Basic Structure of an Arduino Program

The Arduino programming environment provides a straightforward structure for developing embedded system applications. It consists of two main functions, setup() and loop(), which serve as the building blocks for writing any Arduino sketch.

# setup() Function

The setup() function is crucial for initializing the Arduino board. It is called only once when the board is powered on or reset, and its primary purpose is to prepare the environment by setting the pin modes (input or output), initializing libraries, and starting serial communication. Think of the setup() function as the place where you set the stage for the main operations that will occur in the loop() function.

For instance, if you are using a sensor that requires specific settings or an LED that you want to control, the setup() function is where you will configure these components. Here's an example of what a setup() function might look like:

void setup() {  
 // Initialize the digital pin as an output.  
 pinMode(13, OUTPUT);  
 // Start the serial communication at 9600 baud rate.  
 Serial.begin(9600);  
}

# loop() Function

After the setup() function has finished executing, the loop() function begins to run. The loop() function contains the code that will run repeatedly, making the Arduino board responsive and interactive. This continuous execution allows the board to perform real-time tasks such as reading sensors, controlling actuators, and processing inputs. The loop() function is essential for creating programs that need to monitor and react to changes in the environment.

In the loop() function, you can include conditional statements, loops, and function calls to perform complex tasks. The code inside loop() will keep running in a cycle, meaning that once it reaches the end of the function, it starts over from the beginning. Here’s an example of a simple loop() function:

void loop() {  
 // Turn the LED on (HIGH is the voltage level)  
 digitalWrite(13, HIGH);  
 // Wait for a second  
 delay(1000);  
 // Turn the LED off by making the voltage LOW  
 digitalWrite(13, LOW);  
 // Wait for a second  
 delay(1000);  
}

the basic structure of an Arduino program revolves around the setup() and loop() functions. The setup() function sets up your board and the loop() function contains the logic that is repeated for as long as the board is powered on. This simple structure allows you to create powerful and responsive programs with ease.