by Amir Erfan Eslamikia

Controlling an LED with Bluetooth: A Proteus Simulation Project

This project demonstrates turning an LED on and off using Bluetooth in android and Proteus.

It combines hardware simulation and wireless communication, ideal for beginners.

Introduction to Bluetooth-Enabled Electronics in Proteus

Bluetooth Basics

Wireless tech used for short-range communication between devices.

Proteus Simulator

Allows virtual design and testing of electronic circuits with Bluetooth.

Project Goals

Simulate Bluetooth control of an LED , Something like smart house.

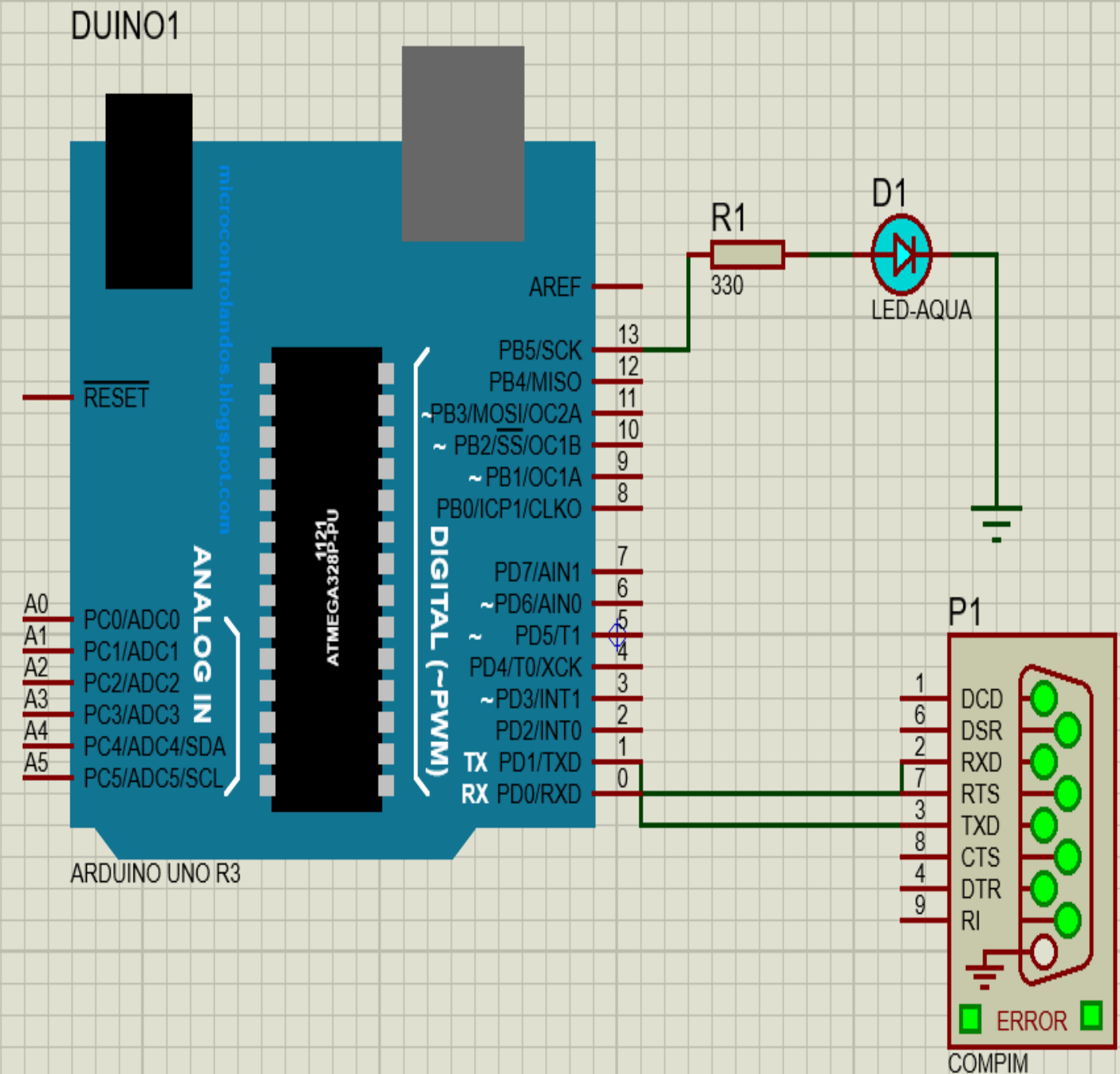# Project Overview: Components and Circuit Design

Key Components

- Microcontroller (Arduino Uno R3)

- HC-05 Bluetooth Module or COMPIM

- LED with resistor

- Power supply

Circuit Layout

Microcontroller interfaces with Bluetooth RX/TX pins.

LED connected to a digital output pin via resistor.

Setting Up the Bluetooth Module in Proteus

Module Configuration

Assign baud rate (e.g., 9600 bps) matching microcontroller code.

Connection Pins

Properly connect RX, TX, VCC, and GND pins to microcontroller.

Simulation Settings

Enable virtual serial port for data transmission in Proteus.

