Real-Time Mesh Utilities

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MNE-CPP

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Outline

- Assignment / Task

- Features

- Status

- Outlook

- Software Demonstration

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Assignment/Task

Goal: Utilities for real-time capable interpolation and visualization of MEG/EEG sensor data

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Standard Visualization

3D Visualization

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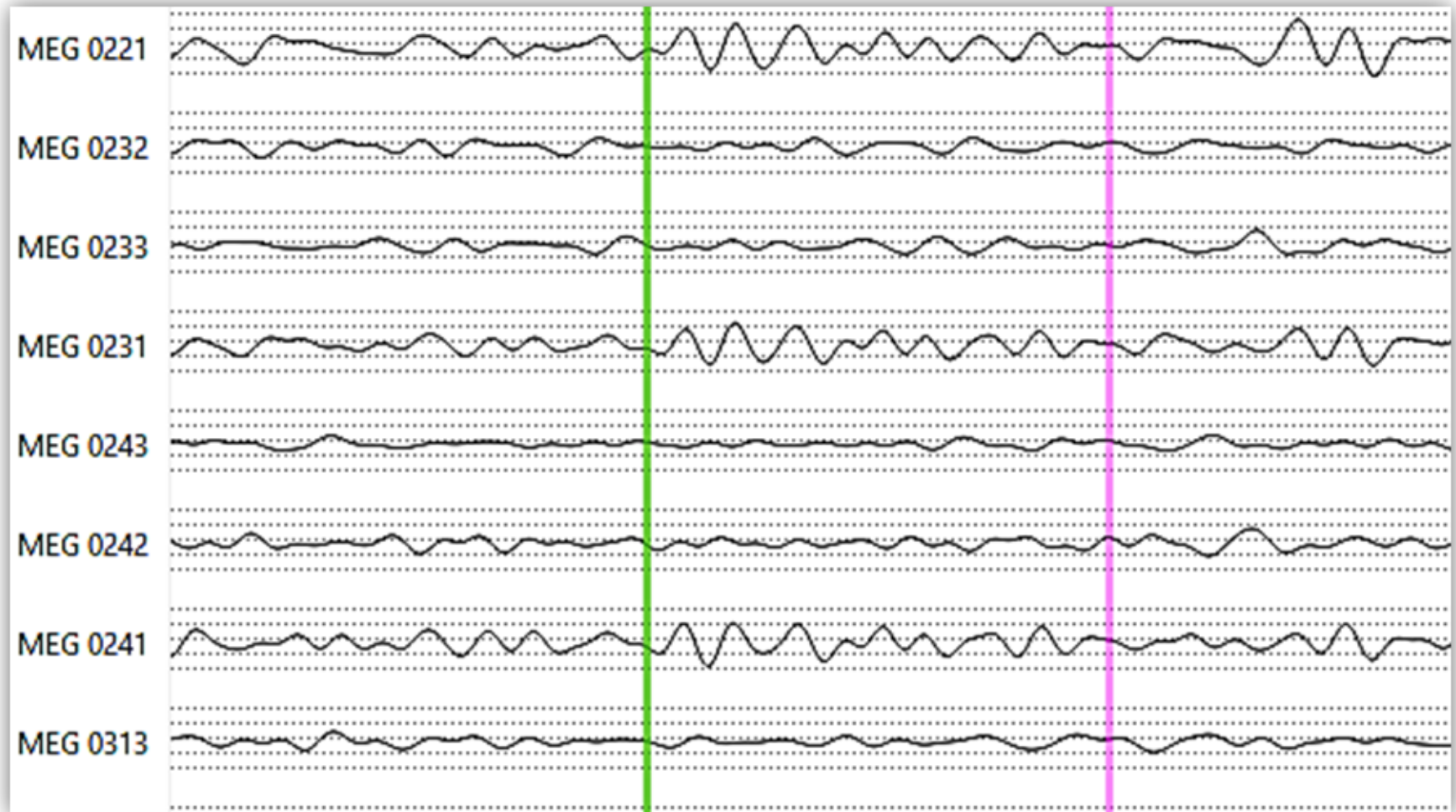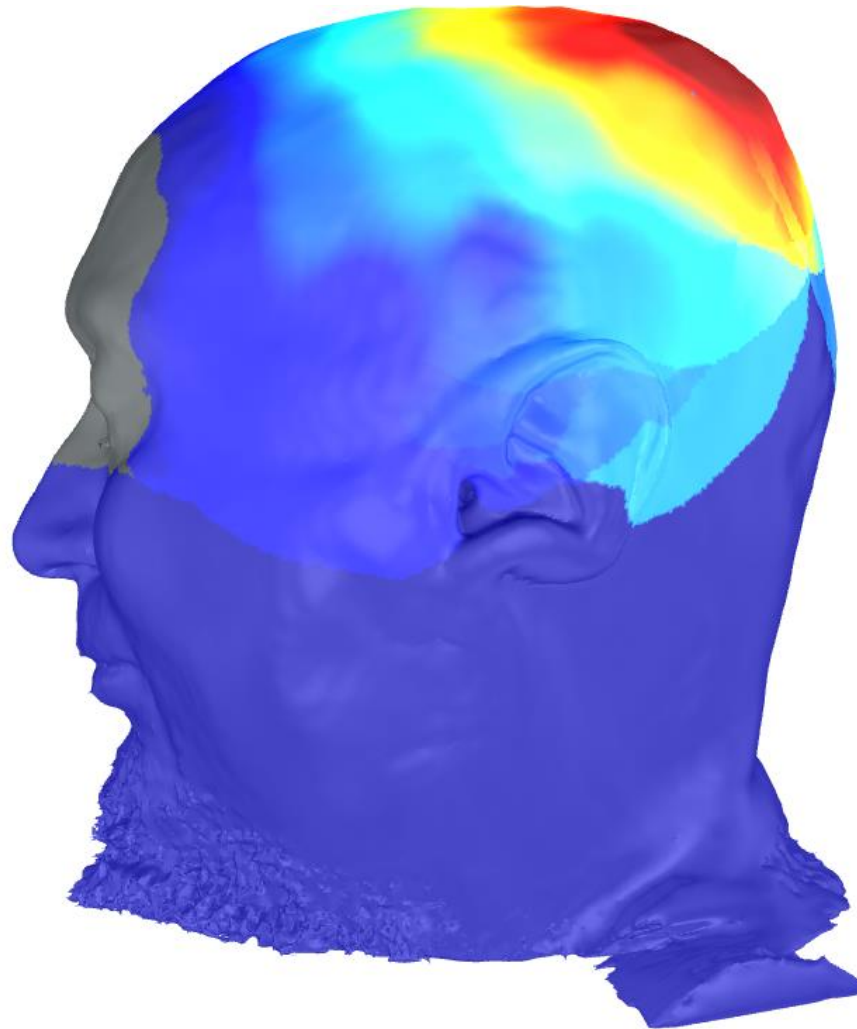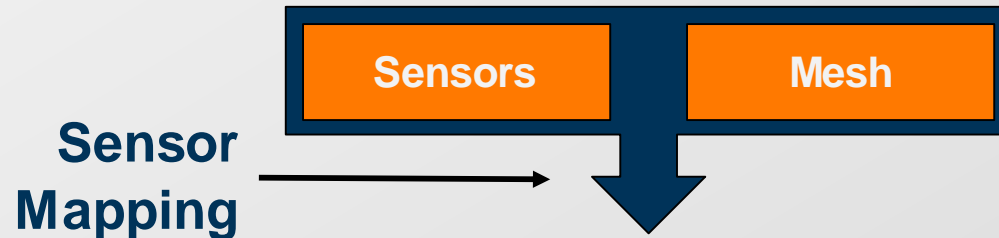
Input/Output

