



VISVESVARAYA TECHNOLOGICAL UNIVERSITY  
BHEEMANNA KHANDRE INSTITUTE OF TECHNOLOGY  
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING  
BHALKI-585 328

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

Presented by:

SHUBHAM :3RB22EC070  
AMAAN ALI : 3RB22EC048  
VARUN :3RB22EC088  
VIJAY :3RB22EC091





# Introduction to Wheelchair Safety



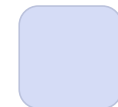
Safety importance

**Critical for wheelchair users' independence**



Traditional limits

**Traditional wheelchair lack intelligence and autonomy**



Smart system benefits

**Secure, independent mobility with technology**



# 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

1

## Gyroscope & Accelerometer

Measure movement to detect falls

2

## Fall Event Trigger

Alerts activated upon detection

3

## GPS & Emergency Call

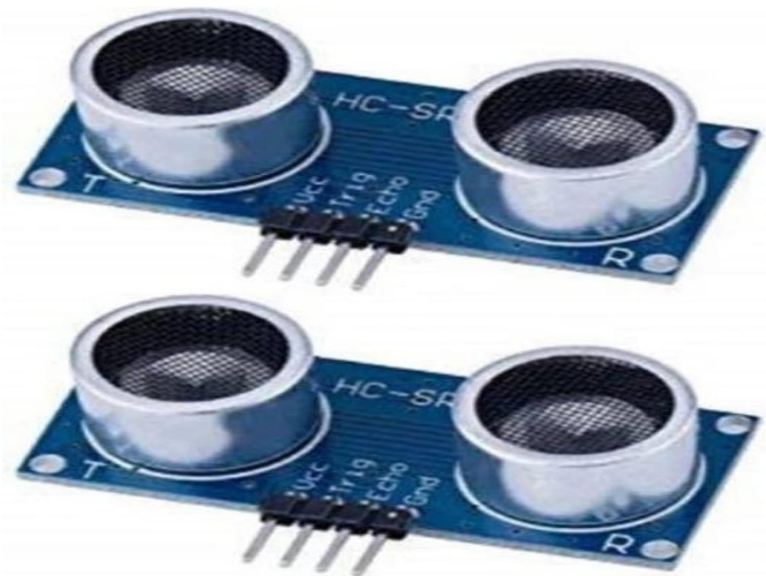
Location sent immediately for assistance



