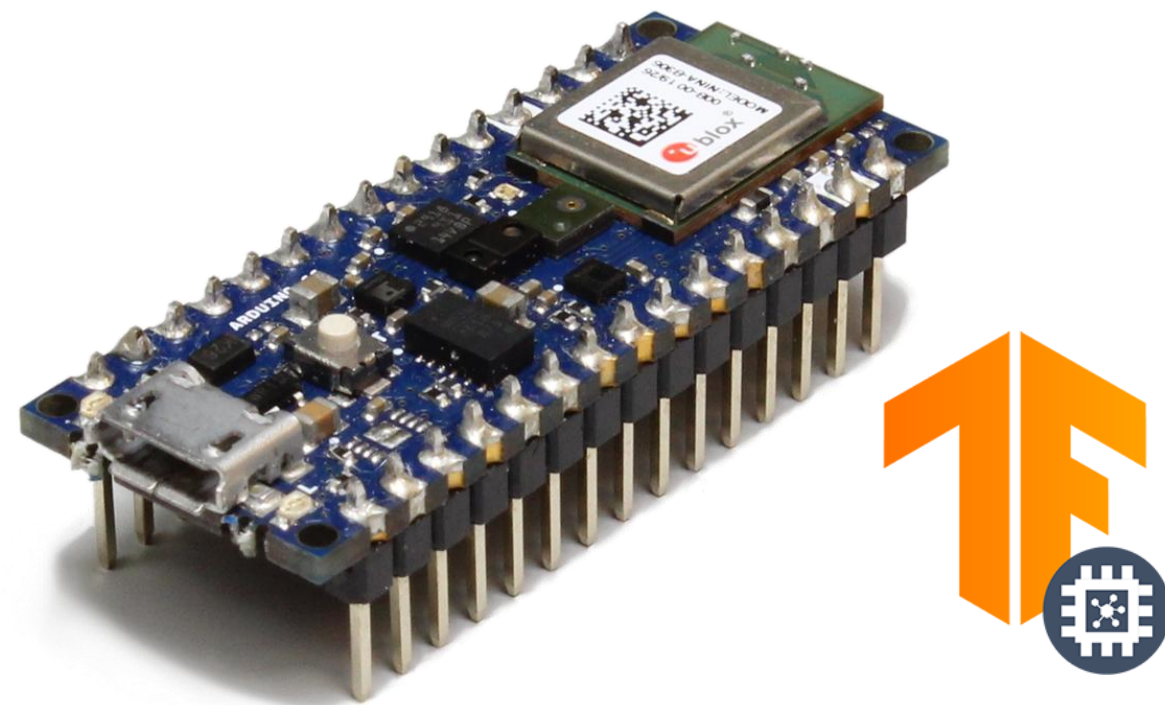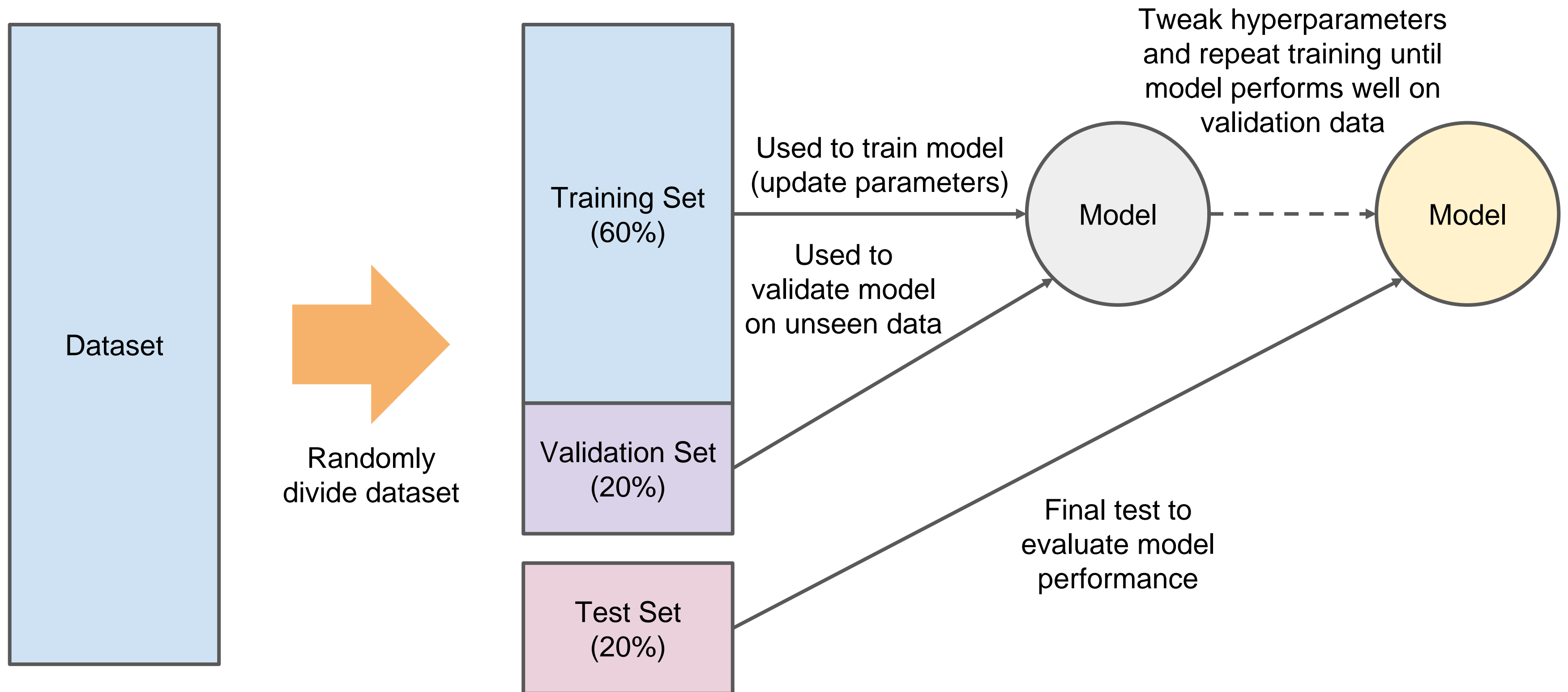**Single Board Computer**
- More powerful (faster processor, more memory)
- Runs full, general purpose operating system (OS)
