
Engineering Technology (ENGR 101)

Variable Scope



Variable scope

```
int globalVar = 3;           ←  
  
void setup() {  
    int localVar1 = 2;         ←  
  
    globalVar = 4;  
  
    Serial.begin(9600);  
    Serial.println(localVar1);  
}  
  
void loop() {  
    int localVar2 = 3;         ←  
  
    Serial.println(localVar2);  
    Serial.println(globalVar);  
}
```

Variable Scope

- Local
 - A local variable is only visible inside the current, innermost block
- Global
 - A global variable is visible in the *whole* compilation unit, from the line of declaration to the end of file

Local Scope

file1.ino

```
{  
variable declaration  
}
```

file2.ino

```
{  
{  
variable declaration  
}  
}
```

Global Scope

file1.ino

variable declaration

file2.ino

variable declaration

Variable Scope Example

```
int func(float a, int b)
{
    int i; // i is visible from this point to end of func
    double g = 0; // g is visible from this point to end of func
    for (i = 0; i < b; i++) {
        double h = i*g; // h is only visible from this
                           // point to end of loop!
        // Loop body - may access a, b, i, g
        Serial.println(h + a + b);
    } // end of for-loop
    // func body - may access a, b, i, g
    Serial.println(i + a + b);
    return g;
} // end of func()
```

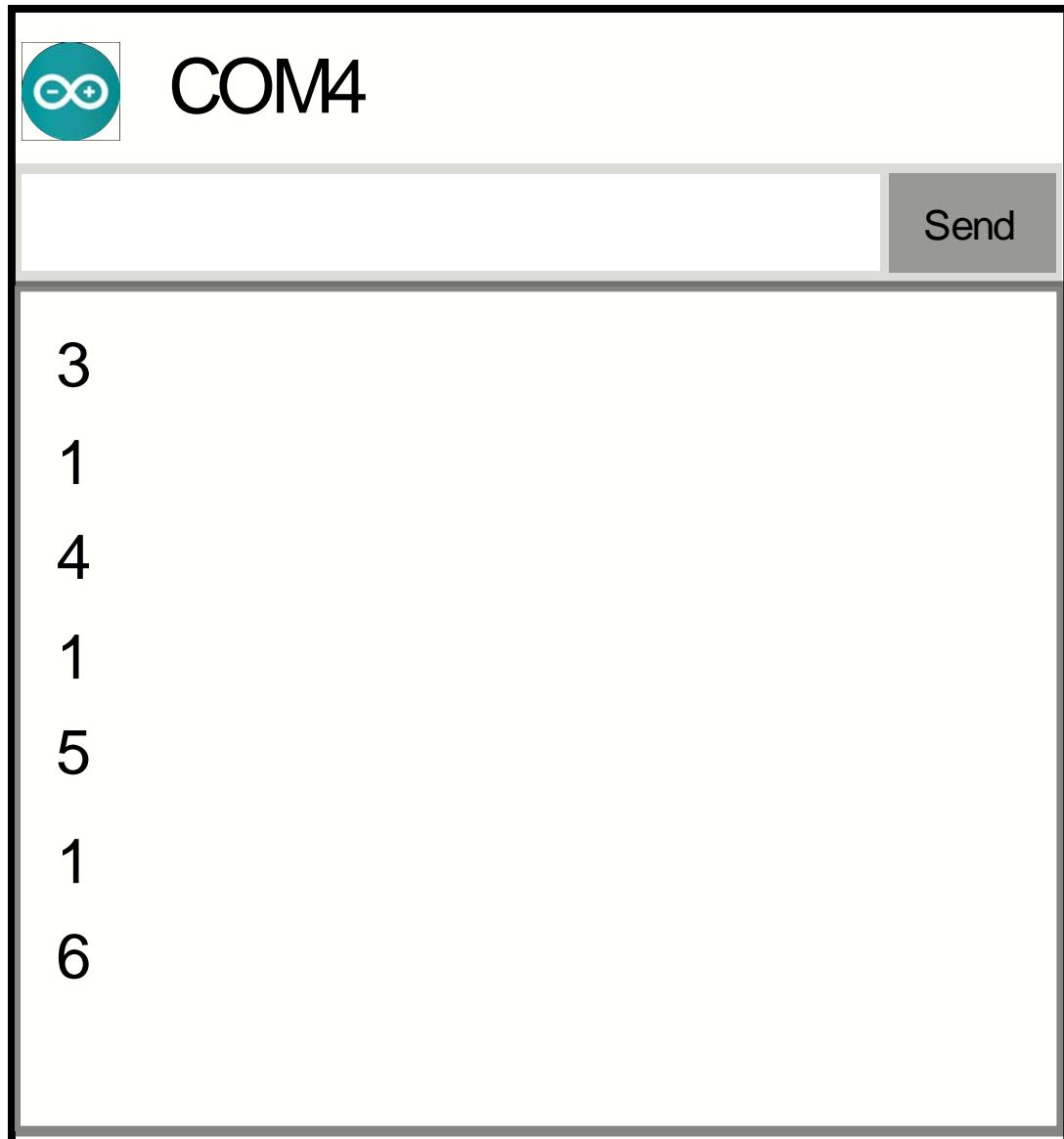
The diagram illustrates the scope of variables in the `func` function. The entire function is enclosed in a large grey box. Inside, a green box covers the entire function body from the opening brace to the closing brace. A blue box covers the loop body from the `for` keyword to the closing brace of the loop. A yellow box covers the innermost block within the loop, from the `double h` declaration to the final closing brace. Arrows point from each variable declaration (`a`, `b`, `i`, `g`, `h`) to its respective scope box.

