & MANAGEMENT	B. Tech	IT_1 & IT_2	5	
3	DATA ANALYTICS & PREDICTIVE MODELS - FUEL, ENERGY & ENGINE	B. Tech, BCA	IT_3 & IT_4	5	
4	DEVICE ENCLOSURE – DESIGN & MANUFACTURING	B. Tech (Mech)	Module_1	5	
5	APPLICATION DEVELOPMENT	B. Tech, BCA	IT_5	5	

1. IOT APPLICATION DEVELOPMENT & SENSORS DEPLOYMENT

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

2. IOT CLOUD INTEGRATION & MANAGEMENT

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

3. DATA ANALYTICS & PREDICTIVE MODELS - FUEL, ENERGY & ENGINE

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

4. DEVICE ENCLOSURE – DESIGN & MANUFACTURING

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

5. APPLICATION DEVELOPMENT

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

Hardware required of Product Development: Smart Genset

Smart Gen-Set Product Development					
Sr.No	**New Hardware Requirement**	**Qty**	**Unit price**	**Total Cost**	**Link**
1	Wave share ESP32-S3 Microcontroller	4	740	2960	Link
2	MAX6675 Module + K Type Thermocouple	4	189	756	Link
3	DFRobot Fermion MEMS Smoke Gas Detection	2	549	1098	Link
4	Multispan MFM 3PH Power Output	1	2250	2250	link
5	CT Coils	3	150	450	link
6	MAX485 TTL To RS485	5	23	115	Link
7	7Semi ESP32-S3 EC200U 4G LTE Cat-1 WiFi Bluetooth GNSS IoT Smart Modem	1	3243	3243	link
8	Buck converter 12/24V DC to 5V DC	5	136	680	link
				11552	
Required Hardware in Stock					
1	Magnetic Fuel Level Sensor	2			
2	Wave share Noise Sensor	2			
3	RPM Sensor (Inductive Proximity Sensor)	2			
4	Vajravegha Voltage Current Energy Sensor Module 100V 100A DC	2			