## 🚀 PHASE 1: 10 AVR ****Bare-Metal**** Projects (ATmega328P or similar)

| # | Project | Description | Skills Covered |
| --- | --- | --- | --- |
| 1 | LED Toggle with Registers | Blink LED using DDRx, PORTx | GPIO, Register-level basics |
| 2 | UART Serial Terminal | Send/receive characters | USART, Baud rate config |
| 3 | Software PWM | Generate PWM for LED brightness | Timers, waveform, duty cycle |
| 4 | ADC Temperature Sensor | Read analog LM35 data, show on UART | ADC registers, UART integration |
| 5 | Keypad Lock System | Password lock using 4x4 keypad | GPIO scan matrix, logic control |
| 6 | IR Remote Decoder | Decode IR signals using External INT | Interrupts, pulse decoding |
| 7 | Timer-based Delay + ISR | Blink LED at exact intervals using Timer ISR | ISR, Timer config |
| 8 | EEPROM Read/Write | Store and retrieve passwords in EEPROM | EEPROM access, data handling |
| 9 | Ultrasonic Sensor Interface | Measure distance via HC-SR04 | Input capture, Timer, precise timing |
| 10 | Real-Time Clock via I2C | Read time from DS1307 and show on UART | I2C protocol, peripheral interface |

✅ **Outcome**: These projects will give you **solid control over GPIO, UART, ADC, Interrupts, I2C, and EEPROM**, all **without any Arduino libraries**.