Variable scope

```
int i = 3;

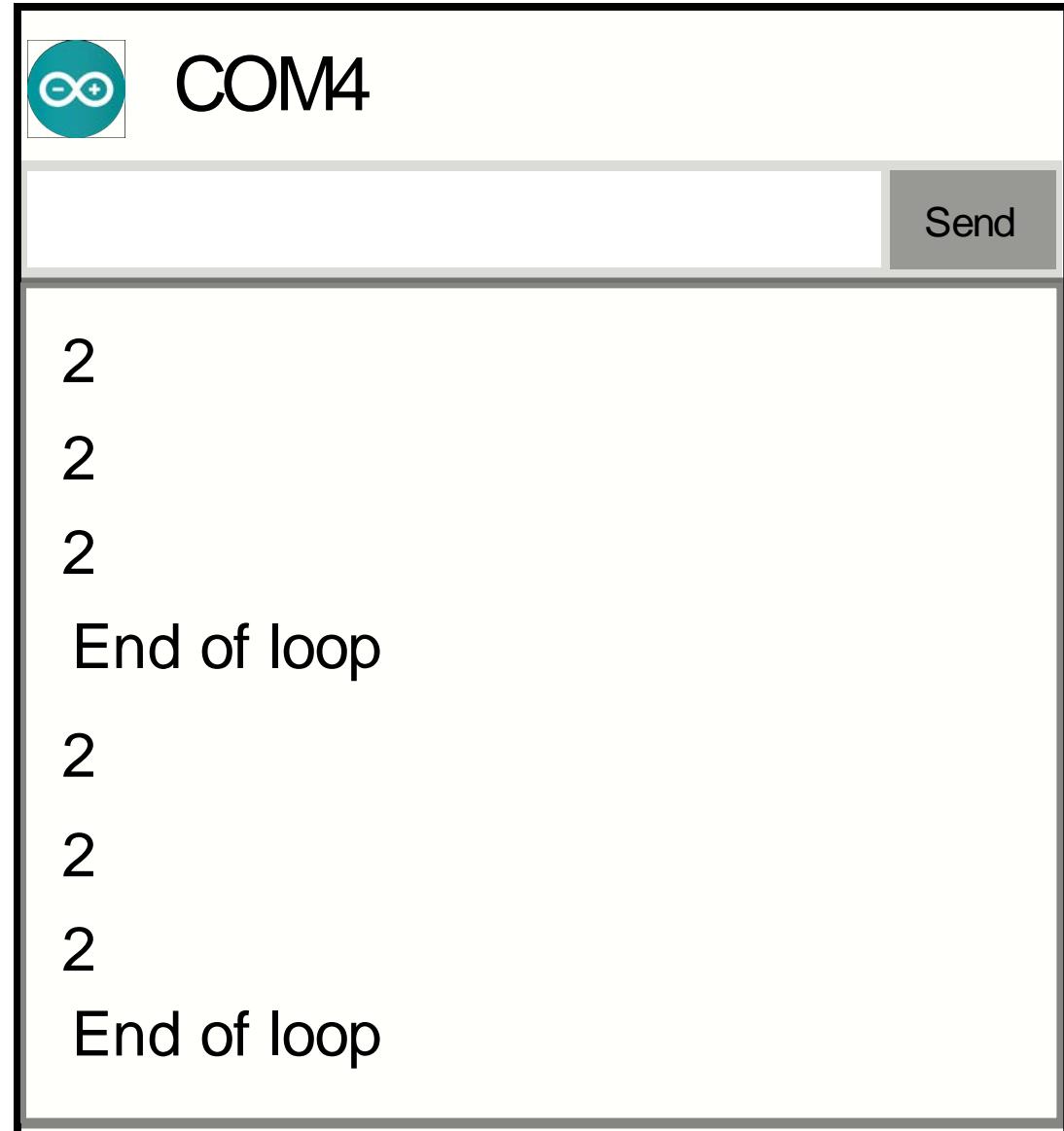
void setup() {
    Serial.begin(9600);
    Serial.println(i);
}

void loop() {
    int a = 0;
    a++;
    i++;
    Serial.println(a);
    Serial.println(i);
}
```