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Input:
- vertices (x, y, z)
- Neighbour-relationships
- Sensor points (x, y, z)
- Sensordata (1000hz)

Features

Output:
- Matrix containing (interpolated) intensities for every vertex

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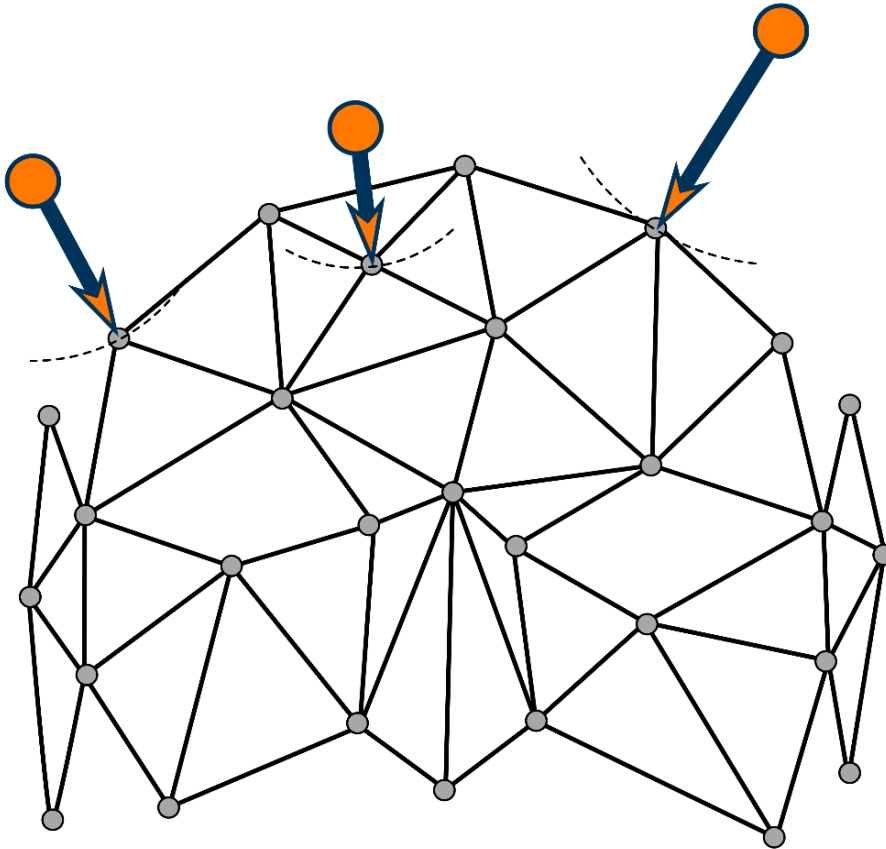The **SPIRIT** of science

