

Karnataka State Council for Science & Technology

Indian Institute of Science Campus, Bengaluru - 560012

Student Project Programme

Details of prototype of the product / commercialisation of Student Projects supported by KSCST under Student Project Programme

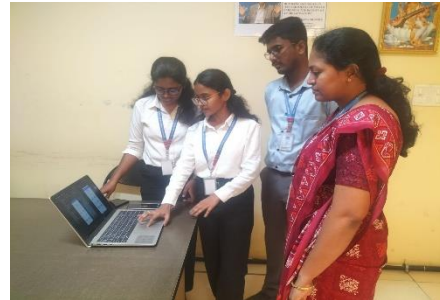
Name of the Institution:

Sl. No.	Name of the SPP Project and Branch sanctioned from KSCST (Title, Duration, Funding, Year)	Name of the Project Guide / HoD with contact and email for communication	Prototype of the project / working model available in the institution (Yes / No) If Yes, please enclose photograph and short synopsis of the project	Is the project / service patentable? (Yes / No) If Yes, has a patent application been filed? Please provide details about the patent application status:	Name of the Entrepreneur identified for commercialisation with contact details
1.	Armor: Ride with Augmented Safety	Name of the Project Guide: Prof. Jyothi S S	Yes	Yes Application has not filed yet	NA

Branch: Computer
Science and
Engineering

2024-2025

Email id:
jyothistanik@gmail.com
Contact No: 9449705175



The Smart Helmet is an IoT-based safety solution designed for two-wheeler riders. It features real-time GPS tracking, fall detection, SOS alerts, and Bluetooth connectivity with a companion Android app. Key components include an OLED display, buzzer, LEDs, motion sensors, and voice assistance for hands-free operation. The helmet ensures rider safety through instant alerts and navigation support. Designed to be affordable and scalable, it addresses critical road safety challenges and holds strong potential for real-world application and future commercialization.

Inventory Report Format for the student projects supported by KSCST under the Student Project Program.

KSCST Student Projects Inventory Report Format

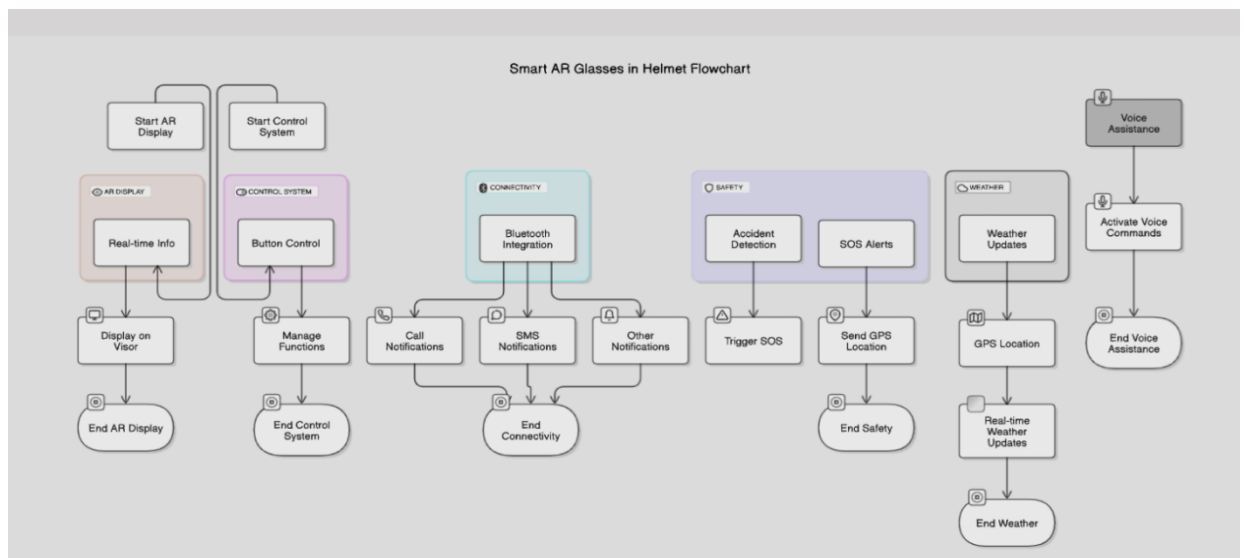
1. Project Overview

- **Project Title:** ARmor: Ride with Augmented Safety
- **Project ID:** 48S_BE-0505
- **Institute/University Name:** SAMBHRAM INSTITUTE OF TECHNOLOGY
- **Department:** Computer Science and Engineering
- **Project Guide:** Prof. Jyothi S S
- **Student(s) Involved: 3**
 1. Name: DARSHAN R.
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 2. Name: DEEKSHA M.
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 3. Name: M KUSUMA
USN No.:1ST21CS105
Email id: varalm1981@gmail.com
Mobile No.:8660112123
- **Duration of the Project:** 5 Months
- **Funding received:**
- **Year:** 2025

