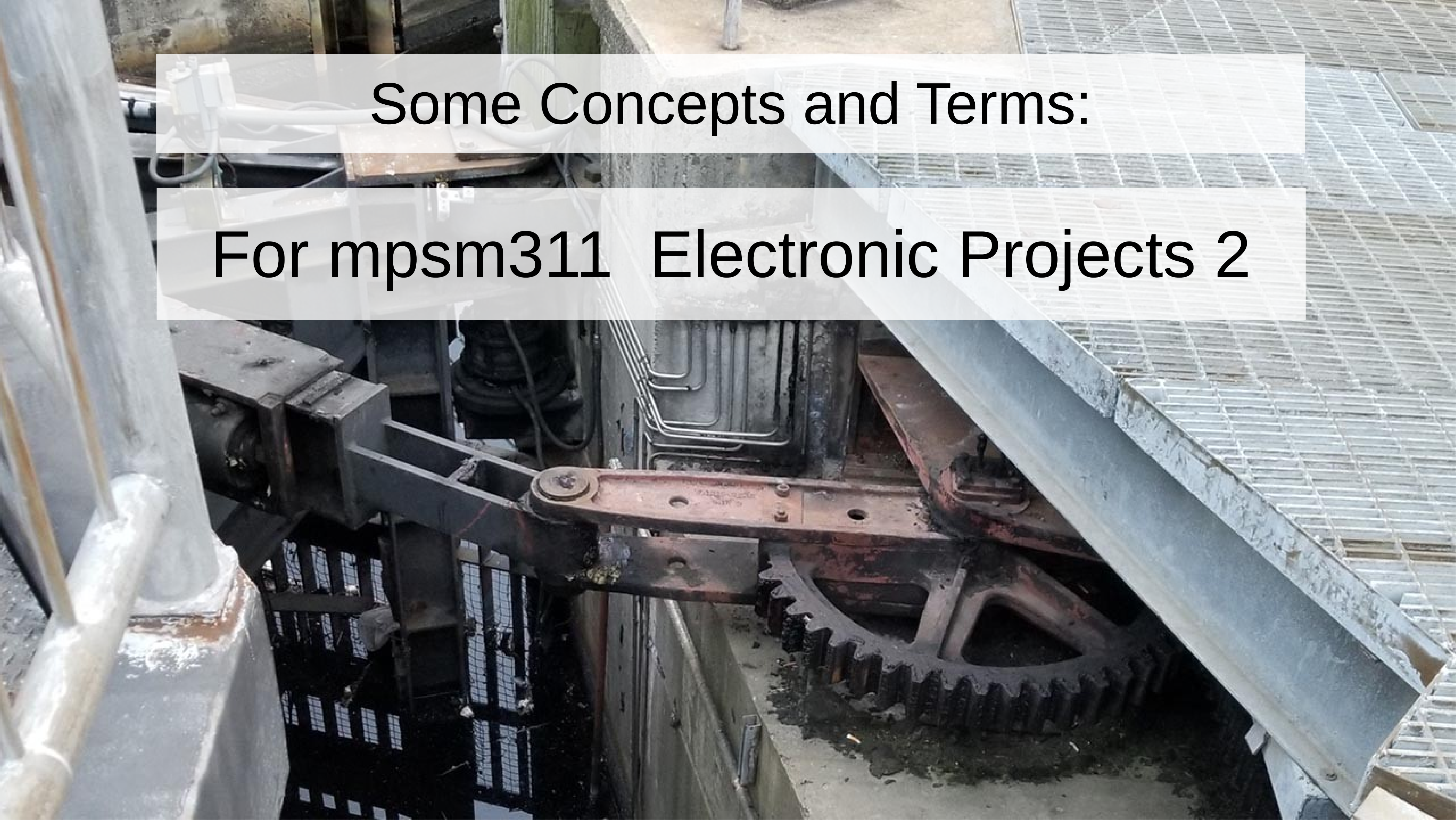
