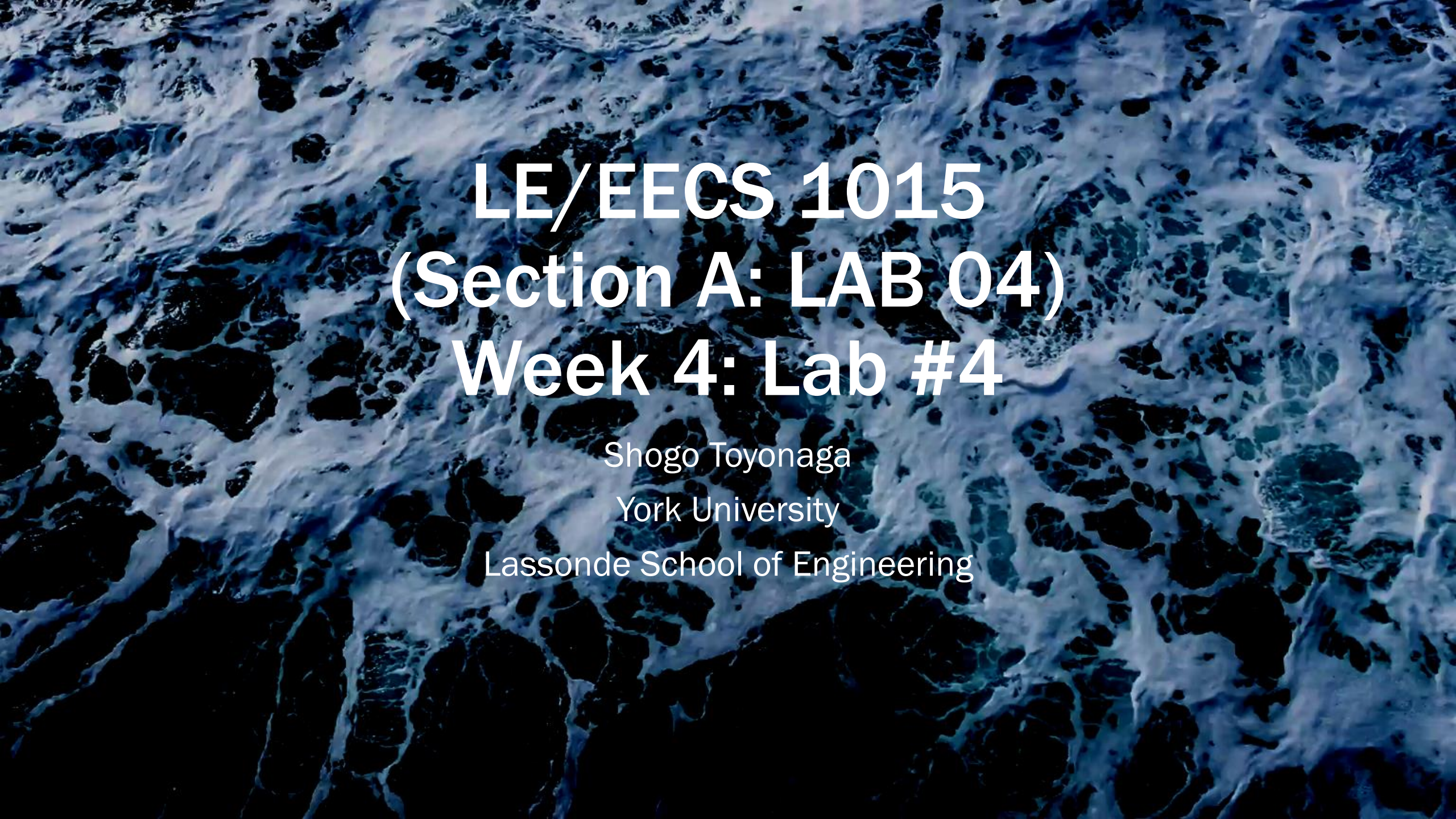

LE/EECS 1015 (Section A: LAB 04) Week 4: Lab #4

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Goals of Lab 4

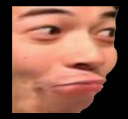
1. Practice writing functions (function design recipe)
2. Learn how to debug functions
3. Learn how to write test cases (doctest)

