Chromist

"Mist, Managed."
Click. Sync. Breathe.

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TOOLS USED:	KiCad, AVR-GCC, Wokwi, MIT App Inventor, VS Code

INTRODUCTION

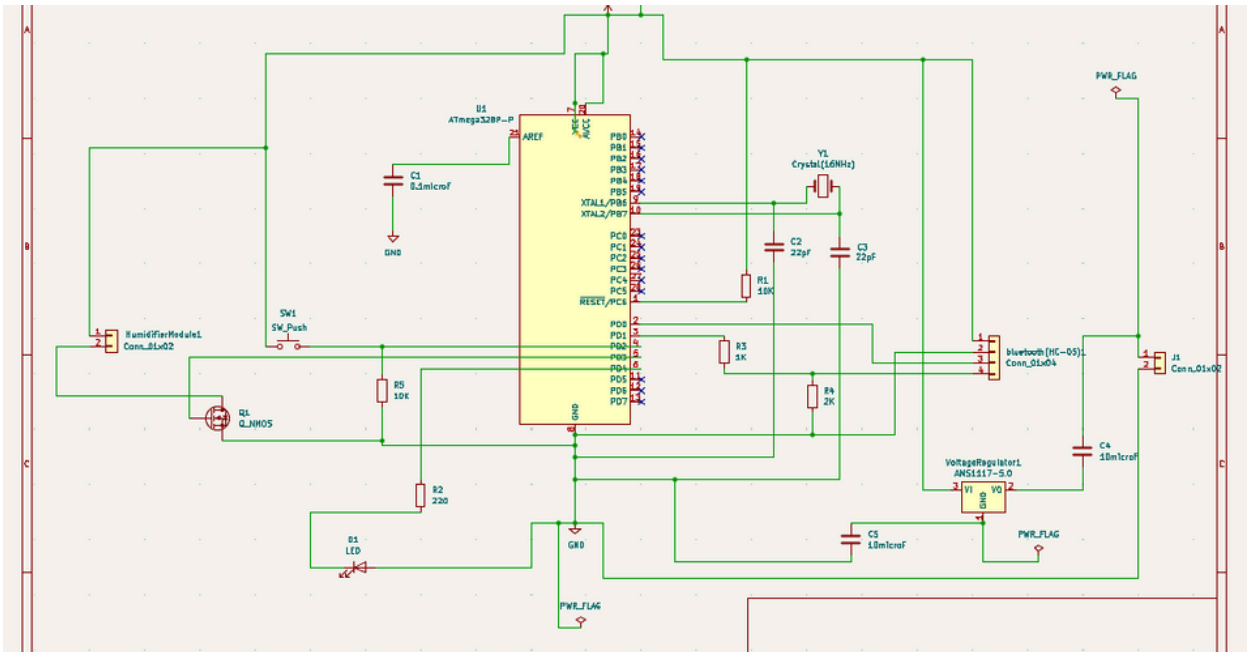
This project presents a low-cost, microcontroller-based Smart Ultrasonic Humidifier, controllable via Bluetooth using either physical buttons or a mobile application. The system is designed around an ATmega328P microcontroller with an HC-05 Classic Bluetooth module, enabling wireless mist control.

OBJECTIVE

- Control a humidifier via Bluetooth or push-button.
- Design a compact PCB layout for integration.
- Simulate embedded logic in Wokwi.
- Propose future browser-based BLE support.

Main Components:

- ATmega328P Microcontroller
- HC-05 Bluetooth Module
- NMOS for Humidifier Power Control
- Push Button Input
- LED Output Indicator
- AMS1117-5V Regulator



Functionality:

- Bluetooth and manual control of mist.
- App sends ON/OFF commands via serial to ATmega.
- ATmega controls humidifier power via MOSFET.
- LED indicator for mist state.
- All logic verified through simulation.