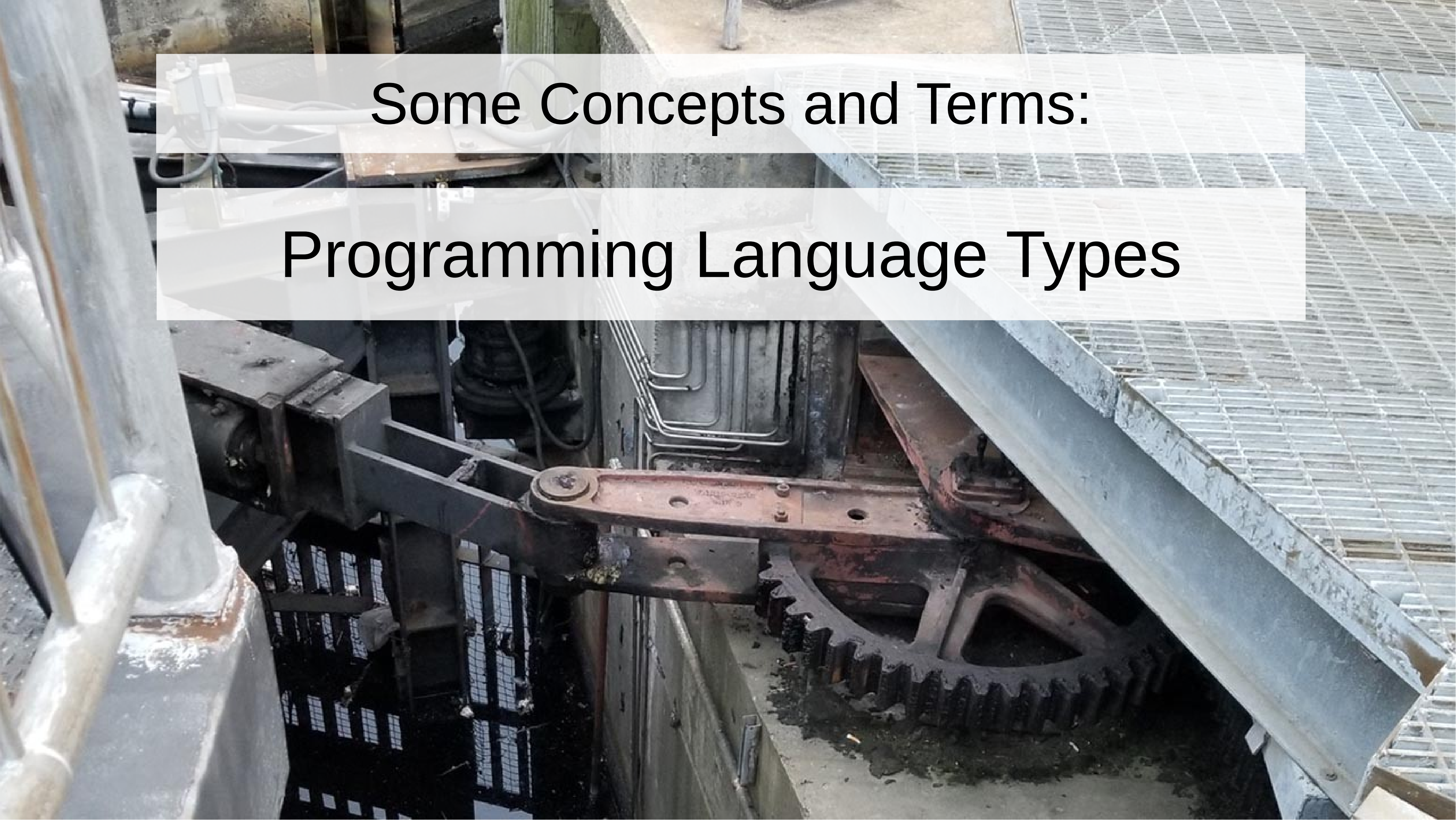


