Proposal for School Connect Programme

Course Title	Traffic Safety Education and Awareness Using Virtual Reality		
Vision and Objectives	The vision of this course is to promote traffic awareness among young road users through engaging technologies like Virtual Reality (VR). The core objectives are to actively teach fundamental traffic rules, improve real-time hazard recognition, and encourage safe pedestrian and commuter habits through interactive learning.		
Duration of course (days)	4 months		
Number of Cohorts	2		
Calendar of events including proposed start and end date	1st November 2026 to 28th February 2027 (4 months)		
Mode of Delivery	Online		
	In-person Hijli High School and Kendriya Vidyalaya in IIT Kharagpur	In-person at the school (Hijli High School and Kendriya Vidyalaya in IIT Kharagpur)	
	Hybrid (describe)		
Level for which the course is suitable (you may tick more than one)	1. Foundational (Primary & Middle School)		Yes
	2. Intermediate (Secondary & Higher Secondary)		Yes
	3. General Educators		Yes

	4. Special Educators	Yes
	5. Others (specify) Village Community	Yes
Relevance / importance of this course for next level of education / conceptual learning / strengthening of foundation in a particular field or generic.	Road traffic injury is the leading cause of death worldwide for the 5–19 age group, India accounts for roughly 11% of global road-traffic fatalities while holding about 1% of the world's registered vehicles, and pedestrians disproportionately children walking to and from school — form a large share of those deaths. Road safety is nonetheless taught almost entirely as recall of signs and rules. Students are never given the chance to practise the perceptual judgement that keeps them alive: estimating vehicle speed, judging an acceptable gap and resisting an unsafe peer. This course closes exactly that gap. Beyond road safety, the course strengthens competencies that transfer widely speed–distance and spatial estimation, risk assessment under time pressure, reasoning from data the students generate themselves, and resistance to social pressure. It gives students their first structured exposure to immersive technology, simulation and behavioural data analysis, supporting later study in engineering, computer science, planning and public health. It maps onto the road-safety chapters already present in the CBSE / ICSE curriculum and gives teachers a way to deliver them experientially rather than didactically.	
Preferred language of delivery (vernacular languages will be encouraged particularly for L-1 and L-2 courses)	Bengali/Hindi/English	
Will the course require use of any software such as MATLAB or any programming language, etc. or any other tool?	**For the project team: Yes.** Unity 6.x with C# scripting is used to build the environment **For the students:** No.	
	Theory and class lectures	6 hours

Structure of Course (hours)	Interaction / problem solving	6 hours
	Laboratory (institute level)	6 hours at the RCGSIDM VR laboratory, IIT Kharagpur
	Field demonstration (specify venue)	20 hours at the school-gate crossing and the nearest junction / mid-block crossing on the approach road to each school
Mode of Final Assessment / evaluation / presentation of outcome	Poster / exhibition	
	Computer based	
	Others (specify)	Survey-based and Training assessment analysis
Will the proposed course map to any course in the AICTE / ICSE / CBSE/ equivalent model curriculum?	Course Name: Be Smart, Be Safe (NCERT Class 4) Course Code: Chapter 4	
Proposed schools for conducting the course	1) Hijli High School, Kharagpur 2) Kendriya Vidyalaya, Kharagpur	
Support required from other Departments / Cells / Units (including students) from IIT	No	

Budget with breakup	Travel and Logistic (for participants, experts, support staff)	1,50,000
	Accommodation (including venue)	
	Honorarium (including IIT faculty, external experts, TA, others)	5,00,000
	Advertisement and Outreach	
	Course material, consumables	9,33,000
	Total	15,83,000

Name of Instructor (s)	**Dr. Gajanand Sharma**	**Prof. Arkopal Kishore Goswami**

<table>
<tr><td>Department (s)</td><td colspan="2">Ranbir and Chitra School of Infrastructure Design and Management</td><td>Ranbir and Chitra School of Infrastructure Design and Management</td></tr>
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<tr><td>Mobile Phone Number</td><td colspan="2">9806943689</td><td>9928036618</td></tr>
<tr><td rowspan="8">Names of 2 reviewers for the course (to be from other institutes in India

(Will be used if we need any additional inputs on the course)</td><td>Name</td><td colspan="2">Prof. Gopal R. Patil</td></tr>
<tr><td>Department and Designation</td><td colspan="2">Professor at Department of Civil Engineering</td></tr>
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<tr><td>Name</td><td colspan="2">Prof. Ankit Gupta</td></tr>
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Traffic Safety Education and Awareness Using Virtual Reality

1. Introduction

Children and teenagers are exposed to traffic risks while walking to school, crossing roads near campuses, using shared streets, and interpreting signals in crowded Indian traffic conditions. Classroom explanations of road signs and traffic rules are important, but they often remain abstract because students do not get to practise decisions in realistic yet safe environments.

