RideGuard IoT: Smart Helmet Detection System

Ensuring Rider Safety Through IoT Innovation

Presented by Saiyam Tuteja, Graphic Era Hill University, at Rise of Venture.

The Problem: Road Accidents & Safety Negligence

Rising Fatalities

Motorcycle accident deaths are increasing globally each year.

Low Helmet Usage

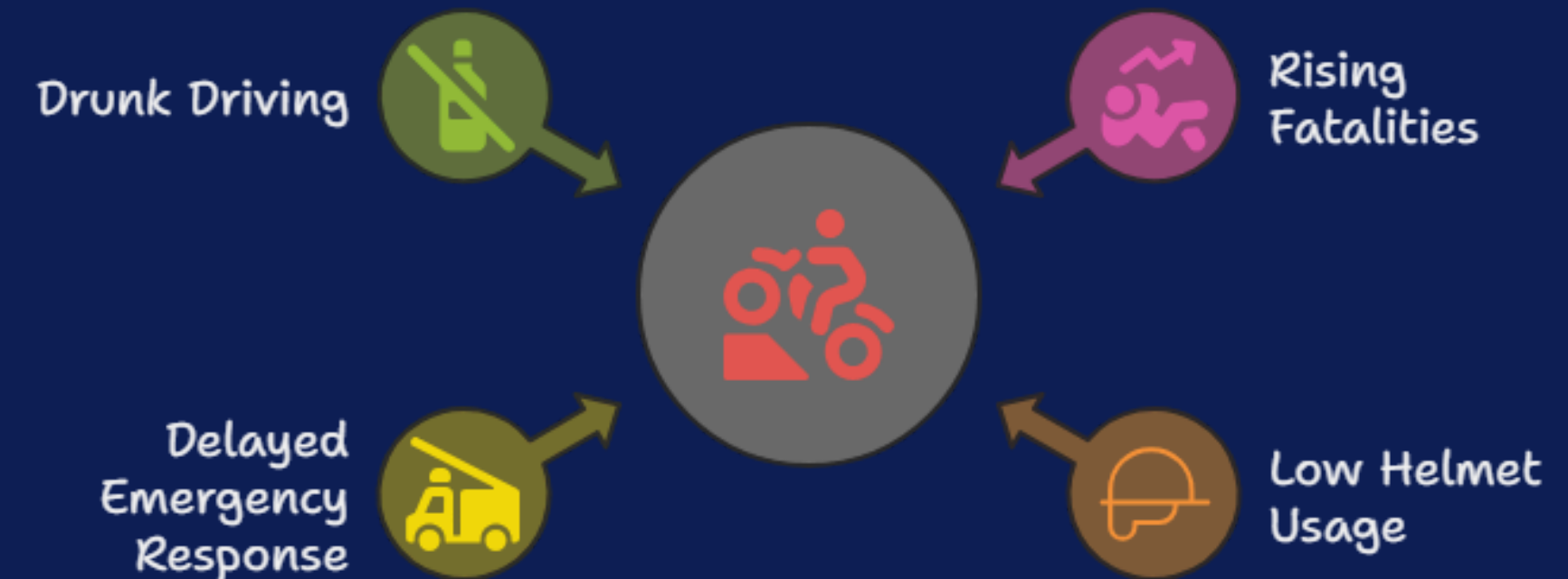Many riders neglect helmet wearing, leading to severe head injuries.

Delayed Emergency Help

Slow accident response worsens injury outcomes.

Drunk Driving

Alcohol-impaired riding increases accident risks significantly.

