

# Nicholas Howe

Software engineer and founder of CircuitCoder

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Software engineer who builds products end to end, from microcontroller firmware to web and Android apps, and takes over unfinished codebases to get them to release. Founder of CircuitCoder, a Raleigh software studio for small and mid-sized companies.

## Experience

### Contract software engineer, Apex Instruments

Mar 2026 – present

#### *XD-502 emissions-testing console (shipped)*

- Sole developer of the ESP32 firmware and built-in Wi-Fi web app for an EPA stack-emissions testing console, letting technicians monitor, control, calibrate and download tests from any phone or laptop.
- Added over-the-air firmware updates, seven-language support and a two-tier password lock for calibration values.
- Serialized commands from several simultaneous web users through one mutex-protected FreeRTOS queue.
- Traced a Wi-Fi fallback fault to two root causes across the ESP32 and PIC32 boards and fixed both; made CSV export to SD card and USB drive reliable in the PIC32 firmware.

#### *Next-generation automated sampling console (in development)*

- Leading a ground-up rewrite covering firmware for three boards (PIC32MZ, ESP32), a browser app and a Python hardware simulator: about 41,000 lines of C, warning-free under `-Werror -Wconversion` with no dynamic allocation.
- Implemented EPA Method 1–5 isokinetic calculations in C, mirrored in Python and JavaScript with parity tests against the previous-generation console.

### Founder, CircuitCoder

2026 – present

#### *Ember, Android habit and accountability app*

- Streaks, XP, badges and 16 multi-week programs, all recalculated from versioned goal history so edits to past days stay consistent. Kotlin, Jetpack Compose, Room; 57 unit tests on the core logic.

#### *Binder, Android trading-card scanner and price tracker*

- On-device OCR (CameraX, ML Kit) matched against four card-data APIs. Built an evaluation harness over 140 real card photos that raised top-1 match accuracy from 47% to 89% for Pokémon and 58% to 91% for Magic.

#### *MicroPython starter guide, free electronics course*

- Hands-on lessons taking beginners from a first blinking LED on an ESP32 to a Wi-Fi-controlled robot.

## Research

### Neural networks for stock market prediction

Undergraduate research, UNC Asheville

- Compared LSTM, CNN, CNN+LSTM and Transformer networks at predicting S&P 500 (SPY) moves from price history and technical indicators, using TensorFlow, scikit-learn and pandas.
- [Key finding: which architecture performed best, and by how much]

## Education

### B.S. in Computer Science, University of North Carolina Asheville (transferred from NC State University)

2025

## Skills

|                |                                                                                    |
|----------------|------------------------------------------------------------------------------------|
| Languages      | Python, JavaScript, C, C++, Java, Kotlin, PHP, HTML/CSS                            |
| Embedded       | ESP32 (ESP-IDF, Arduino), PIC32 (XC32), FreeRTOS, over-the-air updates, Modbus TCP |
| Web and mobile | Android (Jetpack Compose, Room, CameraX, WorkManager), REST and WebSocket APIs     |
| Data and ML    | TensorFlow, scikit-learn, pandas, time-series modeling                             |