



VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BHEEMANNA KHANDRE INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

BHALKI-585 328

# Autonomous Wheelchair: Voice-Control, GPS & Safety System

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# Introduction to Wheelchair Safety

Safety importance

Critical for wheelchair users'  
independence

Smart system benefits

Secure, independent mobility with technology

Traditional limits

Traditional wheelchair lack  
intelligence and autonomy



# Key Safety Features Overview

## Fall Detection System

Automatically detects and alerts falls

## Obstacle Avoidance

Prevents collisions with smart sensors

## Emergency Alarm

Voice-activated calls for help

## Voice control

Hands free wheelchair movement

## GPS Tracking

Real-time location for security and safety



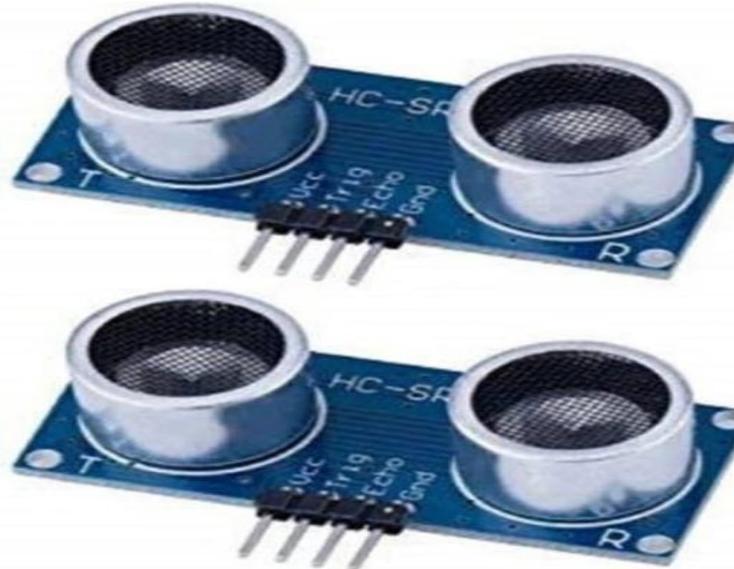
# Fall Detection System Details



# Obstacle Detection & Emergency Alarm

## Ultrasonic Sensors

Detect obstacles in path



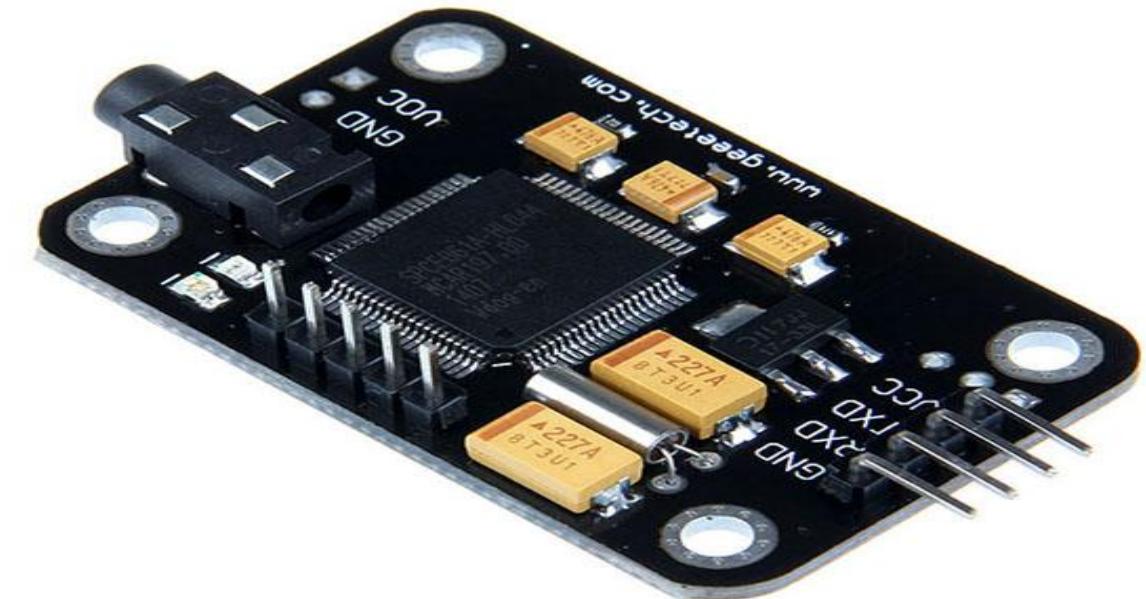
## Automatic Movement Stop

Prevents collisions

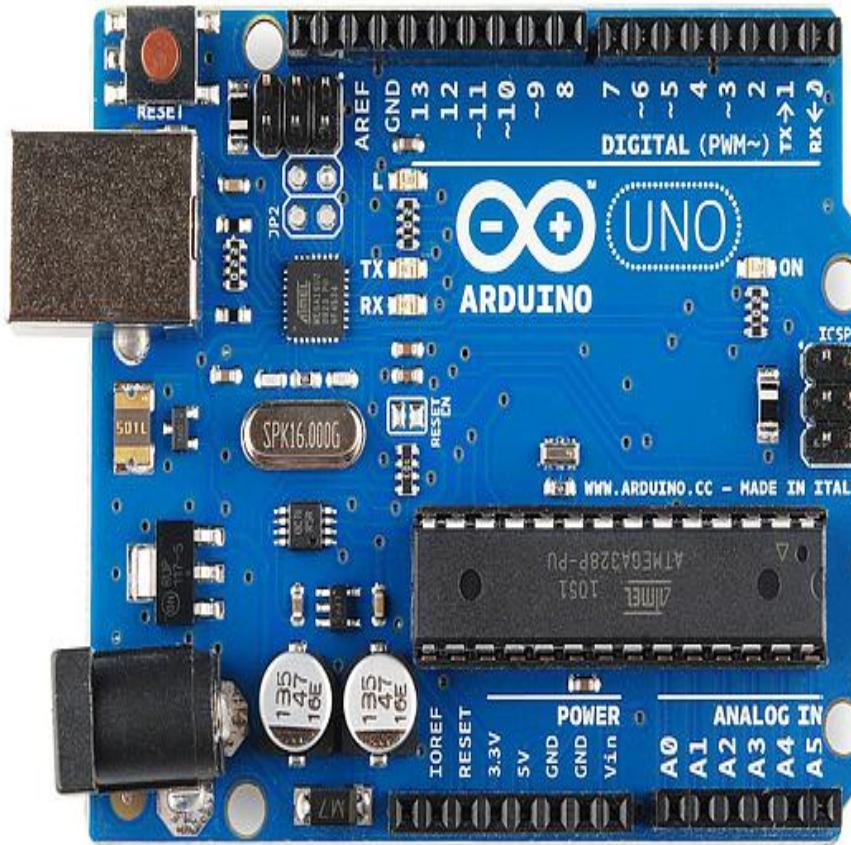


## Voice-Activated Call

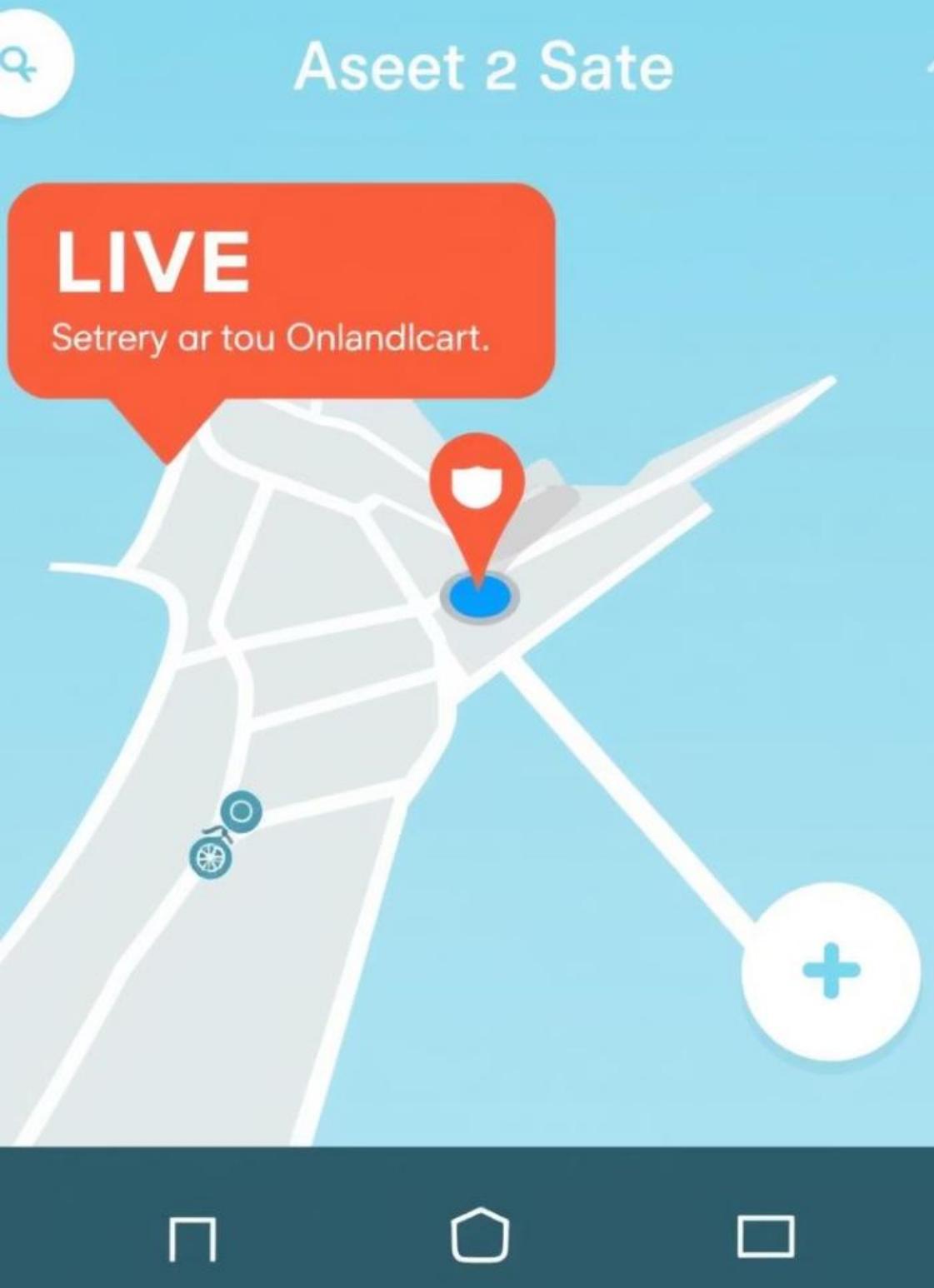
Quick, hands-free emergency alerts



# Arduino uno microcontroller



- Arduino Uno is the central microcontroller used for processing voice commands.
- Based on ATmega328P microcontroller.
- Receives input from a voice recognition module (e.g., Voice Recognition V3).
- Controls motor drivers (e.g., L298N) to move the wheelchair in desired directions.
- Interfaces with sensors for obstacle detection (e.g., ultrasonic sensors).
- Simple to program using Arduino IDE.
- Provides digital and analog I/O pins for connecting components.
- Compact, cost-effective, and ideal for embedded projects like assistive mobility devices.



