

**DYSMECH COMPETENCY SERVICES PVT. LTD.**  
PRODUCT DEVELOPMENT AT INVERTIS UNIVERSITY  
SMART BUS – ATTENDANCE & NEAR-BY ALERTS

**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

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**Dear Students,**

We are pleased to invite you to participate in an interdisciplinary Product Development Program focused on the development of a Smart Bus Management System. This program offers a hands-on learning experience in IoT-based transportation solutions, real-time location tracking, and smart passenger validation, preparing students for careers in IoT, embedded systems, and smart mobility.

With increasing urbanization, school and college transportation requires efficient tracking and management to enhance security and convenience. This project addresses key challenges such as long waiting times for parents, bus overcrowding, and unauthorized access. Through this Smart Bus System, students will develop a real-time tracking and passenger authentication system using IoT sensors, cloud platforms, and mobile applications.

This program is open to students from various disciplines, including B.Tech, BCA, and MCA, allowing them to collaborate and contribute expertise across multiple domains.

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## SMART BUS - ATTENDANCE & NEARBY ALERTS

### 1. OBJECTIVE

The Smart Bus Management System enhances public and educational transport by integrating real-time GPS tracking, geofencing alerts, and RFID-based passenger validation. The system is designed to improve:

1. **Parental Convenience:** Allows parents to create a virtual fence around their location and receive live updates on the bus's proximity, reducing unnecessary waiting times to pick up their KG children.
2. **Student Authentication & Bus Access Control:** Ensures only fee-paid students can access college buses via RFID authentication, preventing unauthorized access and overcrowding.
3. **Live Bus Tracking & Alerts:** Provides students and parents with real-time bus location updates through a mobile app integrated with cloud platforms.

4. **Improved Transportation Efficiency & Security:** Utilizes ESP32 microcontrollers, GPS with 4G connectivity, and RFID systems to ensure a smooth and secure bus experience.

The mobile application enables users to monitor bus movement, receive geofencing alerts, and enhance safety and convenience.

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## **2. Involvement of Different Engineering Departments**

### **B.Tech (Engineering Branches):**

#### **1. Embedded Systems & Hardware Integration:**

- 1.1. Develop and integrate ESP32 microcontroller, GPS module, and RFID system.
- 1.2. Implement 4G-based connectivity for real-time data transmission.

#### **2. Smart Transportation & IoT Integration:**

- 2.1. Design real-time tracking and alert mechanisms using GPS and geofencing algorithms.
- 2.2. Optimize data transmission for fast and reliable tracking.

### **B.Tech/BCA/MCA Students:**

#### **1. Cloud Connectivity & Data Transmission:**

- 1.1. Implement cloud-based tracking using Firebase for real-time location monitoring.
- 1.2. Enable seamless data transfer between the bus and mobile application.

#### **2. Mobile App Development:**

- 2.1. Develop a user-friendly app to display bus location, manage virtual fences, and receive alerts.
- 2.2. Integrate push notifications for bus arrival updates.

#### **3. RFID-Based Authentication System:**

- 3.1. Implement an RFID-based student attendance and bus access system.

- 3.2. Ensure only fee-paid students can access college buses through RFID validation.
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### **3. Students' Learning Outcomes**

By participating in this program, students will gain valuable skills in:

- 1. Embedded Systems & IoT Development**

- 1.1. Hands-on experience with ESP32, GPS modules, RFID technology, and 4G connectivity.
- 1.2. Real-time data acquisition and processing for smart tracking.

- 2. Cloud-Based IoT Solutions**

- 2.1. Implementation of real-time data transmission using Firebase and cloud APIs.
- 2.2. Remote monitoring and notification systems for transportation tracking.

- 3. Mobile & Web Application Development**

- 3.1. Designing interactive user interfaces for live tracking and alerts.
- 3.2. Developing geofencing features for location-based alerts.