2. Project Details

• Description of the Project:

ARmor is a smart augmented reality (AR) helmet designed to enhance rider safety and convenience. It features a transparent AR display integrated into the helmet visor, which shows real-time navigation, weather updates, SOS alerts, and call notifications —allowing hands-free access to essential information while riding. The system uses a ESP32 as the core processor, connected to Bluetooth and GPS modules, crash detection sensors, and button-based control. In case of an accident, the helmet automatically sends an SOS message with the rider's location. The design is modular, affordable, and scalable, making it a practical solution for improving road safety and rider awareness through technology.



Technology Used:

Hardware Components:

ESP32 Microcontroller:

- It enables wireless communication via **Wi-Fi** and **Bluetooth**, handles sensor data processing, and interfaces with the Android app.

INMP441 Digital MEMS Microphone:

- Enables voice recognition and communication for voice assistant features.

NEO6M GPS Module

- Provides real-time GPS location and coordinates.

MAX98357A Audio Amplifier

- Converts digital audio signals into analog and amplifies the output.

Small Speaker

- Outputs voice-based alerts, navigation instructions.

Buzzer

- Emits loud alert tones during emergencies or warnings.

Two Small LEDs

- Indicate power status and emergency alerts.

LM2596 DC-DC

- A voltage regulator for stable power supply.

MPU6050

- A motion sensor that detects acceleration and tilt for safety monitoring.

Two 3.7V Battery

- Rechargeable lithium batteries to power the system.

OLED Display

- A compact, low-power screen used for showing real-time speed, notifications, and system status clearly even in daylight.

Power Button

- To turn the helmet on/off or switch modes.

Software technologies:**Google API**

- Provides real-time weather updates and chat assistant functionality.

Arduino IDE

- Used for writing, compiling, and uploading code to the ESP32.

Basic C++ (Arduino Coding)

- The programming language is used to control the hardware components and functionality.

Duration of the Project:

(09/09/2024 – 20/1/2025)

3. Prototype/Industry Readiness**• Is the Project Prototype Ready?**

Yes

• If Yes, Brief Description of the Prototype:

The Smart Helmet prototype is a fully functional system designed to enhance rider safety and provide intelligent features using IoT technology. The core of the system is powered by an ESP32 microcontroller, which manages data communication via Bluetooth and Wi-Fi. It integrates several key components including a GPS module (NEO6M) for real-time location tracking, an MPU6050 motion sensor for fall detection and tilt monitoring, and an OLED display for showing speed,

notifications, and system status. The helmet includes a buzzer and LEDs to provide immediate audio-visual alerts in case of emergencies or status changes. The system is supported by a custom-built Android application that allows the user to connect via Bluetooth, access navigation using Google Maps, send SOS alerts via SMS, save emergency contacts, and view system information. A microphone and speaker, driven by the MAX98357A amplifier, are included to support interactive functionalities.

Voice assistance is included as an additional feature to enable hands-free operation, improving usability and safety during travel. The entire setup is powered by dual rechargeable lithium batteries with a voltage regulator for stable power supply, making the prototype reliable and suitable for real-world testing.

- **Potential Applications/Services:**

- **Two-Wheeler Riders and Commuters** – For enhanced safety and convenience.
- **Delivery Services & Logistics** – Efficient route guidance and accident response.
- **Police and Emergency Responders** – For hands-free communication and live updates.
- **Smart Wearable Tech Industry** – As a market-ready prototype for commercialization.
- **Urban Mobility and Smart Cities Projects** – Supporting initiatives on safe transport and connected vehicles.
- **Defense and Tactical Applications** – With further development, could be adapted for mission-critical use.

4. Status of prototypes, Patents, Start-ups, Copyright's, Designs

Functional prototype developed and tested.