Factors Contributing to Motorcycle Accidents

Drunk Driving

Rising Fatalities

Delayed Emergency Response

Low Helmet Usage

Innovative Safety Features

Dual-Helmet Detection
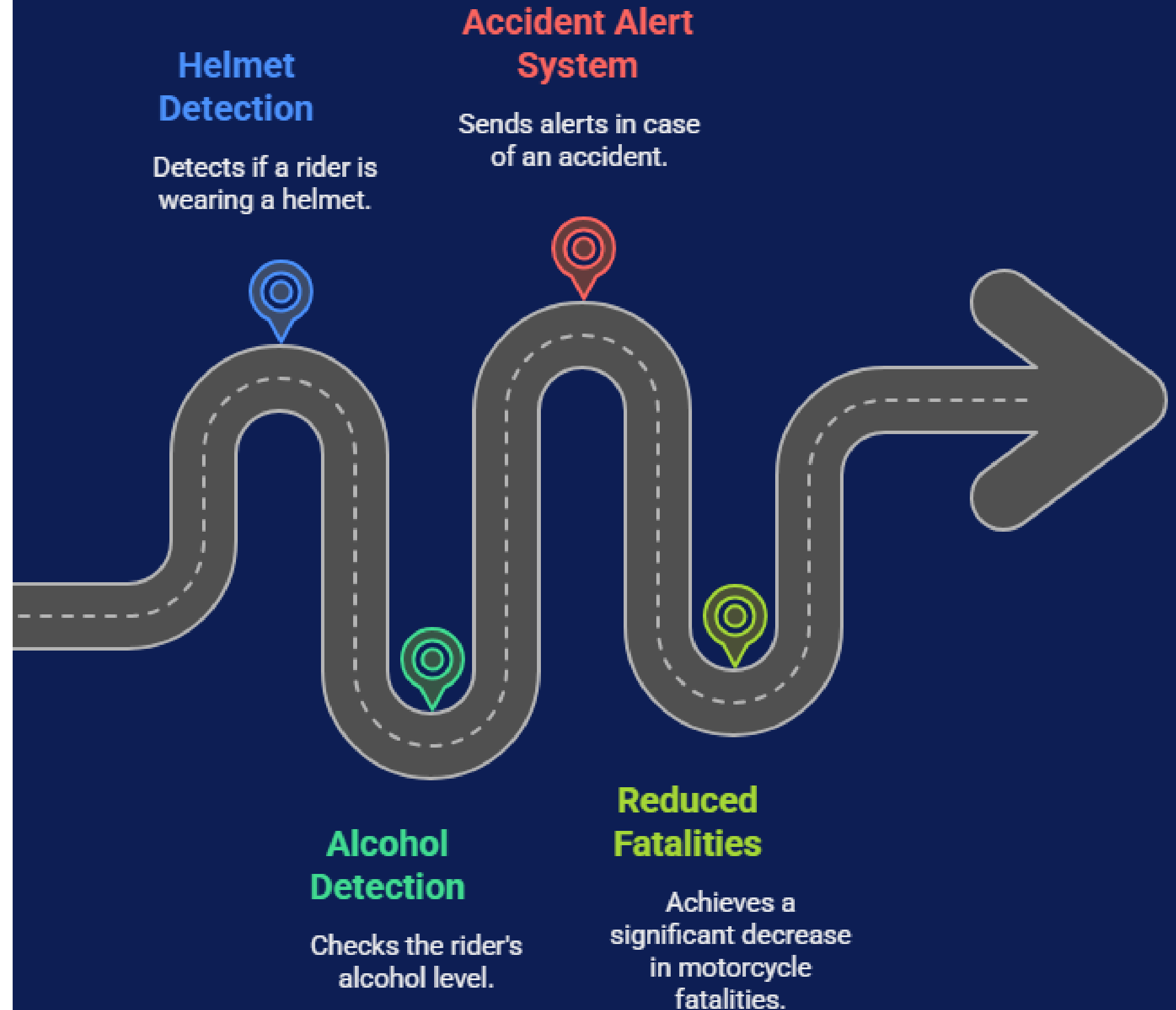
Alcohol Monitoring System

Ensures both riders wear helmets, enhancing safety during rides.