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Features

Sensor Mapping
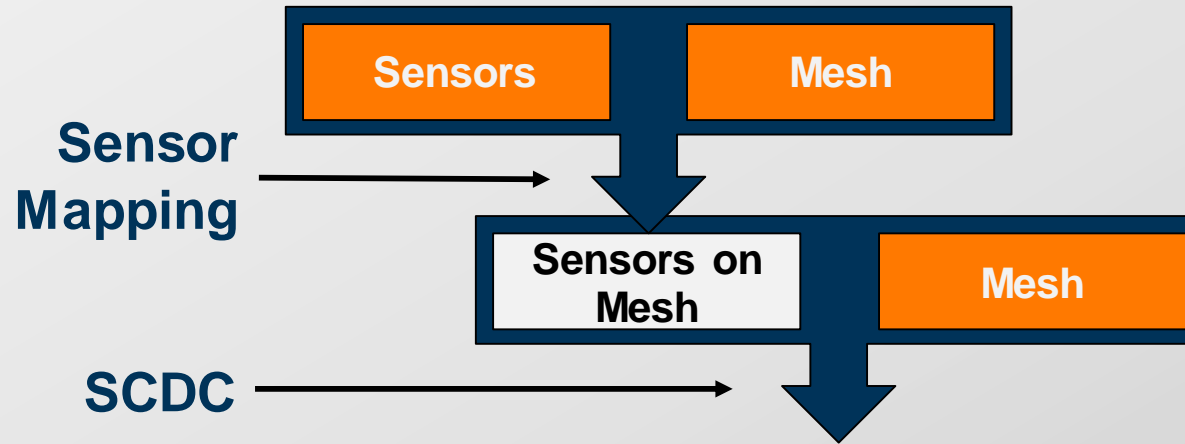## Feature 1

- Sensorpoints are not part of the mesh
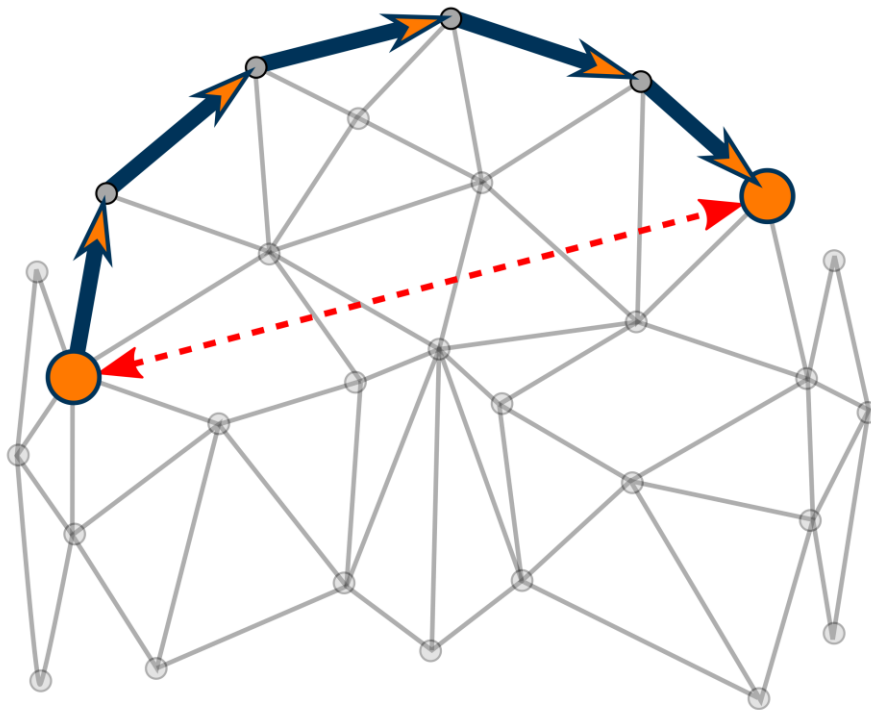- relative position on surface unknown