- 4. Smart Transportation & Security Systems**

- 4.1. Implementing RFID-based automated student authentication.
  - 4.2. Enhancing bus security and preventing overcrowding.
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### **4. Relevance with Industry & Job Opportunities**

This product development program equips students with industry-relevant skills applicable to:

- 1. Smart Mobility & Transportation Technology**

- 1.1. Roles in real-time tracking systems, smart public transport, and IoT-based fleet management.

- 2. Embedded Systems & IoT Development**

- 2.1. Opportunities in hardware and software integration for smart transportation solutions.

### 3. Cloud Computing & Data Analytics

3.1. Careers in cloud-based data management, geospatial analysis, and IoT solutions.

### 4. Mobile Application & Full-Stack Development

4.1. Web and mobile-based tracking solutions for transport systems.

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## 5. Conclusion

The Smart Bus Management System Product Development Program is a collaborative initiative that fosters innovation and practical learning in IoT, smart mobility, and transportation security. Students will gain hands-on experience with real-world applications, enhancing their technical and problem-solving skills.

We invite you to join this exciting program and be a part of shaping the future of smart transportation and automated security systems.

Let's build the next generation of intelligent public transport together!

## 6. Revenue Potential

The product developed through this project could generate billing of approximately ₹ 5,00,000.00 to ₹ 6,00,000.00 for Invertis University.

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SMART BUS  
PRODUCT DEVELOPMENT ROAD MAP

# INVERTIS CSED SMART BUS

## ATTENDANCE & NEAR-BY ALERTS

## PRODUCT DEVELOPMENT ROAD MAP

DCS Mentor : Mr. Hitesh

Approximate Product Timeline : 75 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 & Physical access to College Buses, Access to Bus fee Management sheets - To Study & Understand User Challenges and Smart Requirements	Talha Khan	3
5	Smart Bus – Market Standards, Requirements, Product Design & Smart Features	Mani Shankar (DCS)	2
6	Smart Bus – Research on Required Hardware Materials	Hitesh (DCS)	2
7	Smart Bus - Product Development Planning, Road Map, Task Breakup & Timeline Sheet (Meeting with Team)	Mani Shankar (DCS)	3
8	Smart Bus – Data Science Model Building – Analytics on Collected Data, Generate Visual Reports, Trigger Alerts, predict trends & suggest automation responses.	Mr Kuldeep Verma / Hitesh (DCS)	15
9	Permission to Work with College Bus & Bus Drivers, Student ID Cards, Bus Fee Management Staff Feasibility Study, Install IoT Devices inside Bus, Provide Wi-Fi Range to IoT Device when Required	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	<b>Phase 1 (IoT &amp; Data Science) Task &amp; Timeline Execution</b>	Avadhesh Sharma/ Rahul Chaple (DCS)	20
14	Device Enclosures & Mechanical Fixtures - 3D Design & Manufacturing	Sandeep (DCS)	10
15	Install IoT Smart Bus Devices inside College busses, Testing, Validation & Documentation Electrician Requirement – Invertis CSED Need to Arrange	Nazmul (DCS)	4
16	Team Discussion on Mobile Application Features Meeting – Students, Assigned Invertis Staff & DCS Mentors	Chaudhary Ravi Singh	1
17	Mobile/Web application Requirements, Task Breakup & Timeline	Mani Shankar (DCS)	2
18	Compose App Development Software & Paid Subscriptions Budgeting	Rushikesh Pande (DCS)	2
19	Invertis CSED - Purchase Approval - Place Order	Chaudhary Ravi Singh	1
20	<b>Phase 2 (Mobile App) Task &amp; Timeline Execution</b>	Chaudhary Ravi Singh/ Rushikesh Pande (DCS)	45
21	Final Product Testing	Rahul Chaple (DCS)	4
22	Product Validation	Mani Shankar (DCS)	2

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SMART BUS

TEAM FORMATION

## INVERTIS CSED SMART BUS 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	<b>DCS MENTOR</b> Mr. Mayank Sing  <b>INVERTIS</b> 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			