Accident Alert Mechanism

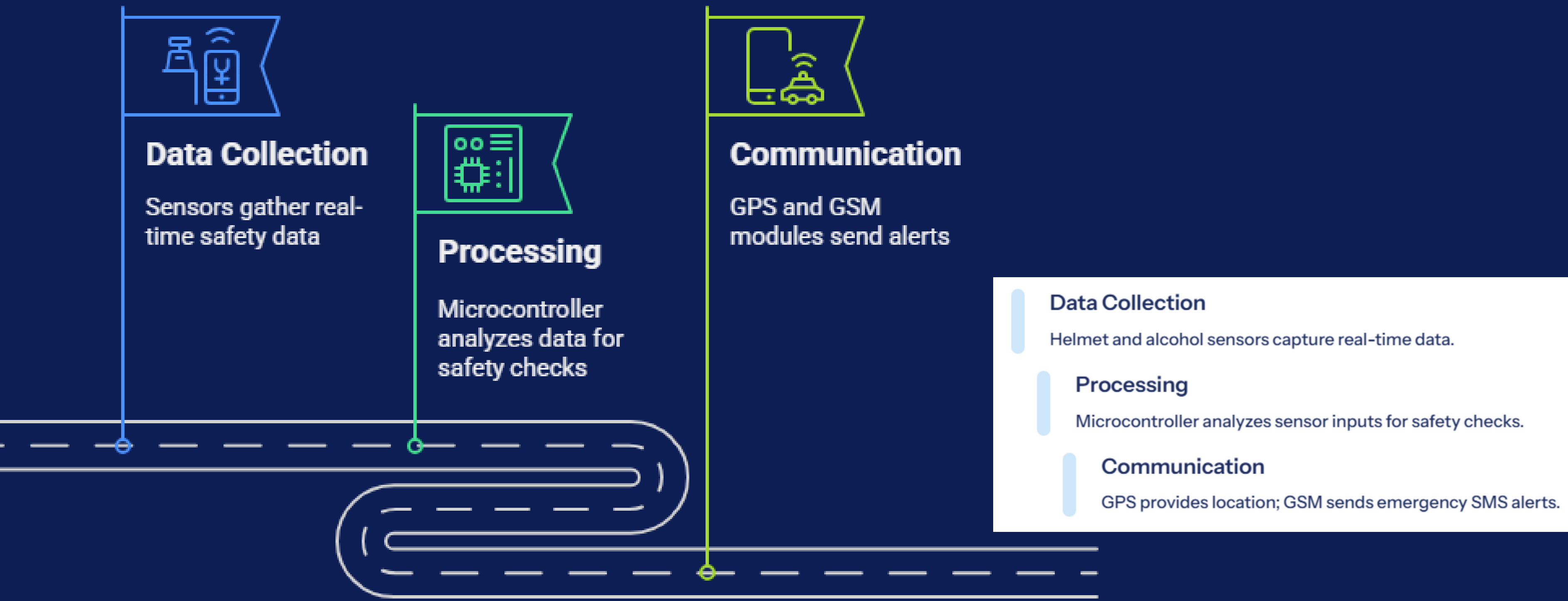Instant notifications to emergency contacts when an accident is detected.

Real-Time Monitoring

Continuous tracking of rider's alcohol levels for safer travel.

Helmet Detection

Detects if a rider is wearing a helmet.

Accident Alert System

Sends alerts in case of an accident.

Alcohol Detection

Checks the rider's alcohol level.

Reduced Fatalities

Achieves a significant decrease in motorcycle fatalities.

System Architecture: Integrated IoT Ecosystem

Data Collection

Sensors gather real-time safety data

Processing

Microcontroller analyzes data for safety checks

Communication

GPS and GSM modules send alerts

Data Collection

Helmet and alcohol sensors capture real-time data.

Processing

Microcontroller analyzes sensor inputs for safety checks.

Communication

GPS provides location; GSM sends emergency SMS alerts.

Core Hardware Modules

GPS Module

NEO-6M module provides accurate location tracking.

GSM Module

SIM800L module sends emergency messages via SMS.

Alcohol Sensor

MQ-3 sensor ensures rider sobriety by detecting alcohol.

Microcontroller

Arduino Nano processes sensor data and controls alerts.

Helmet Sensors

Capacitive sensors detect helmet usage for safety.