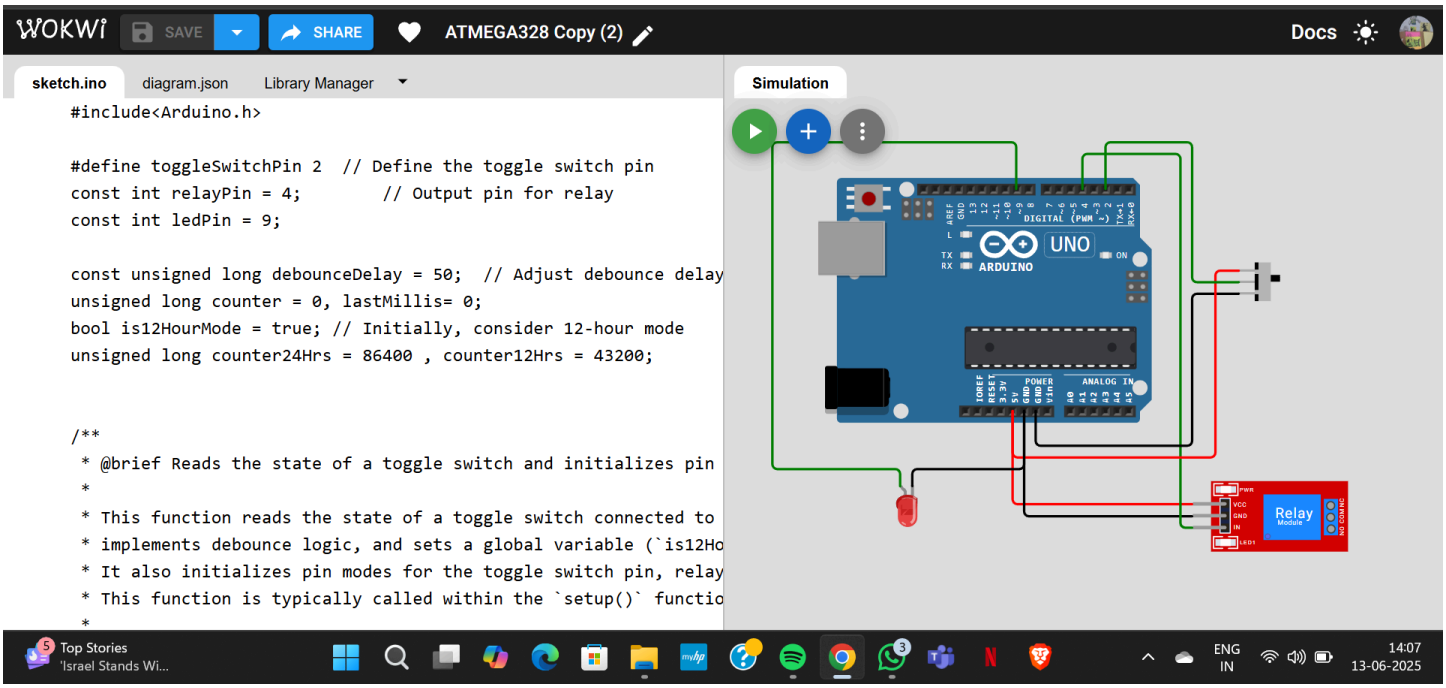
02. SOFTWARE & SIMULATION

SOFTWARE TOOLS USED

TOOLS	PURPOSE
KiCad	PCB design and schematic capture.
AVR-GCC + VS Code	Embedded C development for ATmega.
Wokwi	Virtual hardware simulation.
MIT App Inventor	Mobile Bluetooth app.

Simulation (Wokwi) :

