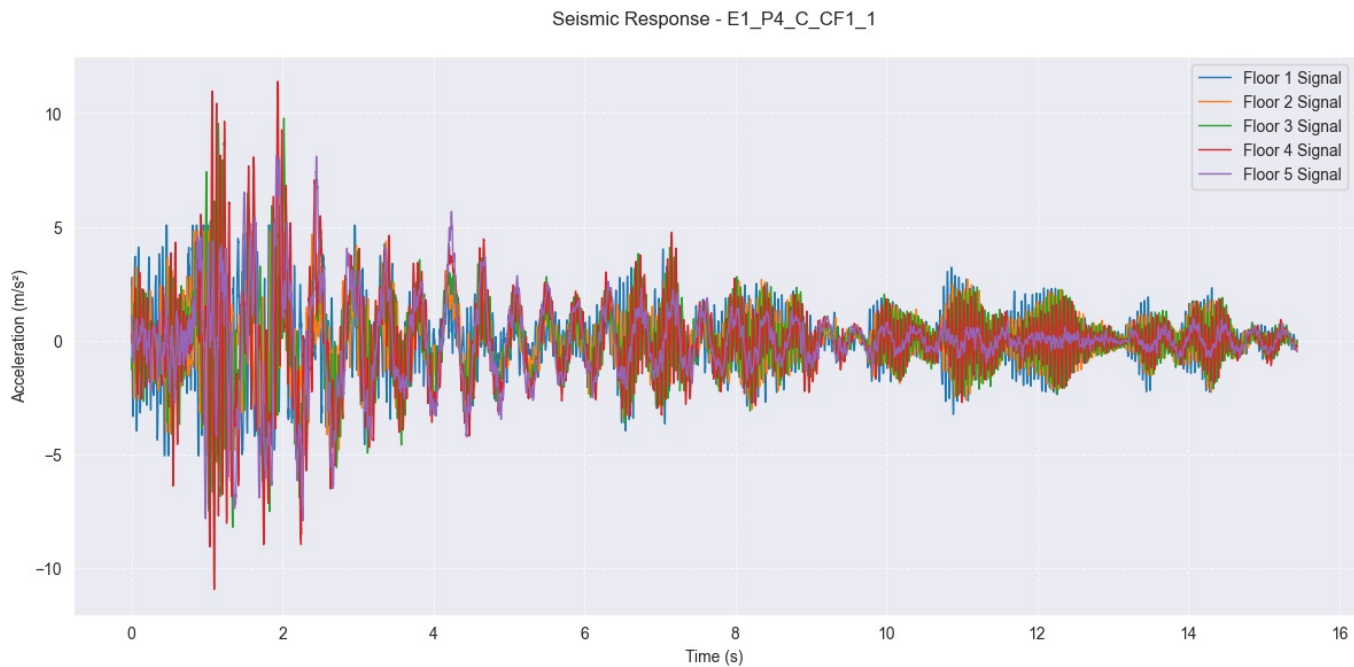


```
In [6]: import sys
import os
import warnings
warnings.filterwarnings("ignore")
sys.path.append(os.path.abspath('Sources'))
import about_ml_models as mlm
```

```
In [21]: #falla =True -> para obtener datos con fallas estructurales
#falla =False -> para obtener datos sin fallas estructurales
#falla =None -> selección aleatoria de los datos

data_IM, X_new_scaled=mlm.get_seismic_signals(falla=True)
```



=====

SEISMIC SIGNAL REPORT

=====

GENERAL INFORMATION:

Signal ID: E1_P4_C_CF1_1
Structure E1: 4 columns, 5 levels
Earthquake C: Imperial Valley, 10/15/1979, El Centro
Damage Status: Damaged
Damage Location: Floor 4
Damage Severity: Level 0

INTENSITY MEASURES BY FLOOR:

IM	Description	Floor 1	Floor 2	Floor 3	Floor 4	Floor 5
PGA	Peak Ground Acceleration	4.1316	4.4527	6.9413	8.3311	7.393
PGV	Peak Ground Velocity	0.385	0.3695	0.3698	0.4277	0.5372
IA	Arias Intensity	1.8329	2.3172	3.6042	5.4458	6.6292
CAV	Cumulative Absolute Velocity	8.6883	10.1088	12.4022	14.8646	16.2196
RMS	Root Mean Square Acceleration	0.8736	0.9823	1.225	1.5058	1.6614
DS	Significant Duration	10.062	8.684	7.218	6.575	6.04
FP	Predominant Frequency	19.5312	3.9062	3.9062	3.9062	3.9062
IH	Housner Intensity	2.7828	1.9104	1.018	1.0675	1.3206
ET	Time Energy	11.4466	14.4718	22.5089	34.0104	41.4009
EWT	Wavelet Energy Total	12614.1	20542	23387	34163.2	41647

```
In [22]: # Load models
models_det = mlm.load_models()
```

```
# Make predictions
results, consensus = mlm.predict_damage(X_new_scaled, models_det)
```

=====
STRUCTURAL DAMAGE PREDICTION REPORT
=====

Random Forest [1] 92.00%
XGBoost [1] 96.85%
1/1 0s 121ms/step
Neural Network [1] 99.24%
MODEL PREDICTIONS:

Table with 3 columns: Model, Prediction, Damage Probability. Rows: Random Forest (Damaged, 92.00%), XGBoost (Damaged, 96.85%), Neural Network (Damaged, 99.24%).

CONSENSUS ANALYSIS:
Model Agreement: 100%
Final Assessment: HIGH PROBABILITY OF DAMAGE

```
In [23]: # damage location prediction
if consensus>0.5:
    mlm.ubicar_falla(data_IM)
```

=====
STRUCTURAL DAMAGE LOCATION PREDICTION REPORT
=====

1/1 1s 648ms/step
[[6.1232822e-07 1.4444623e-04 1.2143581e-03 9.9964398e-01]]
3
MODEL PREDICTIONS:

Table with 3 columns: Model, Predicted Location, Confidence. Rows: Random Forest (Floor 4, 99.00%), XGBoost (Floor 4, 99.13%), Neural Network (Floor 4, 99.96%).

DETAILED PROBABILITY ANALYSIS:
Table with 6 columns: Model, Floor 1, Floor 2, Floor 3, Floor 4. Rows: Random Forest, XGBoost, Neural Network.

CONSENSUS ANALYSIS:
Model Agreement: 100%
Final Assessment: HIGH CONFIDENCE: Floor 4
Prediction Distribution:
Floor 1: 0/3 models
Floor 2: 0/3 models
Floor 3: 0/3 models
Floor 4: 3/3 models

```
In [ ]:
```