

# Automatic Phase Selection System for Uninterrupted Power Supply

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## Abstract

*This project presents an intelligent automatic phase selection system designed to ensure uninterrupted single-phase power supply from a three-phase system. In many residential, commercial, and industrial applications, phase failure is a common issue that leads to power interruptions and affects the performance of electrical appliances. Traditional manual phase changeover methods are inefficient, time-consuming, and require human intervention. To overcome these limitations, this system introduces an automated solution using a microcontroller-based control mechanism.*

*The system continuously monitors the voltage of all three phases (R, Y, and B) using voltage sensing circuits. An ATmega328 microcontroller analyzes real-time voltage data and determines the health and stability of each phase. Based on intelligent decision logic, the system automatically selects the healthiest available phase. A relay driver circuit (ULN2003) is used to control electromechanical relays, which switch the load to the selected phase without delay.*

*Additionally, the system includes mobile-based monitoring, where switching events and phase conditions are logged and transmitted for real-time observation. This enhances system reliability, safety, and user convenience. The proposed system eliminates manual intervention, reduces downtime, and provides a cost-effective and efficient power management solution. It is suitable for applications in homes, offices, and small industries where continuous power supply is essential.*

## Keywords:

*Automatic Phase Selection, Three-Phase System, Microcontroller, Relay Switching, Voltage Monitoring*

## I. Introduction:

However, phase failure is a common issue that leads to interruptions in single-phase loads. Manual phase changeover systems require human intervention and often result in delays and inconvenience. Sudden phase loss can affect essential appliances and reduce system reliability.



To address this problem, an automatic phase selection system is required. This system ensures continuous power supply by automatically selecting an available phase without manual effort. The proposed solution improves reliability, efficiency, and safety.

### 1.1 Problem Statement:

Three-phase power supply systems are widely used in residential, commercial, and industrial sectors.

Phase failure causes interruption in power supply. Manual switching is inefficient and time-consuming. There is a need for an automated system that can ensure uninterrupted power.

## 2. Objective:

- Provide uninterrupted power supply
- Automatically detect available phases
- Select the healthiest phase
- Reduce human intervention

## 2. Proposed system and methodology:

The proposed system automatically selects the available phase based on voltage conditions. It uses voltage sensing circuits to monitor phase health.

The ATmega328 microcontroller processes the data and applies decision logic. The ULN2003 relay driver controls relays for switching the load to the selected phase.

### 2.1 System Architecture:

- Three-phase input (R, Y, B)
- Voltage sensing circuit
- Microcontroller processing
- Relay driver control
- Load switching