# Obstacle Detection & Emergency Alarm

## Ultrasonic Sensors

Detect obstacles in path



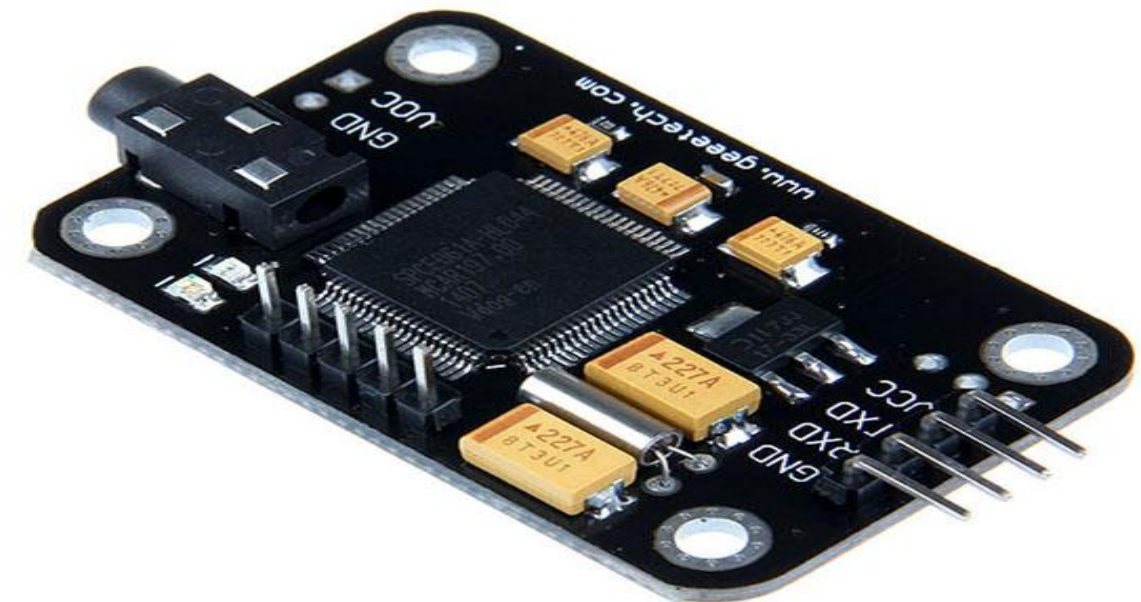
## Automatic Movement Stop

Prevents collisions



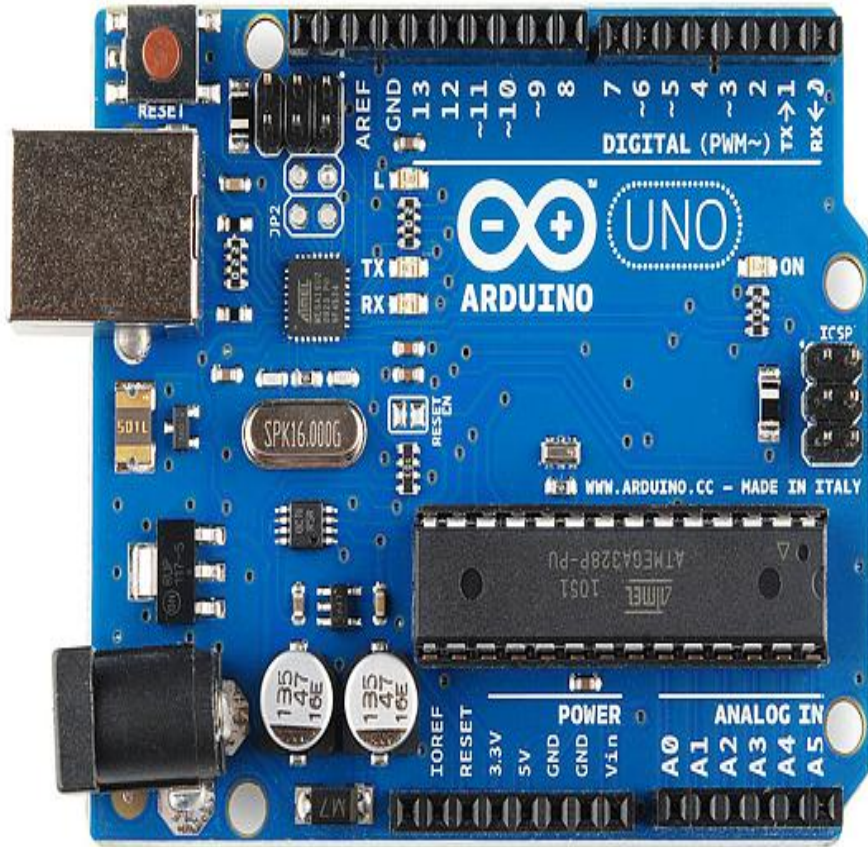
## Voice-Activated Call

Quick, hands-free emergency alerts



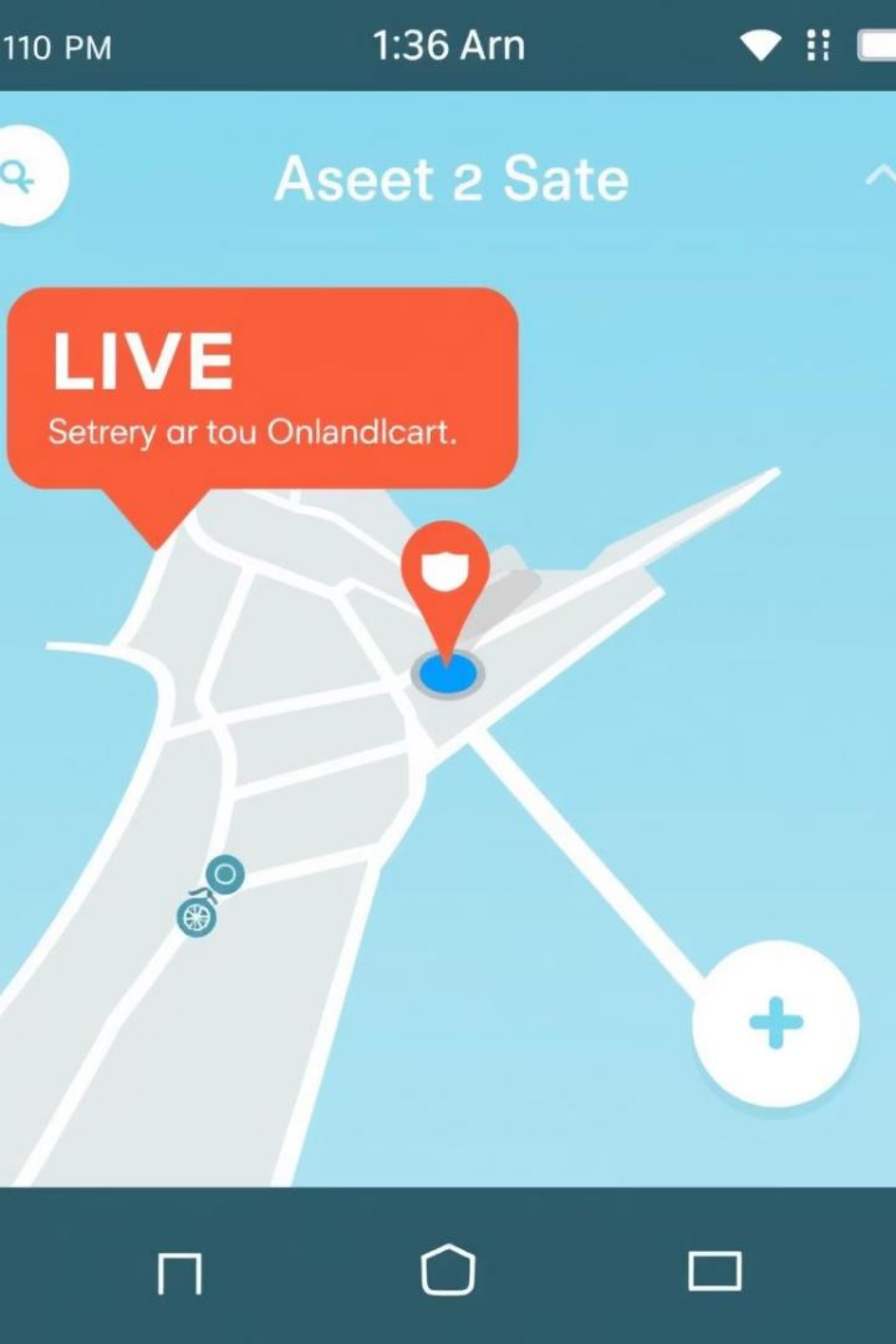


# Arduino uno microcontroller



- 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