File   Edit   Sketch   Tools   Help

Select Board

bluetooth_arduino.ino

```
1    String input;
2    void setup() {
3    pinMode(7, OUTPUT);
4    Serial.begin(9600);
5    }
6    void loop() {
7      while (Serial.available())
8      {
9      delay(10);
10     char c = Serial.read();
11     input += c;
12     }
13     if (input.length() > 0)
14     {
15       Serial.println(input);
16         if(input == "on")
17         {
18           digitalWrite(7, HIGH);
19         }
20     if(input == "off")
21     {
22       digitalWrite(7, LOW);
23         }
24  input="";
25  }
26  }
27
28
```

Programming the Microcontroller for LED Control

</> Serial Communication

Initialize serial port to receive Bluetooth commands.

LED Logic

Turn LED ON/OFF according to received characters.

Debugging

Use serial monitor to check incoming Bluetooth data.

Creating the Mobile Application Interface With Android Studio

App Features

- Connect to HC-05 Bluetooth module

- Buttons to toggle LED state remotely

- Simple and intuitive interface

Development Platforms

Use MIT App Inventor, Android Studio, or similar tools for easy app creation.

Demonstration: Real-Time Bluetooth LED Control

- Connect App to Bluetooth Module
- Send ON/OFF Commands
- Observe LED Response

The LED responds instantly to commands, showing successful wireless control.

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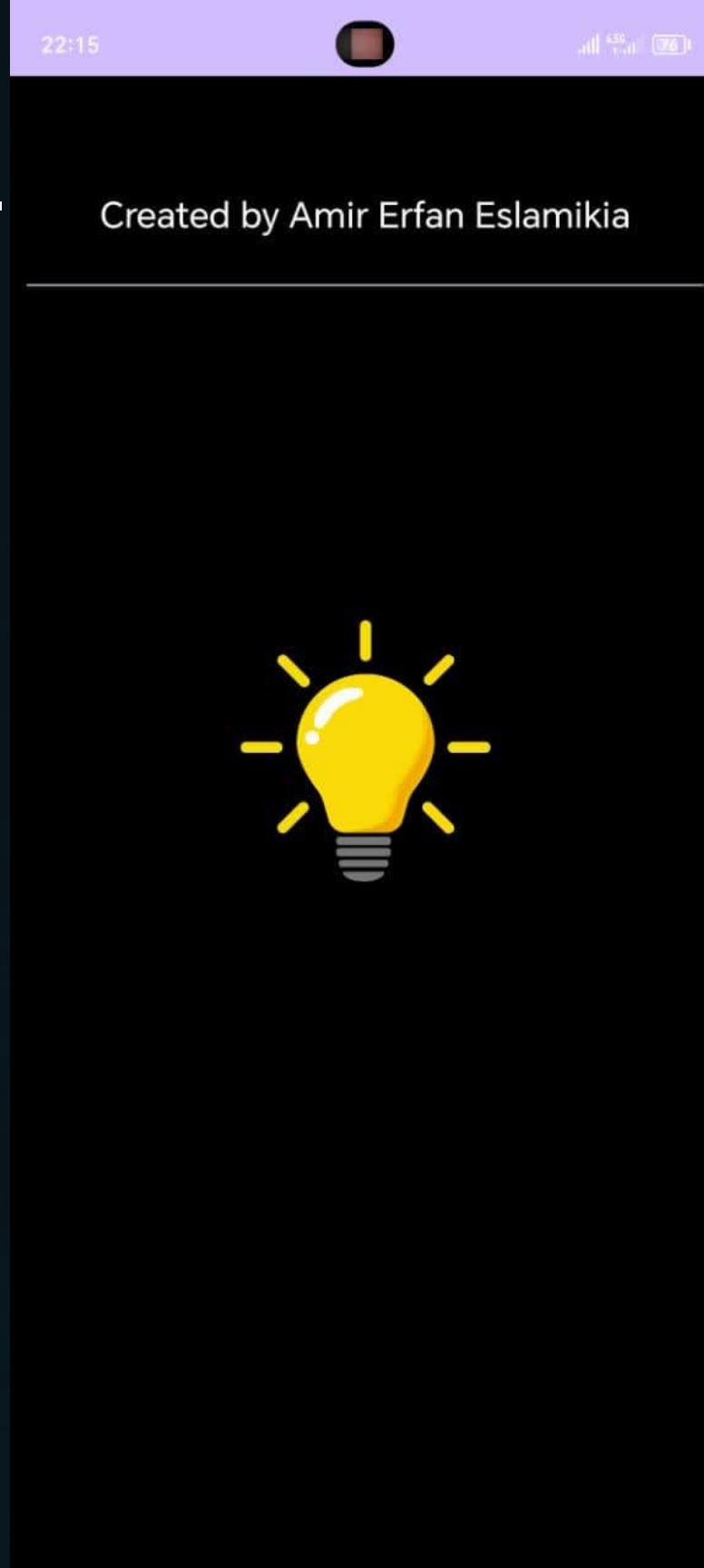
Conclusion: Applications and Future Extensions

Practical Uses

Smart home lighting, remote device control, educational projects.

Future Upgrades

Integrate sensors, add multi-device control, use Bluetooth Low Energy.

Learning Benefits

Hands-on experience with wireless tech and microcontroller programming.