► **Multithreaded linear search**

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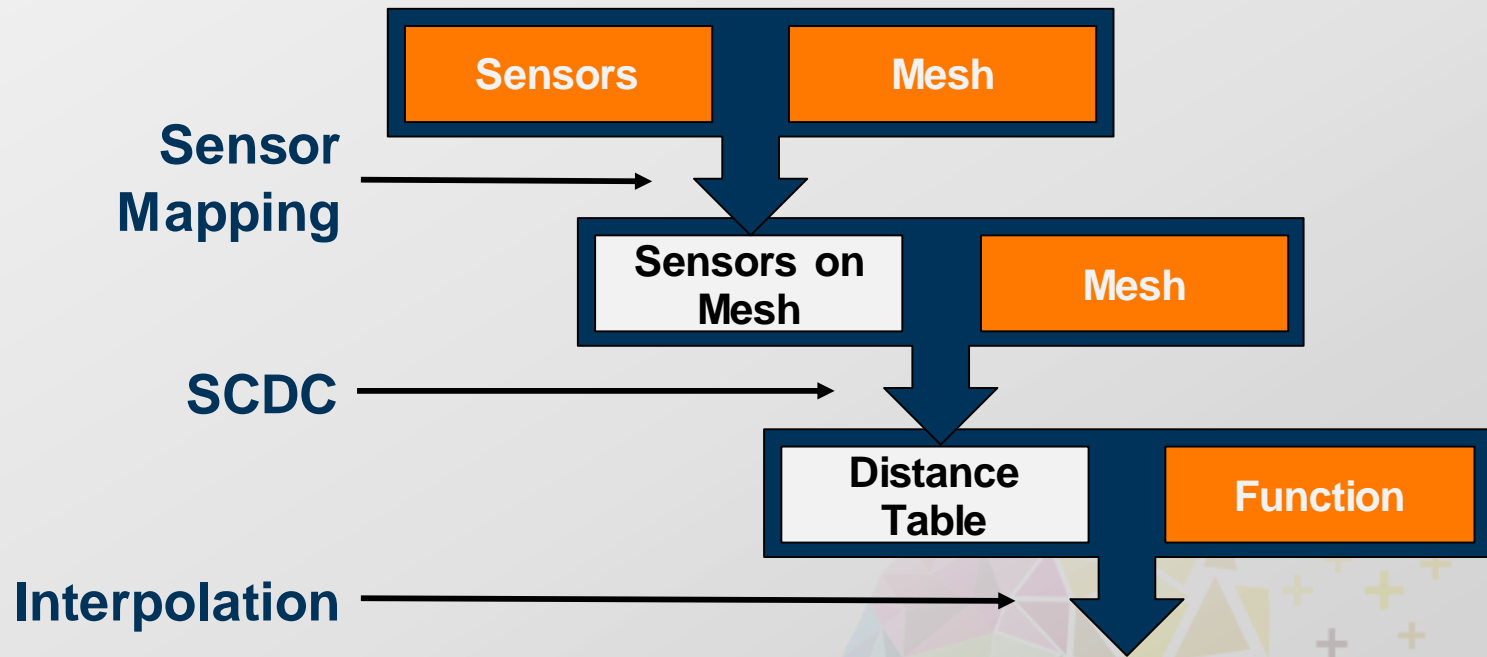# Features

SCDC
Feature 2
(Surface-Constrained Distance Calculation)

- Folded/Curved surface
- Distance between 2 vertices?
- Euclidian distance is inaccurate
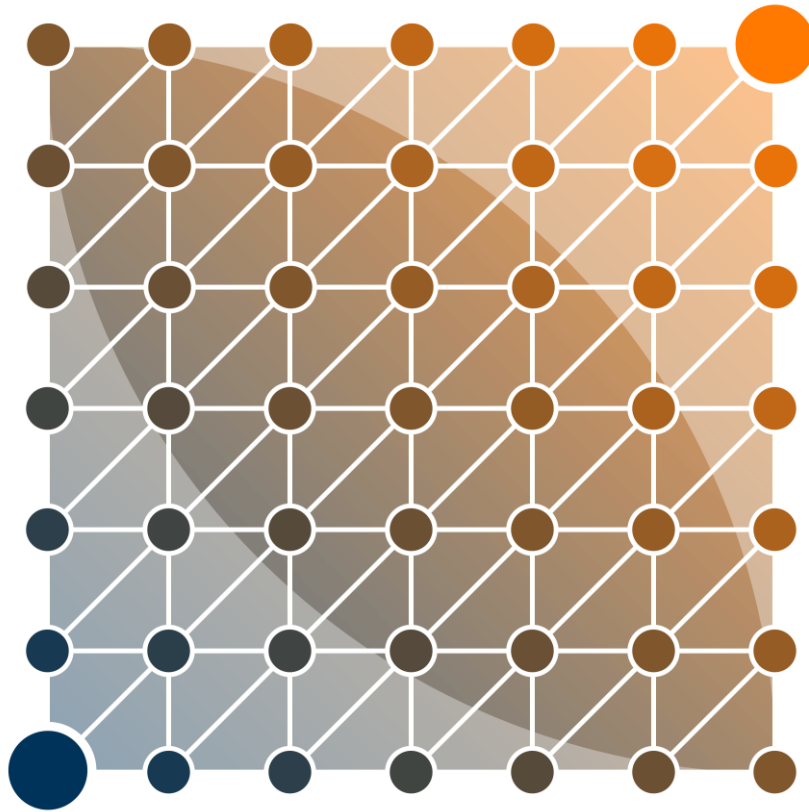
► **Multithreaded iterative Dijkstra**