# GPS Tracking for User Security

## Real-Time Monitoring

Enables caregiver oversight continuously

## Geo-Fencing Alerts

Notifies if user leaves safe zones





# Auto-Stop Mechanism

## Smart Braking

Stops wheelchair on hazardous terrain

## Uneven Surface Detection

Prevents accidents on slopes and ramps

## Fall Prevention

Protects against falls down stairs



# Hardware Components Overview

 MPU6050 Sensors

Fall detection  
gyro & accel

 Alarm System

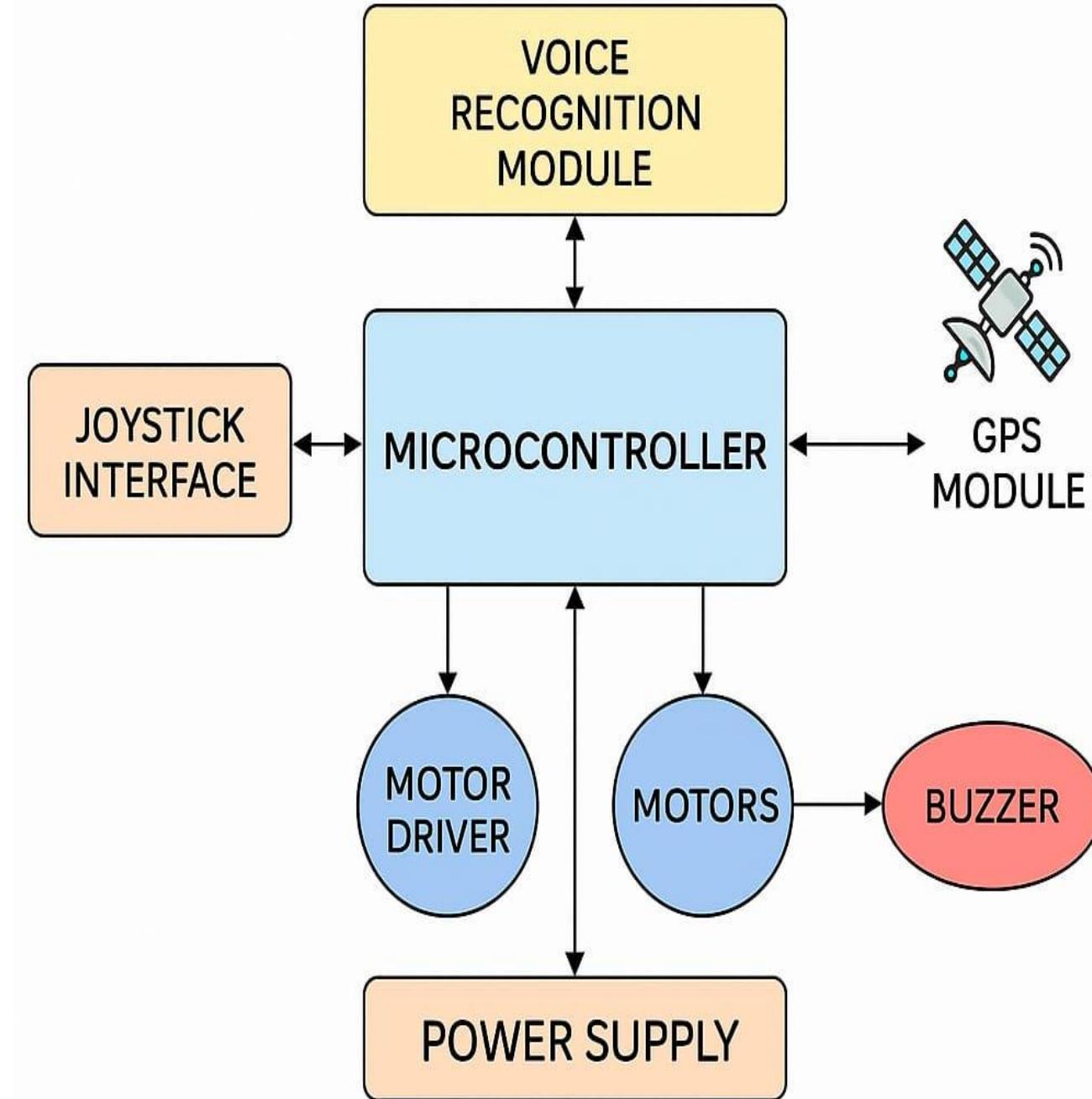
Emergency  
notifications

 Ultrasonic Sensors

Obstacle avoidance

 GPS Module

Real-time user location



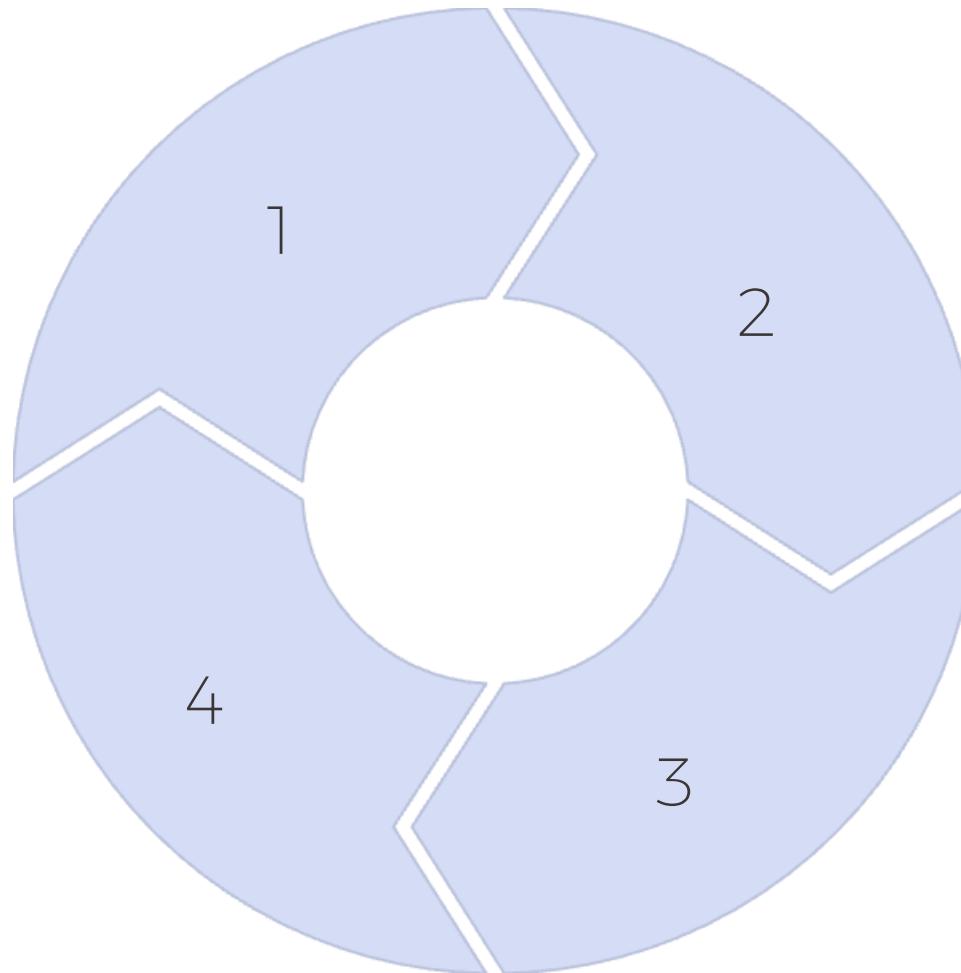
## SYSTEM ARCHITECTURE

Voice-Controlled Smart Wheelchair

# Implementation Methodology

**Hardware Integration**  
Combining sensors & modules

**User Testing**  
Field assessments & feedback



**AI Voice Software**  
Development for voice control

**Sensor Calibration**  
Testing detection accuracy





# Project Outcomes & Future

## Improved Safety

Real-time alerts reduce accidents

## Better Accessibility

Increased independence for users

## Enhanced Caregiver Response

Faster emergency assistance

## Future Enhancements

AI balance & terrain analysis planned

# Conclusion

- A cost-effective, AI-powered wheelchair
- Easy control for users with various disabilities
- Enhanced independence and safety



**THANK YOU**

