

India-UK Joint Opportunity in Telecommunications Research (DST-EPSRC)

1. Title of Project [up to 150 characters]

Logistic optimization system for route optimization and load management

2. Project Area [Themes Specified in Call Script]

3. Applicants

Please provide the names, full affiliations and contact details of all project leads and co-investigators. Please indicate lead investigator from each country in **bold** font.

UK Applicants

Position	Name	Organisation	Department/Division	E-mail

India Applicants

Position	Name	Organisation	Department/Division	E-mail

4. Project Goal & Objectives

To develop an automated logistic optimization system that enhances the efficiency of route planning and load management for trucks involved in manufacturing and reduces delivery time along with increase in the truck fill ratio and maximizing the resource utilizations keeping sustainability in mind.

5. Total Value of Grant Requested

GBP (On UK side)
INR (On India side)

6. Summary

In logistics, **optimizing truck routes and load management** is challenging due to **limited route knowledge** confined to experienced drivers and **supplier-side issues** like improper loading and lack of transparency. These problems lead to inefficiencies, increased costs, and higher damage risks, often resulting in drivers being unfairly blamed for problems beyond their control. To address this, an **advanced automated system** is needed to optimize routes using real-time data, enforce proper loading practices, and provide full transparency regarding truck contents. Such a system would **significantly reduce damage risks**, minimize delays, lower operational costs, and ensure accountability, thus creating a more efficient and equitable logistics environment. The primary challenge lies in developing an intelligent system capable of effectively addressing these complex issues.

Aims and objectives:

Our solution aims to create a comprehensive system that **enhances efficiency** in logistics by optimizing truck routes, improving load management, and increasing transparency and accountability. The first deliverable is to develop an **advanced algorithm for route discovery and optimization**. This algorithm will move beyond the limited route knowledge of drivers, using real-time data such as traffic, road conditions, and delivery schedules to dynamically adjust routes for maximum efficiency and reduced transit times.

The second deliverable focuses on **automated load management**. The system will employ optimal loading practices to minimize the risk of damage to goods and maximize space utilization. Sensors and monitoring tools will be integrated to **track the condition of goods in real time during transit**, ensuring that any potential issues are quickly identified and addressed.

To enhance transparency and accountability, the project will **implement a tracking system** that provides real-time visibility into the truck's contents and their condition. This information will be accessible to both suppliers and logistics managers, enabling quick responses to any problems and ensuring that any errors or damages are traced back to their source.

Finally, the system will **automate logistics processes** to reduce the manual workload and minimize human error. A user-friendly interface will be designed for easy monitoring and management, simplifying the responsibilities of suppliers and drivers.

Applications:

Our solution has **broad potential applications** across various industries. In the manufacturing sector, it can **streamline logistics operations** by optimizing delivery schedules and minimizing damage to goods during transit. For supply chain management, it **enhances efficiency and reliability** through improved route planning and load management. In retail and e-commerce, the system ensures the **timely and secure delivery** of products to retailers and customers, ultimately boosting customer satisfaction and reducing operational costs associated with delays or damages.

Benefits:

The proposed solution delivers several key benefits by addressing existing inefficiencies in logistics operations. By **integrating real-time data and automation**, it reduces dependency on manual processes, lowering the potential for human error and improving decision-making speed. Enhanced visibility into the supply chain **increases transparency**, allowing stakeholders to quickly identify and resolve issues, thus reducing the likelihood of disputes or errors. The system also promotes better collaboration among suppliers, drivers, and logistics managers through **shared data and accountability protocols**. Additionally, the adoption of this technology encourages a shift towards more sustainable practices by optimizing fuel usage and minimizing waste, **supporting environmental goals** while reducing operational costs. This holistic improvement across logistics operations strengthens overall supply chain resilience and competitiveness in a rapidly evolving market landscape.

7. Core Question: Vision and Approach

Abstract:

This research presents an innovative solution aimed at **achieving sustainability** net zero in logistics for manufacturing plants by optimizing truck routes and load capacities during milk runs. Our approach integrates **LIDAR and weight sensors with AI algorithms** to maximize load efficiency and determine optimal filling strategies. Additionally, **Vehicle-to-Vehicle (V2V)** communication facilitated by Dedicated Short-Range Communication (DSRC) technology ensures real-time coordination between trucks. This combined system not only enhances operational efficiency and safety but also **significantly reduces carbon emissions**, contributing to a more sustainable supply chain.

Current practices:

Current milk run practices involve **fixed routes and schedules** to consolidate goods from multiple suppliers into a single truck, aiming to optimize efficiency and reduce costs. However, these practices often rely on **manual route planning and load management**, leading to **inefficiencies and higher carbon emissions**. Our solution improves on these practices by integrating LIDAR and weight sensors with AI algorithms for precise load optimization and real-time V2V communication via DSRC technology. Hence, our approach enhances route efficiency, minimizes load-related damages, and significantly reduces carbon emissions, **offering a more sustainable and technologically advanced logistics solution**.