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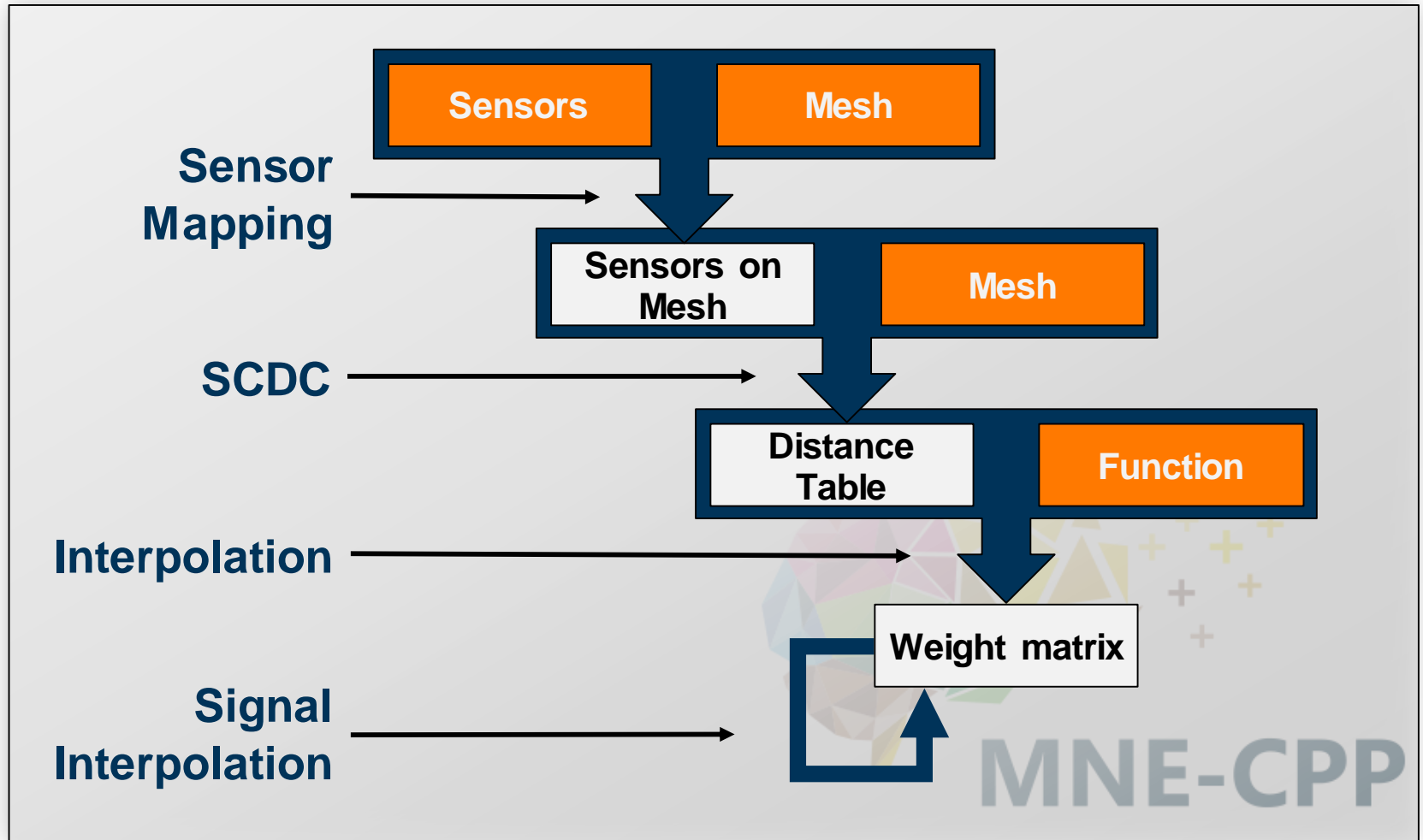# Features