Variable scope

```
void setup() {  
    Serial.begin(9600);  
}  
  
void loop() {  
    int a = 0;  
    int b = 2;  
  
    for( a = 0; a < 3; a++){  
        Serial.println(b);  
    }  
    b = 4;  
    Serial.println("End of loop");  
}
```



Variable scope

```
void setup() {  
    Serial.begin(9600);  
}  
void loop() {  
    int a = 0;  
    int b = 2;  
  
    for( a = 0; a < 3; a++ ){  
        Serial.println(b);  
    }  
}
```

```
void setup() {  
    Serial.begin(9600);  
}  
void loop() {  
    int a = 0;  
  
    for( a = 0; a < 3; a++ ){  
        int b = 2;  
        Serial.println(b);  
    }  
    Serial.println(b);  
}
```

Variable scope

```
void setup() {  
    Serial.begin(9600);  
}  
  
void loop() {  
    int a = 0;  
    int b = 2;  
  
    for( a = 0; a < 3; a++){  
        Serial.println(b);  
    }  
}
```

```
void setup() {  
    Serial.begin(9600);  
}  
  
void loop() {  
    int b = 2;  
  
    for(int a = 0; a < 3; a++){  
        Serial.println(b);  
    }  
    Serial.println(a);  
}
```

Variable scope

```
void setup() {  
    Serial.begin(9600);  
}  
  
void loop() {  
    int a = 0;  
    int b = 2;  
    int sum = add(a, b);  
    Serial.println( sum );  
}  
  
int add(int x, int y){  
    Serial.print(x);  
    Serial.print("+");  
    Serial.print(y);  
  
    return (x + y);  
}
```

```
void setup() {  
    Serial.begin(9600);  
}  
  
void loop() {  
    int a = 0;  
    int b = 2;  
    int sum = add(a, b);  
    Serial.println( sum );  
}  
  
int add(int x, int y){  
    Serial.print(a);  
    Serial.print(x);  
    Serial.print("+");  
    Serial.print(y);  
  
    return (x + y);  
}
```