**HARDWARE DESCRIPTION**

**1. ESP8266 Overview**

The ESP8266 is a low-cost Wi-Fi module used for enabling wireless communication in IoT systems. It integrates a microcontroller with Wi-Fi, supporting TCP/IP, HTTP, MQTT, and more. It can operate in client and access point modes, suitable for remote monitoring and automation.

**Key Features:**

* Built-in TCP/IP stack
* GPIO pins for sensors/actuators
* Low power consumption
* OTA firmware updates
* Programmable via Arduino IDE

**2. Traffic Signal Node (ESP8266)**

**Pin Configuration:**

|  |  |
| --- | --- |
| **Signal Light** | **ESP8266 Pin** |
| TL1 Green | D1 |
| TL1 Yellow | D2 |
| TL1 Red | D3 |
| TL2 Green | D4 |
| TL2 Yellow | D5 |
| TL2 Red | D6 |

**Logic:**

* Alternates traffic flow between TL1 and TL2.
* Sends real-time signal status to the cloud (via HTTP GET to ‘prayalabs.com’).

**3. Building Control Node (ESP8266)**

**Component:**

* Light (controlled via D3)

**Cloud Control:**

* Uses ThingSpeak to read `led1` and `led3` fields from channel ‘2048279’.