This course proposes an immersive learning intervention that uses Unity based virtual reality to teach students how to follow traffic safety rules. The VR environment will simulate school zone roads, signalised and unsignalised crossings, vehicles, speed changes, pedestrian behaviour, and common distractions. Students will be able to learn by acting inside the simulation, receiving feedback, and repeating scenarios without any real-world risk.

2. Background and Learning Rationale

2.1 Teenage and child pedestrian vulnerability

Adolescents are still developing the perceptual and cognitive capacities that safe crossing requires estimating vehicle speed, judging distance, selecting an adequate gap and resisting unsafe social influence. The literature consistently finds that children and teenagers overestimate their own crossing capacity and accept gaps that an adult would reject. A school-based intervention must therefore create repeated, feedback-rich practice in which a student can directly compare a safe choice with an unsafe one and see the consequence of each without incurring it.

2.2 Heterogeneous traffic around schools

School zones in this region combine heavy vehicle movement on the approach road, informal stopping by school vans and totos, inconsistent or absent footpaths, and mixed vehicle types. Depending on the day, a student may cross at a junction, use a zebra crossing or judge a mid-block gap. A VR system can present all these systematically to the same student under controlled supervision, which no field exercise can safely do.

2.3 Virtual reality as a safety-education tool

VR combines realism with safety. The student sees the traffic scene from a first-person perspective and must make an actual crossing decision with their own body, while the instructor controls vehicle speed, signal type, peer behaviour and feedback. Prior comparative work reports that risk-perception patterns in

VR closely track those in matched real environments, supporting VR as a valid training and research medium. Against classroom-only instruction, VR offers three things a lecture cannot: active decision-making, scenario repetition, and objective behavioural measurement of each student's learning.

3. Aim of the Project

The aim of the project is to improve the traffic rule awareness and pedestrian decision-making among children and teenagers through an VR learning system. This will help students practise safe crossing, understand traffic signals and signs, and about road safety rules through repeated scenario-based exposure.

4. Methodology

A school traffic environment will be modelled in Unity and delivered through a VR headset, as shown in Figure 1. This simulation will include scenarios like signal type, crossing type, vehicle speed, road sign visibility, and pedestrian density.

1. Student orientation: Brief the participating students on how to use a VR headset, basic movement of the VR headset, and the purpose of the road safety activity.
2. VR trials: Allow students to complete multiple scenarios so that each one of them experiences different traffic conditions.
3. Assessment: Record decision events such as crossing location, waiting behaviour, collision or near miss events, and time taken to complete each task.
4. Feedback and reflection: Provide immediate guidance after unsafe choices and conduct a short discussion to reinforce the correct road safety behaviour.
5. Analysis and reporting: Compare performance across scenarios and summarise improvements in rule awareness, safe crossing selection, and hazard recognition.

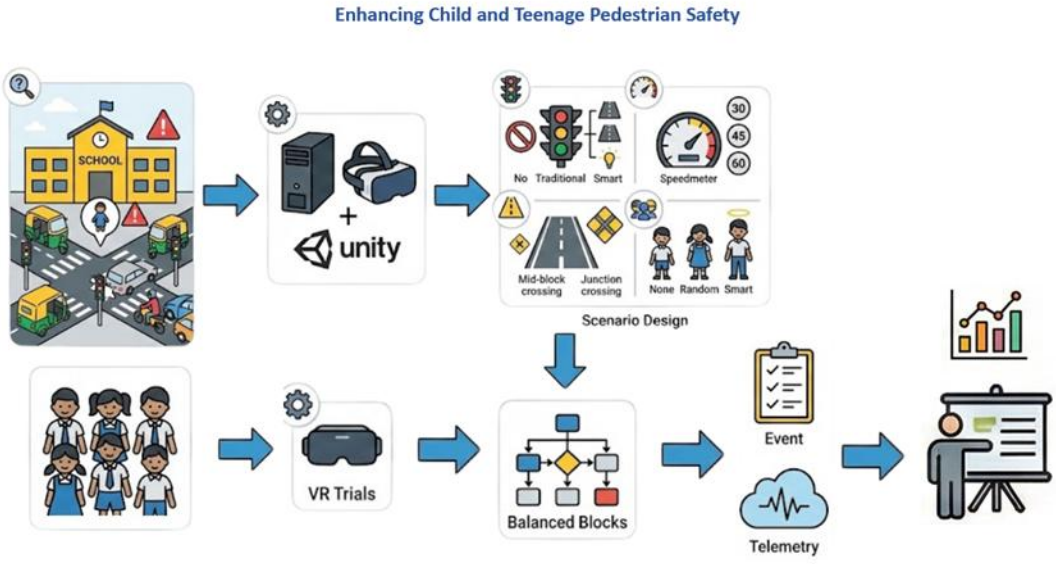


Figure 1. VR-based methodology for student pedestrian-safety learning and evaluation.