Interpolation
Feature 3

- Activity at certain points given (y_{sub})
- Activity at all points wanted (y_{full})

► **Weight matrix (W)**

► **Multiplication calculates**
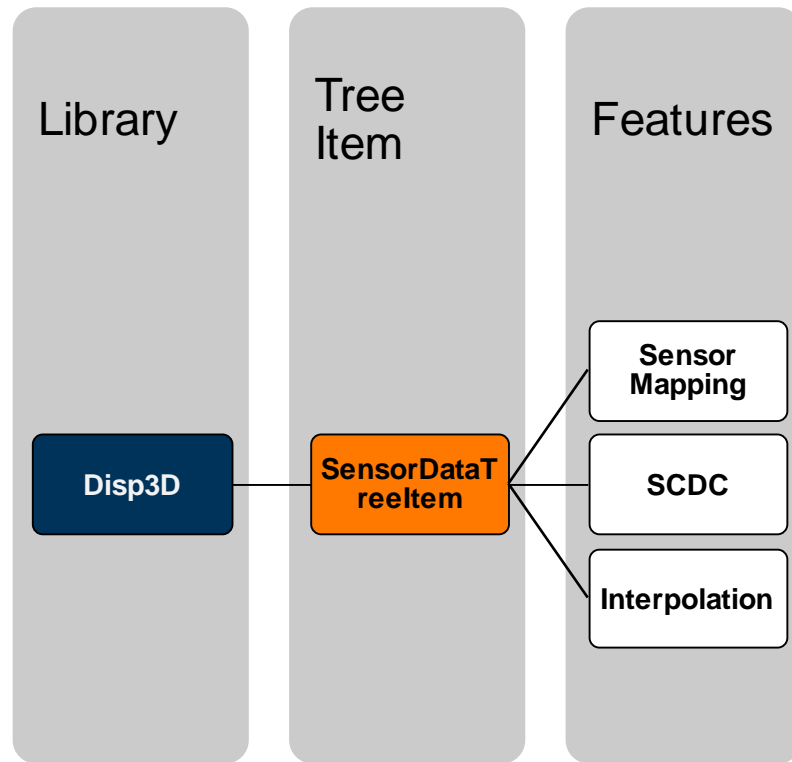
the wanted values

$(y_{full} = W * y_{sub})$

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Features

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SensorDataTreeItem
Feature 4