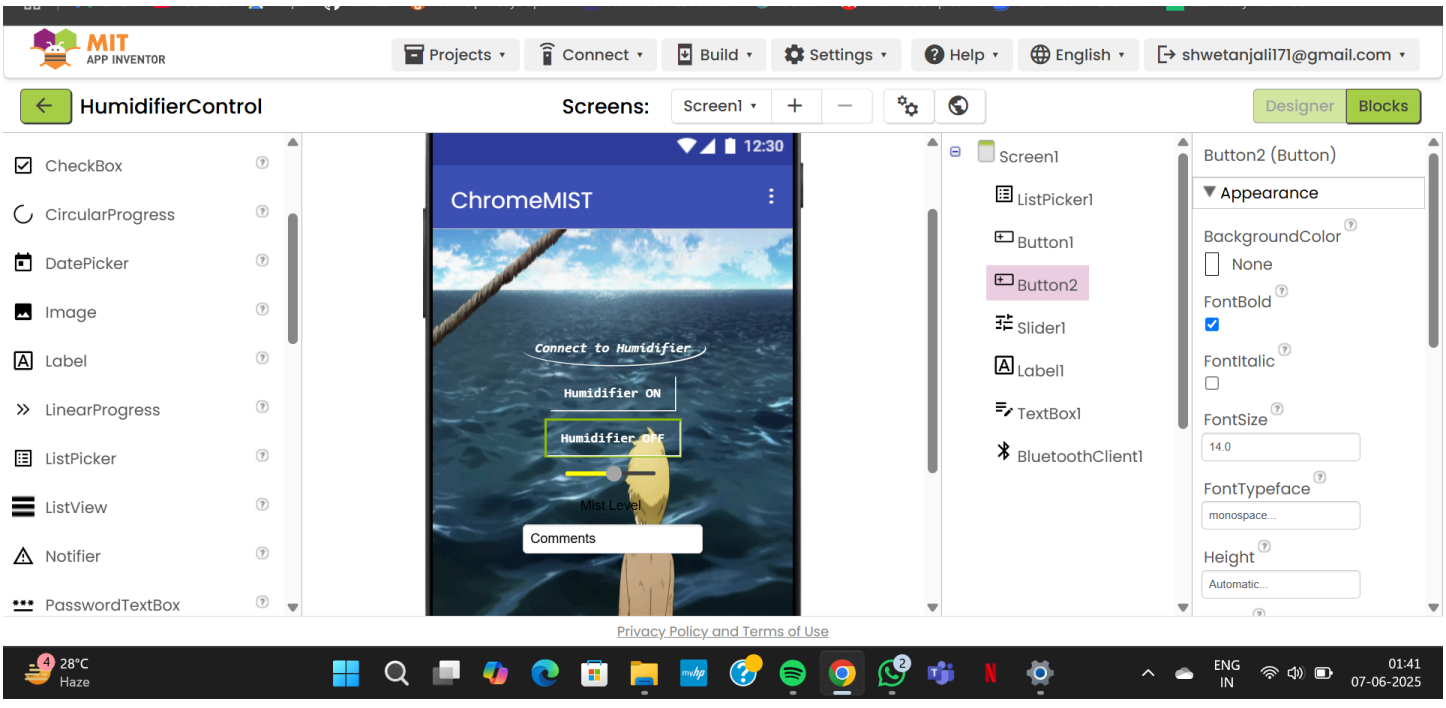
The full logic is tested in Wokwi using a virtual ATmega328P, push button, LED, and UART simulation for Bluetooth control. This validated the control flow of the humidifier logic.



App Control :

A mobile application developed in MIT App Inventor communicates over HC-05, with:

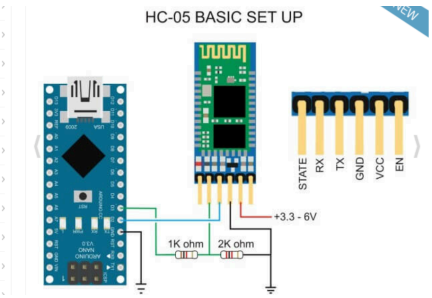
- Device pairing
- ON/OFF buttons
- Mist level slider (optional)
- Feedback comment input



03. Web Bluetooth Integration (Proposed)

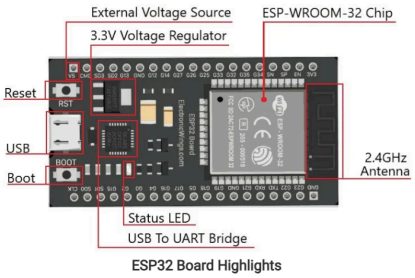
BROWSER-BASED BLE CONTROL WITH ESP32

Current Limitation



HC-05 uses Classic Bluetooth (SPP), which is not compatible with the Web Bluetooth API used in Chrome.

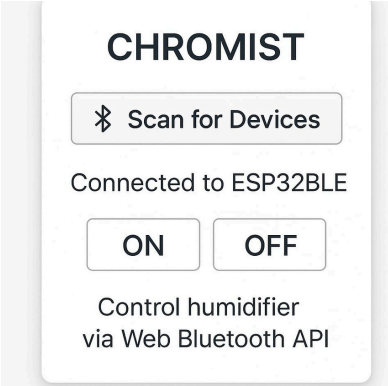
Proposed Solution



Replace HC-05 and ATmega328P with an ESP32 microcontroller that supports:

- BLE GATT Services
- Direct GPIO control
- Native compatibility with Chrome/Web Bluetooth

Browser App Plan



A future web app or Chrome Extension can:

- Scan for BLE devices
- Connect to ESP32 BLE
- Send "ON" or "OFF" over BLE
- Control humidifier via Web Bluetooth API

CONCLUSION

CHROMIST is a smart, simulation-ready humidifier system designed for intuitive control via mobile app and future-ready web integration. Built on ATmega328P with HC-05, it functions fully in simulation and app control. To align with Chromium's browser-based ecosystem, an ESP32 BLE upgrade is proposed — enabling direct Chrome-based control using the Web Bluetooth API.

CHROMIST proves that embedded systems can bridge into the web, offering smart, connected control with minimal hardware.