Power Source

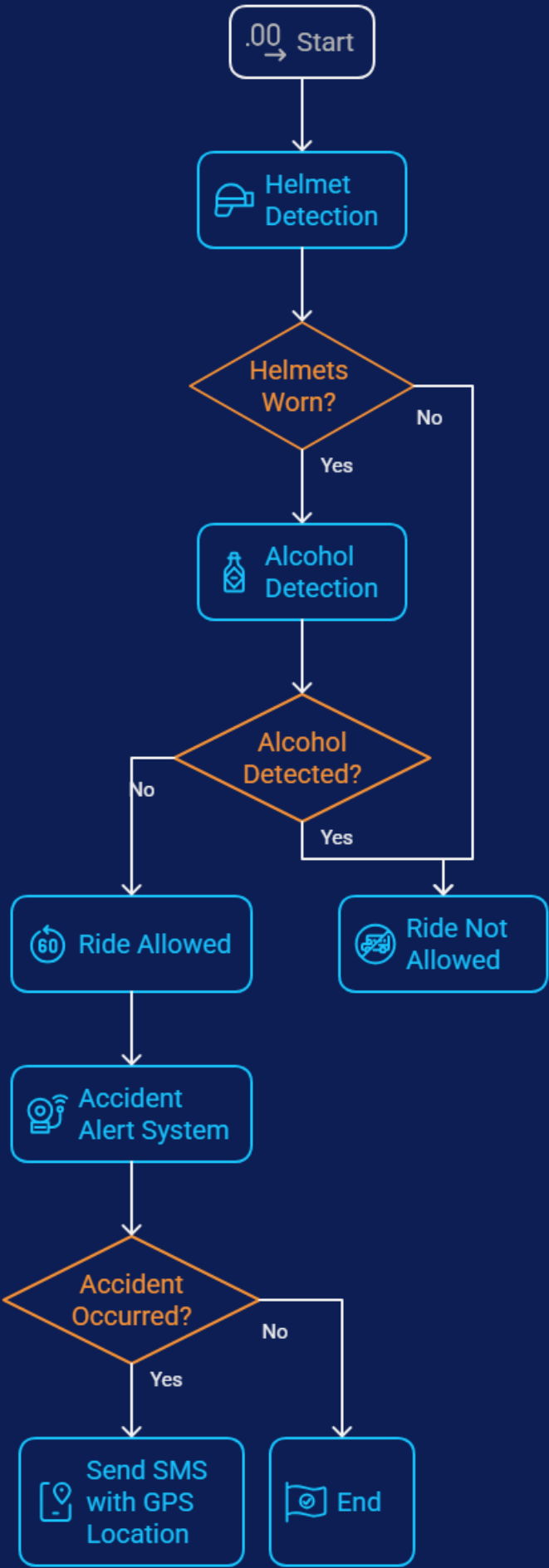Rechargeable battery ensures continuous system operation.

Core Hardware Modules

Smart Motorcycle Safety System Flow

1 — System Activation
Ignition On

System Activation

System starts when vehicle ignition is turned on

2 — Safety Verification
Safety Verification

System verifies rider and pillion are wearing helmets

Helmet Check

3 — Impairment Scan
Alcohol Check

Impairment Scan

System scans for alcohol presence before ride

4 — Collision Monitoring
Collision Monitoring

System monitors for collisions using impact sensors

Accident Detection

5 — Emergency Notification
SMS Alert

Emergency Notification

System sends crash location to emergency contacts

RideGuard IoT System Flowchart

Start

→ Helmet Detection

→ Helmets Worn?
- No → Ride Not Allowed
- Yes → Alcohol Detection

Alcohol Detection → Alcohol Detected?
- No → Ride Allowed
- Yes → Ride Not Allowed

Ride Allowed → Accident Alert System

Accident Alert System → Accident Occurred?
- Yes → Send SMS with GPS Location
- No → End

Benefits & Impact: Safer Roads, Secure Future

Reduced Fatalities

Lower death rates from motorcycle accidents.

Prevent Drunk Riding

Disables riding under alcohol influence for safety.

Fast Emergency Response

Alerts speed up help in accident situations.

Boost Safety Compliance

Encourages helmet usage and responsible riding habits.

RideGuard IoT Benefits and Impact
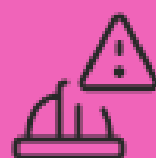
	Reduced Fatalities	Prevents Drunk Riding	Faster Emergency Response	Improved Safety Compliance
Impact	Cuts down deaths	Stops ignition	Enables timely help	Encourages law-abiding

Do you have any questions?

Thank you for your attention
I welcome your queries and feedback!