VR Environment.

Vehicle movement will be scripted at controlled speeds so that the same scenario can be repeated for different students. The VR system will track the student's position, head orientation, crossing start time, waiting time, and path. This makes it possible to convert the learning activity into measurable behavioural evidence.

Scenario Design

The attached methodology diagram shows two linked streams. The first stream begins with the school traffic and converts it into a Unity VR environment. The second stream begins with the student participation, moves through VR trials, and produces useful learning data, where road safety rules are not only explained but also practised.

- Traffic control variations: no signal, traditional traffic light, and smart signal conditions.
- Crossing variations: mid-block crossing, junction crossing, school-gate crossing, and zebra crossing.
- Vehicle and speed variations: low, moderate, and high traffic speed conditions with visible speed limit.
- Pedestrian variations: guided, random, and smart pedestrian movement patterns to represent real road complexity.
- Learning events: correct wait, unsafe crossing, rule violation, near miss, completion, and feedback prompts.

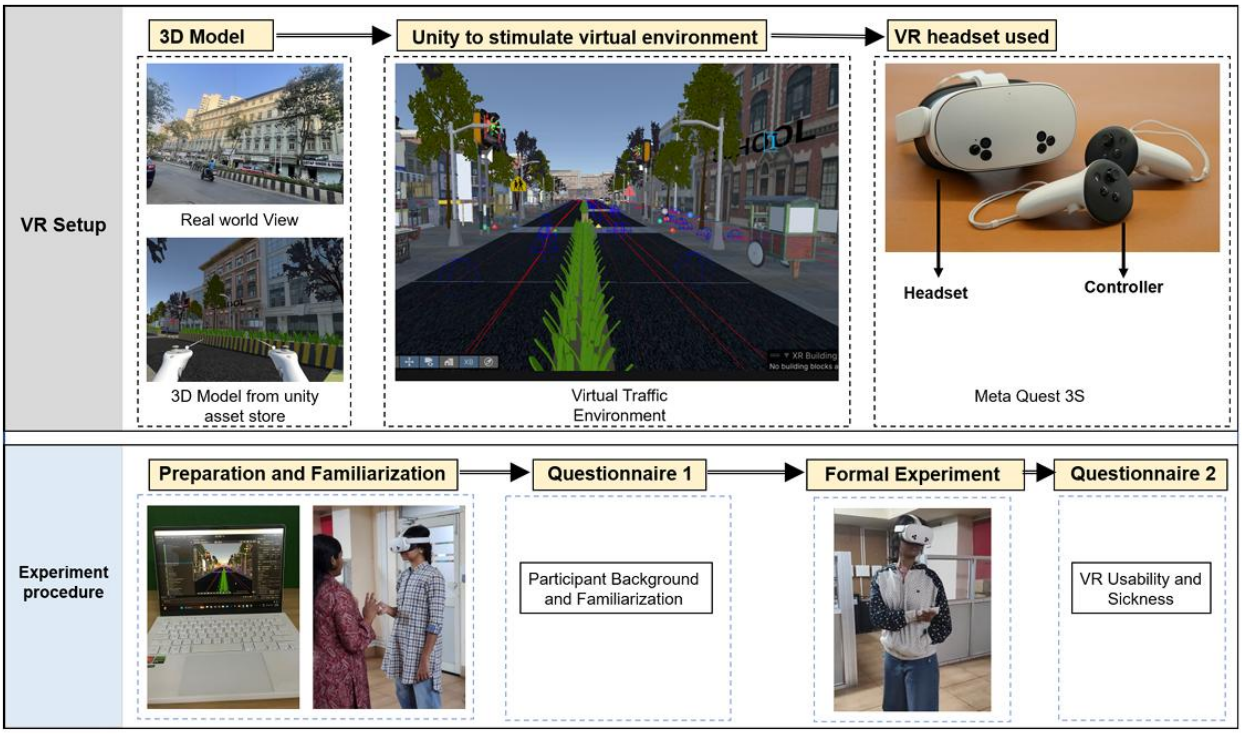
5. Expected Outcomes

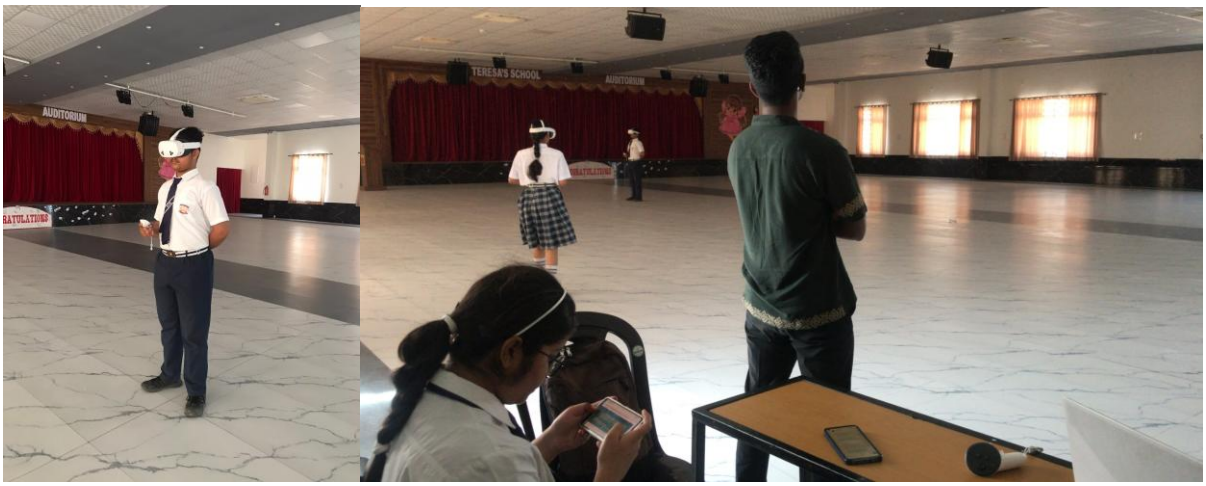
The project is expected to improve students' understanding of traffic rules, pedestrian signals, safe crossing practices, and risk perception. Through repeated VR-based exposure, students will develop improved judgement of vehicle speed, distance, acceptable crossing gaps, and potentially unsafe road situations. The programme will provide students with practical experience in handling complex pedestrian scenarios, including signalised and unsignalised crossings, varying vehicle speeds, and dynamic pedestrian interactions. The immersive VR environment will enable students to practise critical road-crossing decisions safely before encountering similar situations in real traffic environments. The project will also create an effective road safety education tool for teachers and local communities, supporting greater awareness of child pedestrian risks and promoting responsible road behaviour among students. By combining experiential learning with measurable