Vision:

Quality and Importance:

This project represents a significant advancement in logistics management by integrating **cutting-edge technologies** like LIDAR, weight sensors, AI algorithms, and V2V communication. The application of these technologies in optimizing milk run logistics is

innovative and critical to addressing the inefficiencies and environmental impacts associated with traditional logistics operations. By leveraging precise spatial awareness and real-time data, our solution ensures that **trucks are loaded and routed in the most efficient and sustainable manner possible**.

Advancement of Understanding:

The proposed work has the potential to advance current understanding in the field of logistics by demonstrating how emerging technologies can be combined to **optimize both route and load management**. This research contributes new knowledge on the practical application of AI and sensor integration in logistics, offering a model that could be replicated in other sectors requiring efficient transport solutions.

Timeliness:

Given the global emphasis on reducing carbon footprints and enhancing supply chain sustainability, this research is timely and **aligned with current environmental and economic goals**. The increasing demand for efficient logistics solutions in manufacturing makes this work particularly relevant now, as companies seek to **minimize operational costs** while adhering to **stricter environmental regulations**.

Impact:

This research has the potential to make a significant impact on the logistics industry by **reducing the environmental footprint of transportation processes**. The optimized load and route strategies developed in this project can lead to **fewer trips, reduced fuel consumption, and lower carbon emissions**, contributing to global sustainability efforts. Additionally, the **improved safety and efficiency** offered by V2V communication could set new standards in the industry, influencing future developments in logistics technologies.

Beneficiaries:

The primary beneficiaries of this research include logistics companies, manufacturing plants, and the wider community. By **reducing operational costs and enhancing efficiency**, companies can achieve better profitability while contributing to environmental goals. The general public benefits from the **reduction in pollution** and the broader adoption of sustainable practices within the industry.

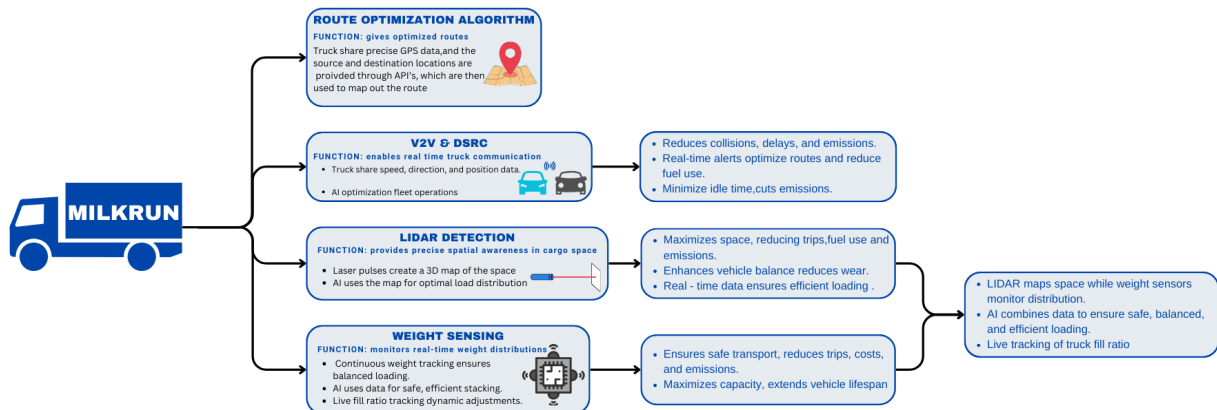
Relevance to Telecommunications:

The integration of V2V communication using DSRC technology highlights the relevance of this research to the telecommunications sector. By facilitating **real-time data exchange between vehicles**, telecommunications technologies play a crucial role in enhancing the safety, efficiency, and sustainability of logistics operations.

Approach:

- Reduces collisions, delays, and emissions.
- Real-time alerts optimize routes and reduce fuel use.

- Minimize idle time, cut emissions.



Design:

The project is designed to **integrate LIDAR and weight sensors with AI algorithms** for optimizing load distribution and route planning. **V2V communication using DSRC** ensures real-time coordination between trucks, further enhancing the overall efficiency of the operation. The design prioritizes **sustainability** by focusing on reducing the number of trips and **minimizing fuel consumption**.

Feasibility:

The project is feasible due to the **availability** of the required technologies and the alignment with current industry practices. Risks such as technological integration challenges will be managed through thorough **testing and iterative development**. The project builds upon existing research in AI-driven logistics optimization, and the implementation plan ensures that the project can be completed within the specified timeframe.

Methodology:

Our methodology involves the use of **LIDAR** to create **detailed 3D maps of truck cargo spaces**, enabling **optimal load distribution**. **Weight sensors** provide **real-time data** on load distribution, which is used by the **AI algorithm** to make informed decisions about **load stacking and capacity utilization**. V2V communication enables trucks to **share real-time data on speed, direction, and position**, improving route coordination and safety.