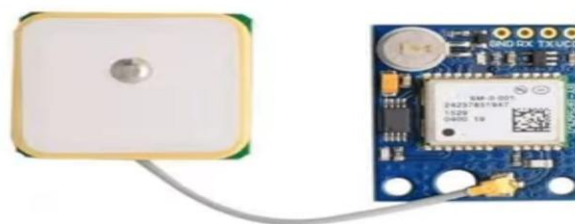
## Real-Time Monitoring

Enables caregiver oversight continuously

## Geo-Fencing Alerts

Notifies if user leaves safe zones

*GPS module*



*Sim800L GSM module*





# Auto-Stop Mechanism



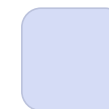
## Smart Braking

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



Ultrasonic  
Sensors

Obstacle  
avoidance



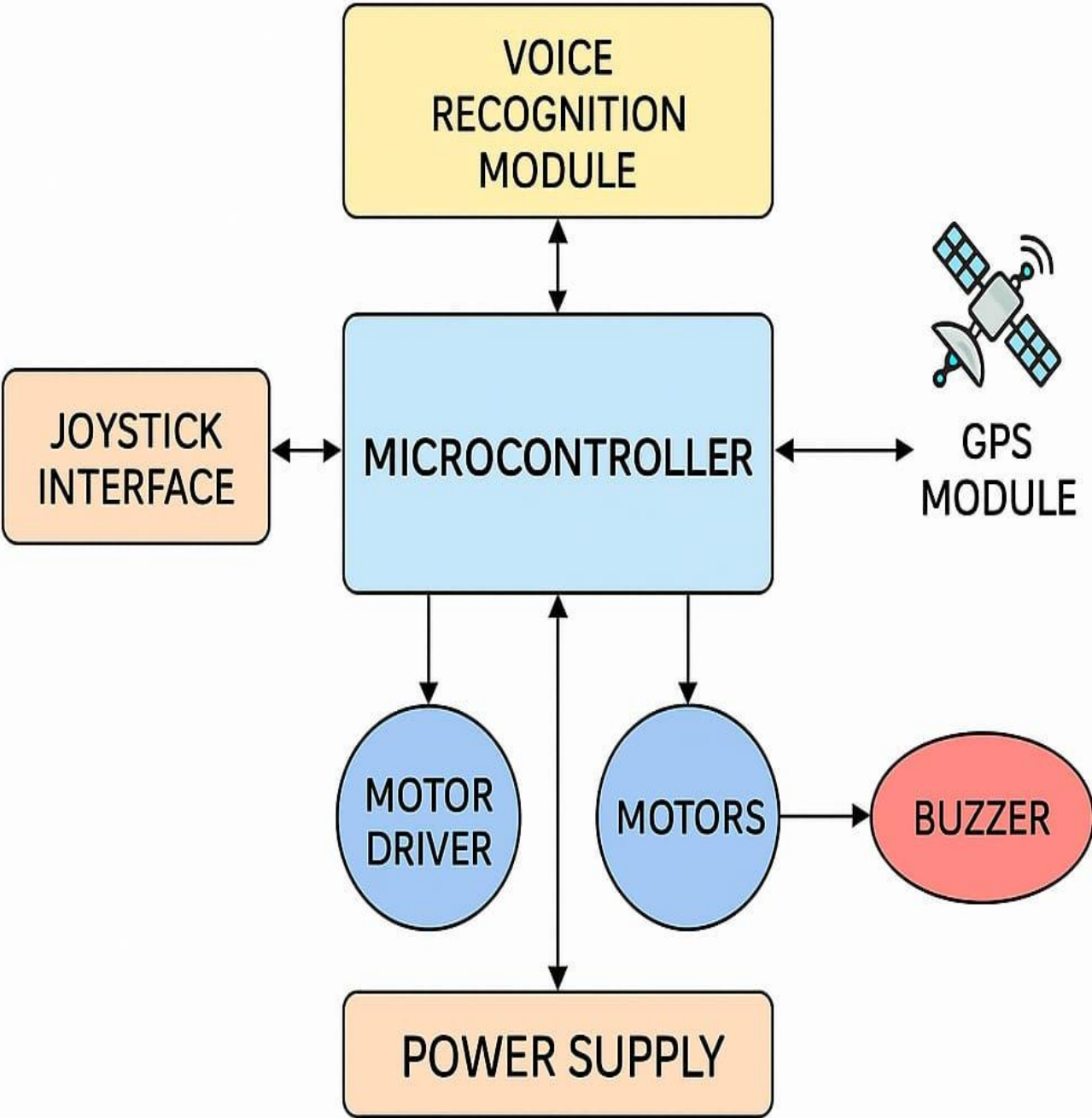
GPS Module

Real-time user  
location



Alarm  
System

Emergency  
notifications



SYSTEM ARCHTECTURE

Voice-Controlled Smart Wheelchair

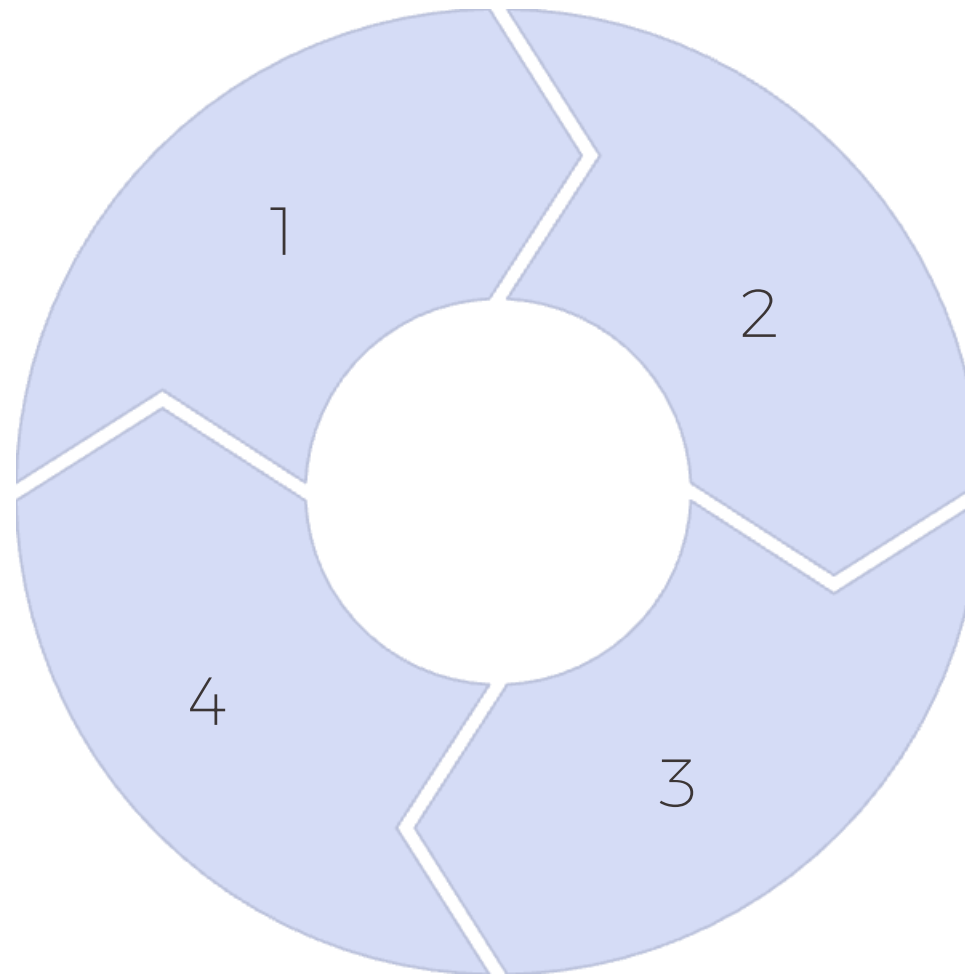
# Implementation Methodology

## 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*