behavioural assessment, the programme will help schools move beyond traditional rule-based teaching towards interactive safety training. Furthermore, the project will establish a reusable VR-based training framework that can be adapted for different schools, traffic environments, and student groups. The developed platform can support future road safety education initiatives, behavioural research, and evidence-based interventions for improving pedestrian safety around educational institutions.

6. Conclusion

This course proposes a Unity based VR intervention for teaching students traffic safety rules. By combining school zone scenario design, controlled traffic variables, student VR trials, behavioural telemetry, and guided feedback, the project can shift road safety education from passive instruction to experiential learning. The central value of the project is that children and teenagers can practise difficult road-crossing decisions in a safe environment before facing real traffic. The same system can also provide measurable evidence about learning progress, common mistakes, and the types of interventions that best support safer pedestrian behaviour near schools.

Previous Project Photos and Letter





To
The Principal
St. Teresa's School, Mansarovar
Jaipur

Date: 28 February 2026
Subject: Request for Permission to Conduct a Virtual Reality Demonstration on Road Safety

Respected Sister,

I humbly request your kind permission to allow my daughter, Ms. Roshini Raju, to conduct an academic activity titled "Virtual Reality for Safer School Zones: Modeling Teenage Crossing Behavior and Smart Interventions in Heterogeneous Indian Traffic" for approximately one hundred students of our school.

This initiative is associated with Indian Institute of Technology Kharagpur (IIT Kharagpur), where she is presently engaged in academic research.

The session will be conducted in a structured and supervised manner, ensuring complete safety and discipline. The VR headsets required for the demonstration will be issued and managed by the concerned authorities from IIT Kharagpur under proper supervision.

I kindly request you to grant permission for the same and allow the necessary arrangements to be made for conducting this program at a suitable time.

Yours sincerely,
Bisili Raju

28/02/26