Translation to Impact:

The outputs of this research, including **optimized load and route strategies** and **enhanced safety protocols**, will be directly translatable into practical applications within the logistics industry. The project's **focus on sustainability** ensures that these outputs contribute to broader environmental goals.

Research Environment:

The project will be conducted in a research environment equipped with the necessary technological infrastructure, including **access to LIDAR systems, weight sensors, AI software, and V2V communication tools**. Collaboration with industry partners will provide additional resources and expertise to ensure the success of the project.

Scientific and Technical Aspects:

This research leverages **advanced sensor technologies** and **AI algorithms** to address critical challenges in logistics management. The integration of these technologies is expected to produce **highly accurate and efficient load and route optimization strategies**, setting a new benchmark in the field.

Access to Resources:

We have secured access to the necessary resources, including **cutting-edge LIDAR systems, weight sensors, and AI development platforms**, to successfully deliver the project outcomes.

Project Plan:

Exchanges:

IPR Management:

References maybe included in this section.

For the Approach, explain how you have designed your work so that it:

- is effective and appropriate to achieve your objectives
- is feasible, and comprehensively identifies any risks to delivery and how they will be managed
- if applicable, uses a clear and transparent methodology
- if applicable, summarises the previous work and describes how this will be built upon and progressed
- will maximise translation of outputs into outcomes and impacts
- describes how your, and if applicable your team's, research environment (in terms of the place, and relevance to the project) will contribute to the success of the work

Within the Approach section we also expect you to:

- describe scientific and technical aspects of the project: may cover methodology to demonstrate the research merit of the project
- demonstrate access to the appropriate services, facilities, infrastructure, or equipment to deliver the proposed work
- provide a project plan including milestones and timelines in the form of a Gantt chart or similar (additional one-page A4)

- proposed project outcomes/impact
- exchanges: Please list clearly details of movements of people between Research teams on an annual basis showing the direction of exchange including the number and duration of the visits.
- address how partners will deal with IPR associated with the project.

References may be included in this section.

8. Core Question: Applicant and team capability to deliver

Word limit: 1,650

Why are you the right individual or team to successfully deliver the proposed work?

What the assessors are looking for in your response

Evidence of how you, and if relevant your team, have:

- the relevant experience (appropriate to career stage) to deliver the proposed work
- the right balance of skills and expertise to cover the proposed work
- the appropriate leadership and management skills to deliver the work and your approach to develop others
- contributed to developing a positive research environment and wider community

You may demonstrate elements of your responses in visual form if relevant.

You should consider how to balance your answer, and emphasize where appropriate the key skills each team member brings:

- contributions to the generation of new ideas, tools, methodologies, or knowledge
- the development of others and maintenance of effective working relationships
- contributions to the wider research and innovation community
- contributions to broader research or innovation users and audiences and towards wider societal benefit

References may be included within this section.

All proposals should be supported with brief biodata of the entire project team members indicating their affiliation, Date of Birth, highlights of academic and research activities/awards.

9. Core Question: Project Partners

Add details about any project partners' contributions. If there are no project partners, you can indicate as NA.

A project partner is a collaborating organisation who will have an integral role in the proposed research. This may include direct (cash) or indirect (in-kind) contributions such as expertise, staff time or use of facilities.

Add the following project partner details:

- the organisation name and address (searchable via a drop-down list or enter the organisation's details manually, as applicable)
- the project partner contact name and email address
- the type of contribution (direct or in-direct) and its monetary value

(For audit purposes, UKRI requires formal collaboration agreements to be put in place if an award is made)

Letters (or emails of support)

Upload a single PDF containing the letters or emails of support from each partner you named in the Project Partner section. These should be uploaded in English only.,
What the assessors are looking for in your response

Enter the words 'attachment supplied' in the text box, or if you do not have any project partners enter NA. Each letter or email you provide should:

- confirm the partner's commitment to the project
- clearly explain the value, relevance, and possible benefits of the work to them
- describe any additional value that they bring to the project
- the page limit is 2 sides A4 per partner

Ensure you have prior agreement from project partners so that, if you are offered funding, they will support your project as indicated in the contributions template.

Do not provide letters of support from host and project co-leads' research organisations.

10. Core Question: Facilities

Word limit: 250

Does your proposed research require the support and use of a facility?

What the assessors are looking for in your response

If you will need to use a facility, follow your proposed facility's normal access request procedures.

Ensure you have prior agreement so that if you are offered funding, they will support the use of their facility on your project.

For each requested facility you will need to provide the:

- name of facility (For UK: copied and pasted from the [facility information list](#))
- proposed usage or costs, or costs per unit where indicated on the facility information list
- confirmation you have their agreement where required

If you will not need to use a facility, indicate this as NA.

Notes:

1. Top part filling. Points 2, 3, 5
2. Point 7 - Project plan, Exchanges, IPR management
3. Ask sir about point 8, 9, 10