- Patent filing is under consideration (not yet applied).
- Startup idea is in the conceptual stage.
- Copyright and design registrations not yet initiated.

5. Publication of the project outcome in State-Level / district Level Newspapers / Media coverage / National and International Journals:

No publications or media coverage have been done so far. Plans for future publication and outreach are under discussion.

6. Commercialization prospects

Target Market Segments:

- Individual two-wheeler commuters seeking enhanced safety and connectivity.
- Fleet and logistics operators requiring efficient, hands-free navigation and rider monitoring.
- Law enforcement agencies and traffic regulators.

Competitive Advantages:

- Integrated AR display providing real-time navigation, weather, and notifications.
- Built-in crash detection system with automated emergency alerts.
- Modular, cost-efficient design suitable for large-scale deployment.

Planned Commercialization Activities:

- Patent filing and intellectual property protection.
- Collaboration with helmet manufacturers and safety gear producers for prototyping and scaling.

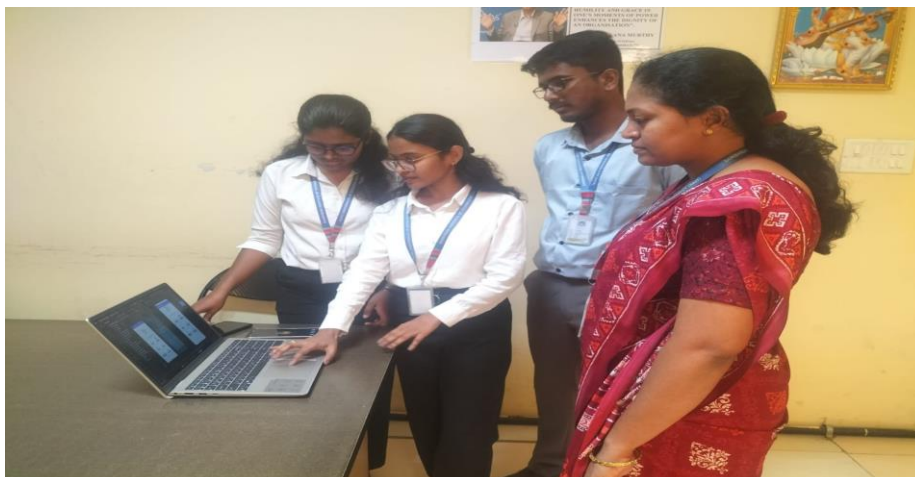
Potential Revenue Models:

- Direct-to-consumer product distribution.
- B2B contracts with logistics and delivery companies.
- Licensing agreements with hardware and AR technology companies.

7. Is a prototype or working model available in the institution?

- Yes

8. If Yes, please enclose a photograph and a short synopsis of the project:



Synopsis: ARmor: Ride with Augmented Safety" is an innovative smart helmet designed to enhance rider safety and connectivity through Augmented Reality (AR). The helmet features a transparent AR display integrated into the visor, projecting real-time information such as navigation, weather updates, and call notifications directly in the rider's line of sight. Powered by a ESP32 WROOM, it includes Bluetooth and GPS modules for seamless smartphone integration and route guidance. Built-in crash detection sensors automatically send SOS alerts with the rider's location in case of accidents. Additional safety is ensured with LED indicators and sound alerts. The design emphasizes affordability, hands-free control via tactile buttons, and modularity for future upgrades. This assistive device aims to reduce road accidents and improve the overall riding experience by combining smart technology with essential safety features.

9. Was the project/service developed in collaboration with any industry

- No

10. Is the project/service patentable?

- Yes

If Yes, has a patent application been filed?

- No
- Please provide details about the patent application status:

APPLICATION HAS NOT BEEN FILED YET

11. Name of the Entrepreneur identified for commercialization:

NOT YET IDENTIFIED

12. Name of the Organization / Company / Industry interested in the project:

TO BE IDENTIFIED

13. Industrial Sector: SMART WEARABLES, INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

14. Contact details of the Organization / Owner: +919880045982

15. Support and Funding

- **KSCST Support Received:**

Selected for KSCST funding under the 48th series - support in terms of recognition, mentoring, and possible financial aid for prototype development

Other Funding Sources (if any): Not Applicable

16. Outcome and Impact

Results Achieved:

- Developed a functional Smart Helmet prototype **with integrated safety and navigation features.**
- Enables **real-time GPS tracking** and **fall detection** for immediate **SOS alerts.**
- Enhances rider safety with buzzer, **LED alerts, and an OLED display.**
- Android app supports **Bluetooth connection, navigation, and emergency messaging.**
- **Voice assistance** adds hands-free control for better usability.
- Promotes **safer riding** practices and **quick emergency response.**
- Designed to be **affordable, portable, and scalable.**
- Suitable for **real-world application**, especially in **accident-prone regions.**
- Potential for industrial upgrades and **future commercialization.**

17. Future Scope:

- **Integration with IoT and Cloud Services:**

Future versions of ARmor can leverage cloud connectivity to store ride data, accident history, and route preferences. This information can be analyzed for improving safety recommendations and personalized ride insights.

- **Advanced Voice Assistant Integration:**

Adding support for AI-based voice assistants like Google Assistant or custom offline NLP models can allow more complex commands, ensuring fully hands-free control.

- **Health Monitoring Sensors:**

Integration of biometric sensors to monitor the rider's heart rate, fatigue levels, and stress could enhance safety, especially for long-distance riders.

- **Real-Time Traffic and Hazard Alerts:**

Using AI and live traffic data, the helmet could alert the rider to nearby hazards, roadblocks, or traffic congestion, making navigation more dynamic and responsive.

- **AR HUD Enhancements:**

Future iterations can include more immersive AR visuals with 3D object detection, obstacle alerts, and contextual route guidance directly projected onto the rider's field of view.

18. Contact Information

- **Project Supervisor Email:** jyothistanik@gmail.com
- **Student Team Lead Contact:** darshanrajanna07@gmail.com

8618917040

19. Student Project Programme (SPP): Impact Analysis of Sanctioned Projects

a) Impact from the institution:

The **ARmor Smart Helmet** project has significantly advanced our institution's engagement with intelligent safety technologies and wearable innovation. It has fostered meaningful collaboration between the **Computer Science, Electronics, and Mechanical Engineering** departments, sparking a surge in interdisciplinary interest and research. As a result of the project, a dedicated **Smart Mobility and Safety Lab** was established to support the development of IoT-based safety solutions. The project's impact has extended beyond the campus, initiating discussions with industry players in automotive and wearable tech sectors. Faculty members have observed increased student engagement in applied research, and the project is now being used as a model example in seminars and workshops to inspire future batches. This initiative has helped position the institution as a proactive contributor to technology-driven social impact.

b) Impact of SPP project support (Faculty Mentors)

Faculty mentors played a crucial role in the success of the **ARmor Smart Helmet** project by offering valuable guidance in areas such as **sensor integration, real-time system design, and embedded communication protocols**. Their mentorship extended beyond technical support, helping the team align the project with real-world safety standards and usability. Regular design reviews, prototype evaluations, and brainstorming sessions encouraged creative problem-solving and refinement of the system. The experience has led to increased faculty involvement in **research focused on smart mobility and rider safety**, with plans underway to explore intellectual property protection and collaborative development opportunities.

c) **Impact on Students:**

The selection and review of the **ARmor: Ride with Augmented Safety** helmet project by **KSCST** had a significant impact on the team members. The recognition from KSCST greatly enhanced the project's credibility, providing the students with valuable exposure to industry experts and potential future opportunities. The hands-on experience allowed them to apply cutting-edge technologies and methodologies in wearable tech and AI, which are highly relevant to the evolving tech landscape. As a result of the project, the team gained a strong practical understanding of integrating sensors, edge AI, and secure communication systems in wearable devices. This experience also led to the creation of a student-led startup focused on wearable technology innovation, further solidifying their expertise in this domain.

Instructions for providing information about projects for prototype for filling the table / report

- Please fill in all columns for each project.
- Ensure to attach photographs and short synopses where applicable.
- Submit the completed table and enclosed report format to KSCST by **28th April 2025**.
- Above completed information needs to be sent to KSCST addressed to: The Secretary, Karnataka State Council for Science and Technology, Indian Institute of Science Campus, Bengaluru 560012 with softcopy of the email to be sent to: office.kscst@iisc.ac.in
- For any queries / information required, you may please contact
Mr. K. N. Venkatesh, Senior Project Engineer, knv@kscst.org.in, 9448906242 /
Mrs. Anjani, Project Engineer, KSCST, anjani@kscst.org.in, 87222 62281