

Volatile & Atomicity

Electrical Engineering

Two distinct bugs that both look like a variable changing value at random.

One is a compiler problem, the other a timing problem.

Volatile

Tells the compiler the value can change

Required for hardware registers

Required for variables an ISR writes

Stops the value being cached in a register

It is not a concurrency guarantee

Atomicity

A multi-byte write can be interrupted

Read-modify-write is three operations

Disable interrupts, or use an atomic type

Keep any critical section extremely short

A single flag byte is usually safe

Volatile stops the compiler optimising a read away. It does nothing to stop an interrupt landing half-way through a write.