Some Concepts and Terms:

For mpsm311 Electronic Projects 2



Some Concepts and Terms:

Programming Language Types

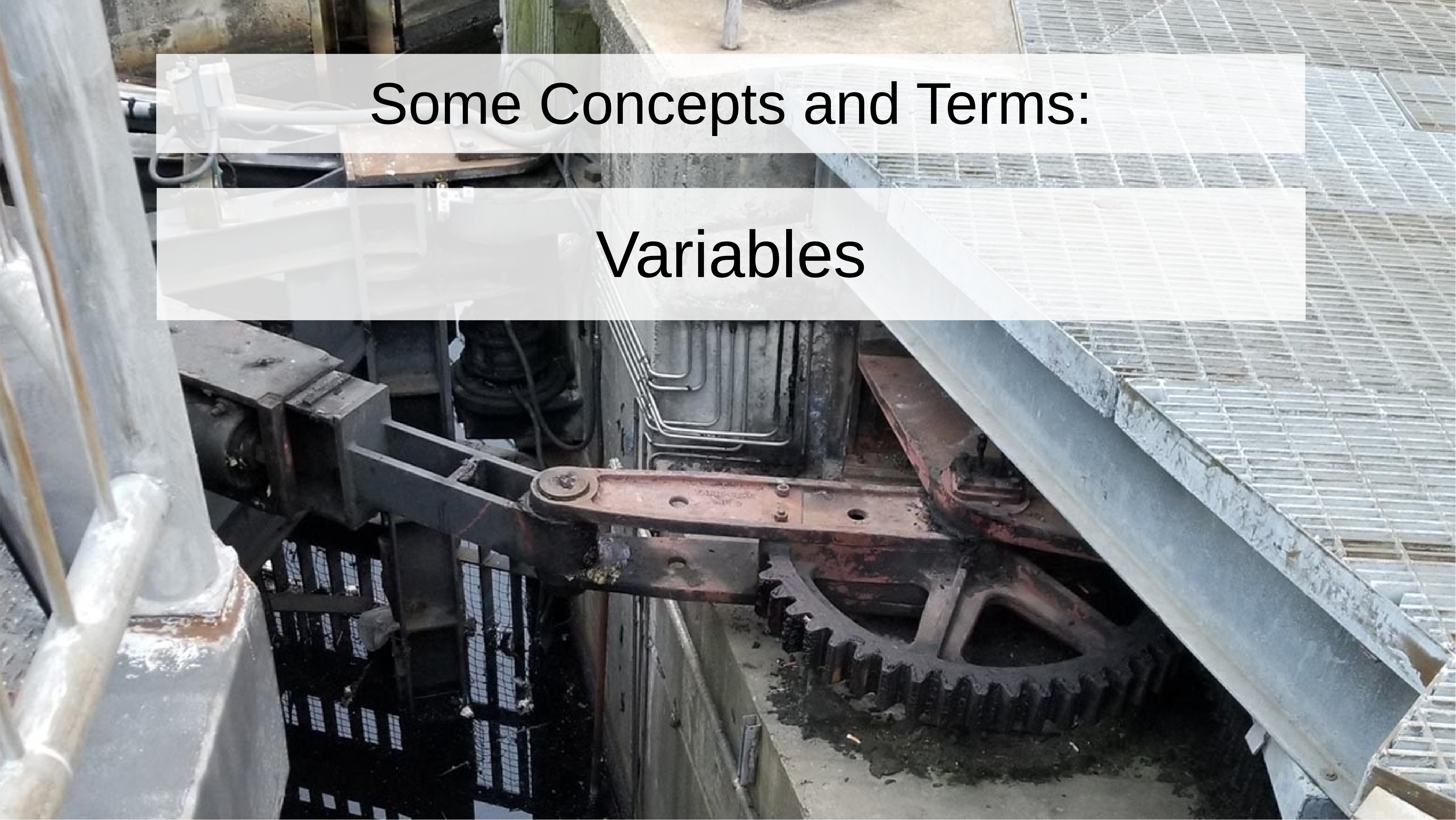
Language Types:

> **Procedural**:
  - *A sequence of command statements are executed*
  Examples: C, Fortran, Basic, [style: Java (Processing), Python]

> **Object-Oriented**:
  - *Software objects are defined which then interact with each other*
  Examples: C++, Java (Processing), Python

> **Functional**:
  - *Works by composing functions, using immutable data and avoiding concepts like variables*
  Examples: Lisp, Haskell

> **Flow Control:**
  - *Graphical widgets are drawn with signal connections*
  Examples: Max, PureData, TouchDesigner



Some Concepts and Terms:

Variables

Variables:

C and Java are what’s called a “strongly typed” languages.