#### Working Flow:

Phase detection → Analysis → Decision → Switching → Monitoring

### 2.2 Components Used:



1) ATM 328 microcontroller



2) Relay

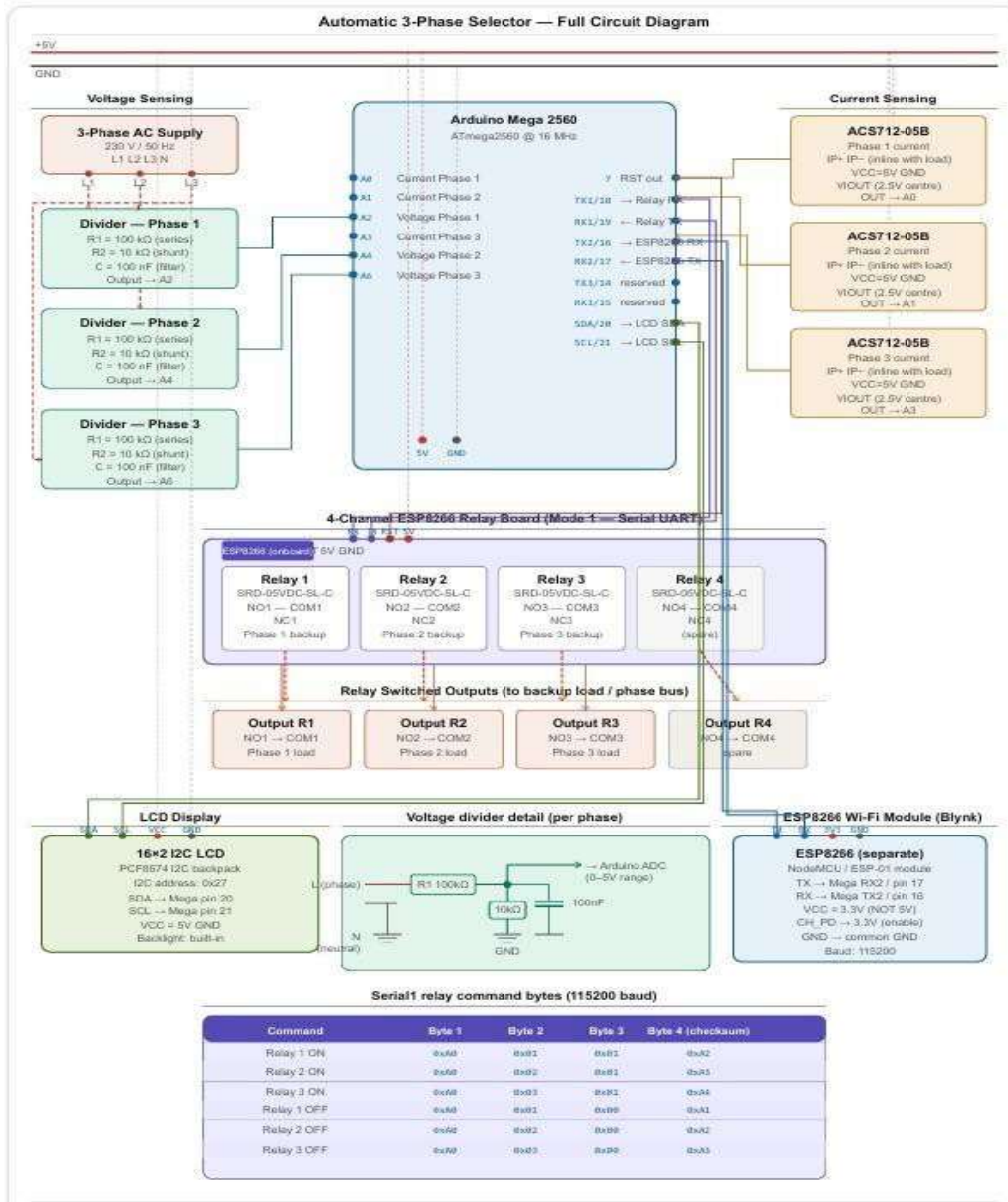


3) Current sensor



4) Communication Module

### 2.3 Circuit diagram:



### 3. Working principle:

The system continuously monitors phase voltages. The microcontroller evaluates the stability and selects the best phase. If a phase fails, the system switches instantly to another available phase.

The system logs all events and sends data to a mobile application. If no phase is available, it disconnects the load for safety.

**Result:**



**When Any Phase is Fault:**  
its shown system status as fault and voltage and relay state



**When all phases are Normally ON:**  
System status is normal and all relays are in off state



**When total supply OFF:**  
When system is OFF of complete supply interruption

### 3.1 Enhancement 1: Healthy Phase Selection

- 1) Traditional systems detect only phase presence
- 2) Proposed system evaluates voltage stability
- 3) Prevents switching to weak or fluctuating phase
- 4) Protects load and improves reliability

### 3.2 Enhancement 2: Mobile Log Monitoring

- 1) System records phase failures and switching events
- 2) Data transmitted to mobile application
- 3) Remote monitoring of system performance
- 4) Enables fault diagnosis and maintenance planning

## 4. Conclusions

The project successfully develops an automatic phase selection system that ensures uninterrupted power supply. It eliminates manual switching and improves system reliability. The integration of mobile monitoring enhances usability and fault detection. Overall, the system provides a simple, efficient, and cost-effective solution.

## 5. Acknowledgement

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