Concept Review

1. Function Scoping
    - Global Variables
    - Local Variables
2. Function Memory Model
    - Stacks
3. Testing
    - Doc Tests
    - Unit Tests

Function Scoping

- Global Variables are accessible everywhere
- Local Variables are only accessible within a certain instance and disappear after their container is terminated.
- In general, you are encouraged to avoid using global variables as they can make troubleshooting unnecessarily difficult.

PAUSECHAMP 

While global variables may have a somewhat negative connotation and should be avoided in trivial cases, an argument can be made for their use:

1. Global variables are required in threaded programs to communicate with each other.
2. Shared memory for memory-parallel programming (multi-processor systems) requires the use of global variables.

Source: http://heather.cs.ucdavis.edu/matloff/public_html/globals.html

Good Styles for Global Variables

1. If you need to access a global variable in a function, pass it as an argument instead (unless it is a constant).
2. Rather than declaring a global variable in a function, return the value and assign it to a variable in __main__.
3. If you need to modify the value of global variables, let the caller assign the value in __main__.

search_list

```python
def search_list(input: list, target: int) -> int:
    """Given a list, return the index of target. If target is not in the list, return -1."""
    for item in input:
        if item == target:
            return item
    return -1

test_case_1 = [1, 2, 3, 4, 5]
target = 25

print(search_list(test_case_1, target))
```

Function Memory Model

Search in Files | Search | Stack Data

search_list(): sample-program.py, line 4 | Options

Variable	Value
locals	<locals dict; len=3>
input	[1, 2, 3, 4, 5]
item	2
target	25
globals	<globals dict; len=10>
__doc__	None
__file__	'C:\Users\Shogo\Documents\GitHub\Teaching Assistant\Sandbox

Debug I/O | Exceptions | Python Shell | Messages | OS Commands

Debug I/O (stdin, stdout, stderr) appears below | Options

Putting it all together

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Challenge

Write a Python function $get\_time\_format(\dots)$ such that it takes in the number of seconds as an argument.

Given the number of seconds, return a string output in the 24-hour digital clock representation; $hh{:}\,mm{:}\,ss$.

Ensure the zero padding constraint.

Challenge

```
def get_time_format(seconds):
    pass
```

Challenge

```
def get_time_format(seconds: int) -> str:
    pass
```

Challenge

```python
def get_time_format(seconds: int) -> str:
    clock_seconds = seconds % 60
    clock_minutes = (seconds // 60) % 60
    clock_hours = ((seconds // 60) // 60) % 24
    return f'{clock_hours:02}:{clock_minutes:02}:{clock_seconds:02}'
```

Challenge

```
import doctest
def get_time_format(seconds: int) -> str:
    Convert a number of seconds into a string formatted as hh:mm:ss.
    >>> get_time_format(0)
    '00:00:00'
    >>> get_time_format(59)
    '00:00:59'
    >>> get_time_format(60)
    '00:01:00'
    >>> get_time_format(90061)
    '01:01:01'
    """
    clock_seconds = seconds % 60
    clock_minutes = (seconds // 60) % 60
    clock_hours = ((seconds // 60) // 60) % 24
    return f'{clock_hours:02}:{clock_minutes:02}:{clock_seconds:02}'

doctest.testmod()
```

Lab 4 – Objectives

1. Task 1: Follow the Steps (/30)
2. Task 2: Debugging (/30)
3. Task 3: Implementation: Wheels (/10)
4. Task 4: Implementation: Tickets (/10)
5. Task 5: Implementation: XOR (/10)
6. Task 6: Implementation: Expressions (/10)

Thank You!

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