Meaning, *you can’t do this:*

```
x = 7;
```

if you want to declare a variable `x` and give it a value of 7.

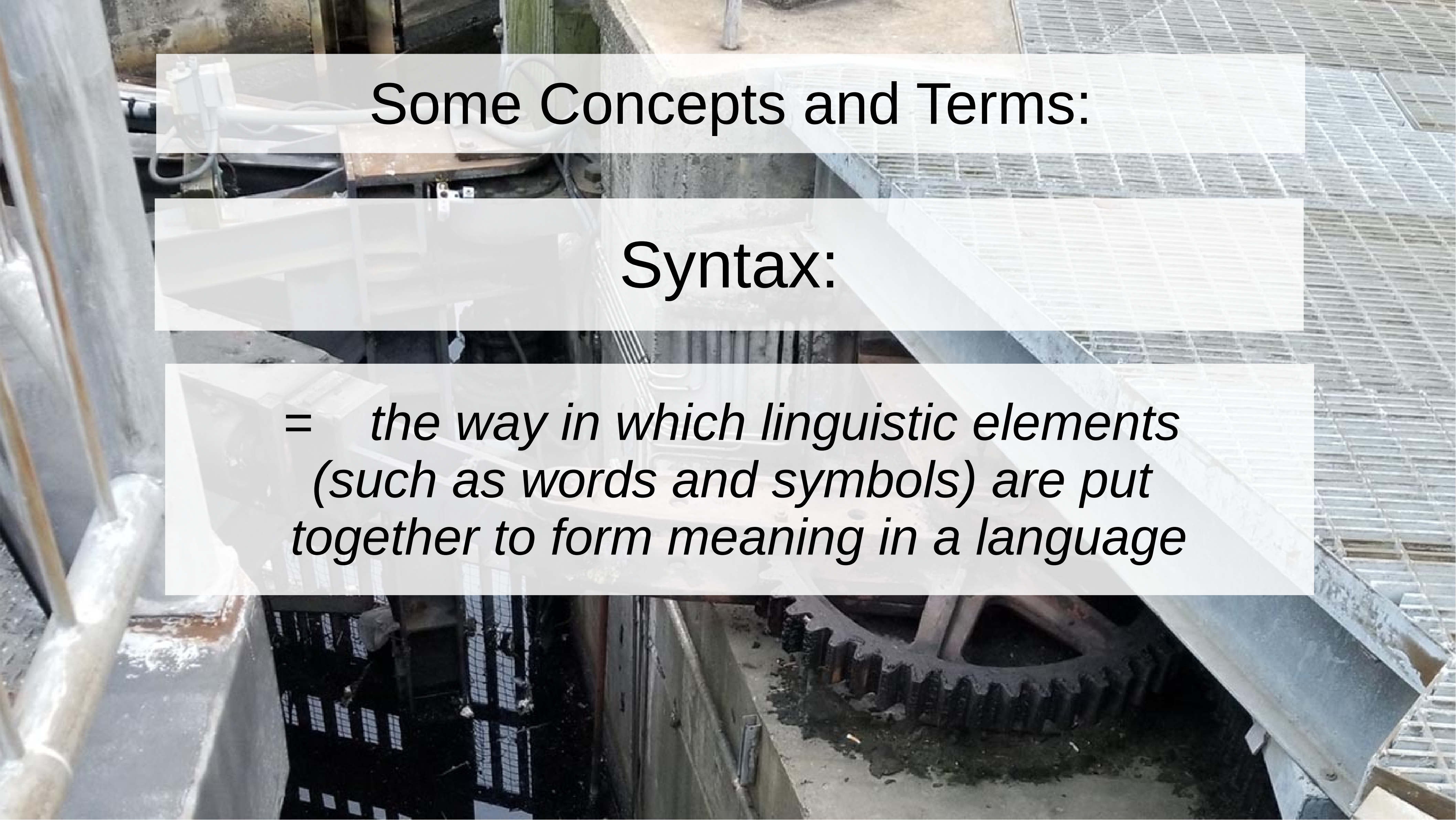
To make a variable, you first have to say *what type of variable it is*, (in this case, an *integer*.)

