A.3 – C Language Basics for Embedded

Data Types

- Use **fixed-width types** from <stdint.h> for reliability:
  - uint8_t → 0–255
  - uint16_t → 0–65535
  - int32_t → -2,147,483,648 to 2,147,483,647

Control Flow

- **if-else:** decision-making
- **for/while:** loops
- **switch-case:** multiple condition handling

Functions & Headers

- .h → declarations, macros
- .c → implementation
- Helps organize firmware into modules.

Arrays & Pointers

- Array = sequence of same type.
- Pointer = stores address of a variable or register.
- Used for buffer management & direct hardware register access.

Practical

- Blink LED + Button counter (bare-metal, no Arduino library).
- Print counter via UART.
- MCU: PIC18 / STM32.

Summary

- Fixed-width types prevent size mismatches.
- Separate .h and .c for clean code.
- Arrays + pointers = efficient embedded memory handling.

References

- **Web Search:**
  - Embedded C Programming Basics
  - Pointers in C
- **YouTube:**
  - Pointers Made Easy