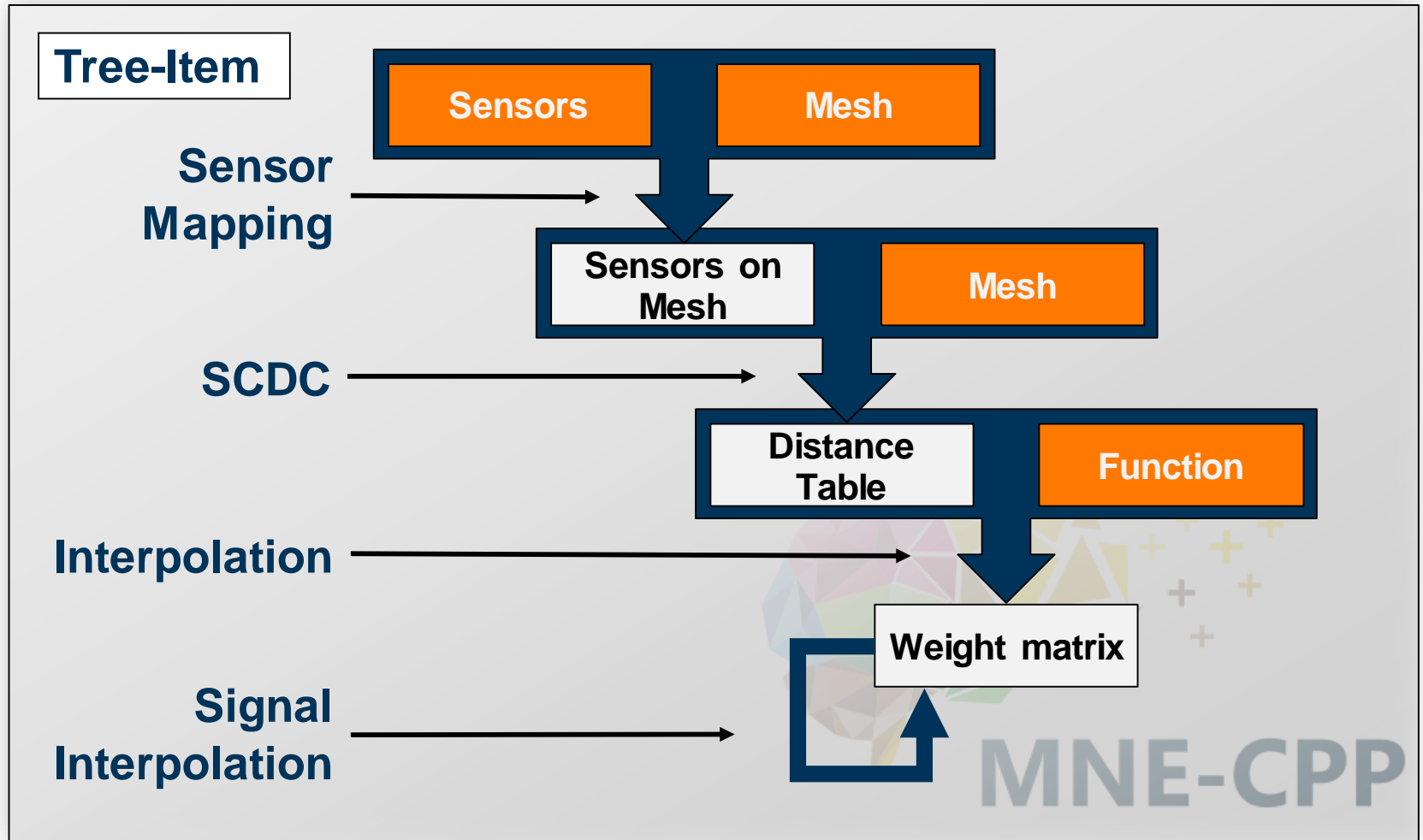| Library	Tree Item	Features
Disp3D	**SensorDataTreeItem**	**Sensor Mapping**
		SCDC
		Interpolation

- The disp3D library has a tree structure
- Features have to be integrated as a part of this tree
- The SensorDataTreeItem manages the features
- MetaTreeItems define the parameters of the algorithms

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Features

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Status

- ✓ Features 1, 2, 3 and 4 implemented and operational 🙂

- ✓ Computation fast

- ✓ Integrated into existing project

- ✓ Documented for further usage and development

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Review

- All functional requirements fulfilled

- Full SCDC needs more resources than estimated

- Internal communication good

- Detailed communication regarding the architecture with product owners sometimes complicated

- Issue-tracking ineffective (not updated correctly, not logged correctly)

- Feature 4 was far more complicated than estimated

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Outlook

- MNE-CPP is an Open-Source project

- Therefore everyone can contribute

- Further development ongoing

- The generic features (SCDC, projecting, interpolation) will be used in other functionalities

- The code is documented as required by the project, it fits in seamlessly