like this: `int x = 7;`

Variables:

Types of variables:

• - `void`	: represents the absence of a variable.
• - `int`	: integer (whole numbers)
• - `float`	: floating point numbers (e.g. “2.5”, “1.618”, etc.)
• - `boolean`	: a 1 bit number (either a “0” or a “1”)
• - `char`	: a single character/letter
• - `String`	: a sequence of chars (e.g. “Hello”)



Some Concepts and Terms:

Syntax:

= *the way in which linguistic elements (such as words and symbols) are put together to form meaning in a language*

statements:

A *declaration or statement* always ends with a semicolon (“;”) - like a period at the end of a sentence.

Examples:

(declaring a variable)

```
int x = 7;
```

(statement that calls a function)

```
Serial.print(“Hello world!”);
```

expressions:

An *expression* in Java or C involves operators like addition (+), assignment (=) or function calls.

Examples:

```
n = n + 2;
Serial.print(“Hello world!”);
```

logical expressions:

There is a special type of expression that uses operators called relational operators that describe a relationship that is either “true or “false” (or mathematically can only be a “1” or a “0”.)

These are called *logical expressions* or *“boolean expressions”* -or sometimes *“boolean tests”*.

Example:

a > b

boolean operators:

Types of boolean tests:

operator:	**meaning:**
a > b	True (1) if a is greater than b, false (0) otherwise
a < b	True (1) if a is less than b, false (0) otherwise
a >= b	True (1) if a is greater than or equal to b, false (0) otherwise
a <= b	True (1) if a is less than or equal to b, false (0) otherwise
a == b	True (1) if a is exactly equal to b, false (0) otherwise
a != b	True (1) if a is not equal to b, false (0) otherwise

loops:

A “*while loop*” repeatedly executes the statements within the curly braces as long as the statement in parentheses is true:

```
int i = 1;
while( i < 5 ) {
   Serial.print(“The number is: ”);
   Serial.println(i);
   i = i + 1;
}
```

Syntax - loops:

A “*for loop*” is used for counting. It repeatedly executes the statements within the curly braces as long as the statement in the test is true:

example:

”loop for as long as i is less than 5.”

initialize i *test value of i* *change (add 1)*

```
for(int i=0; i < 5;  i++) {
  Serial.print(“The number is: ”);
  Serial.println(i);
 }
```

conditional statements (tests):

A “*conditional statement*” *changes the flow of the execution of the program based on the result of a boolean test condition.*

example:

```
n = n + 1;
if(n > 100){
   message = “it’s too big.”;
}
```

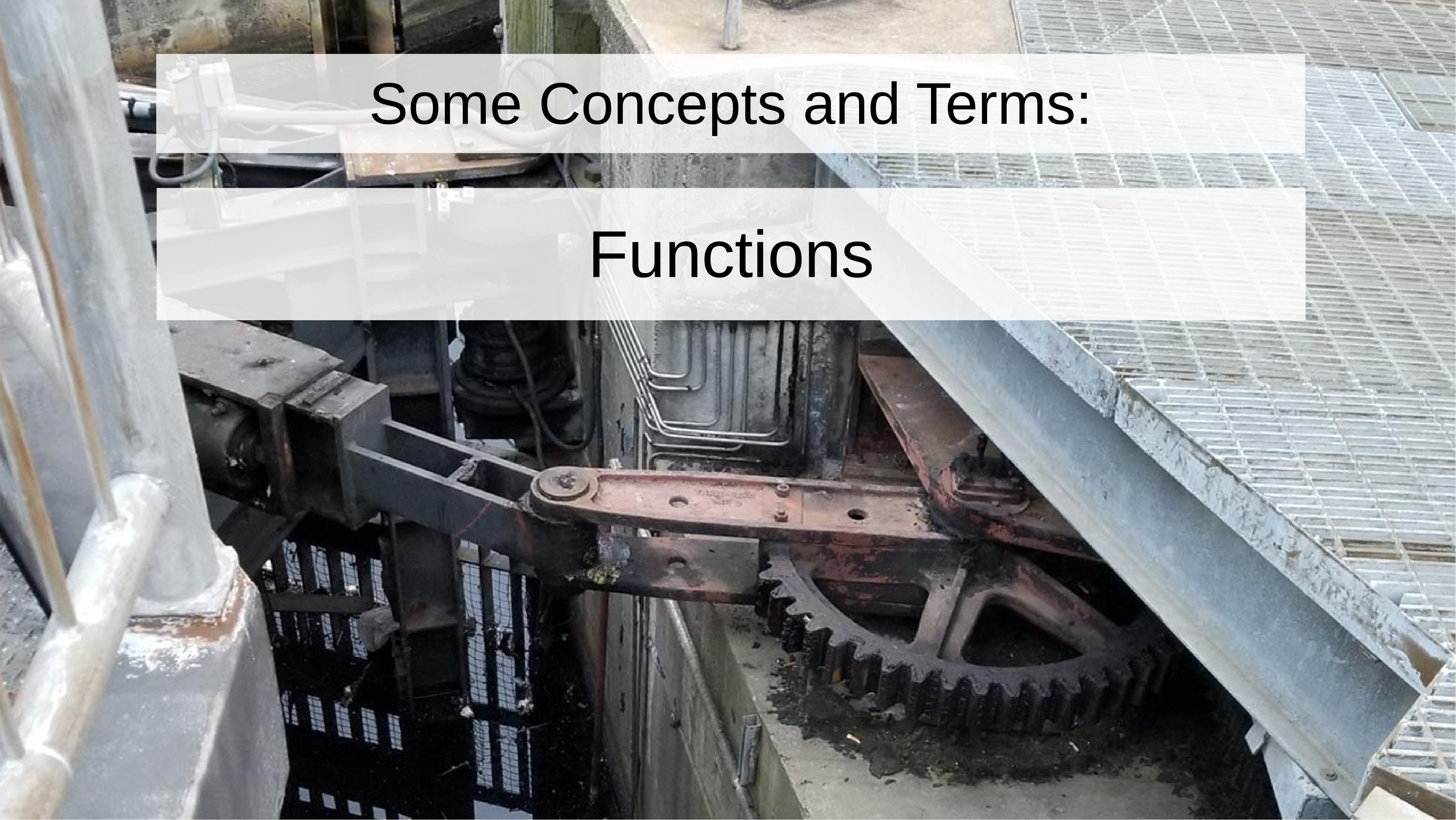
conditional statements (tests):

simple else-if :

```
n = n + 1;
if(n > 100){
   message = “It’s too big.”;
} else {
  message = “It’s ok.”;
 }
```

else.. if.. else :

```
n = n + 1;
if(n > 100){
   message = “It’s too big.”;
} else if(n < 0) {
   message = “It’s too small.”;
 }
```



Some Concepts and Terms:

Functions

functions:

Functions are the building blocks of your programs.

return value   *function name*   *arguments (if none, then empty parentheses.)*

```
    int blinkAdder(int num){
            num = num + 1;
            return num;
}
```

How it would be used: (We say, “calling a function”.)

```
int newNumber = blinkAdder(2);
```

functions:

Another example:

```
void  printButtonState() {
   buttonState = digitalRead(buttonPin);
   if(buttonState == LOW) {
     Serial.print("The button is closed.");
     } else {
     Serial.print("The switch is open.");
     }
 }
```