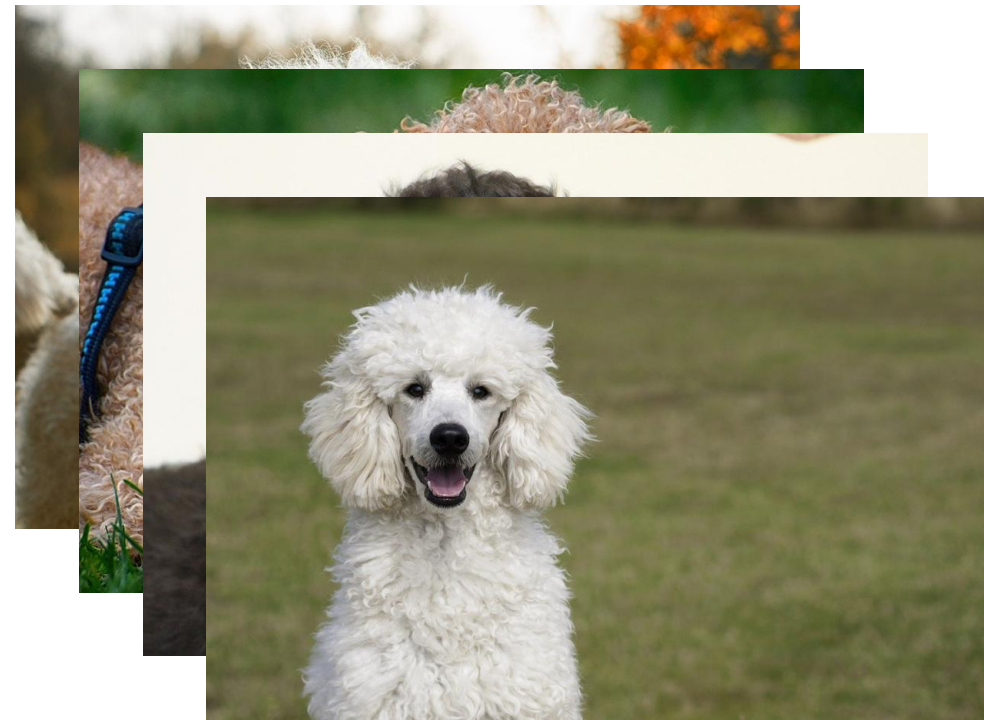- Can provide full command line or graphical user interface
- Requires more power

Microcontroller
- Less powerful
- Bare-metal (superloop) or real-time operating system (RTOS)
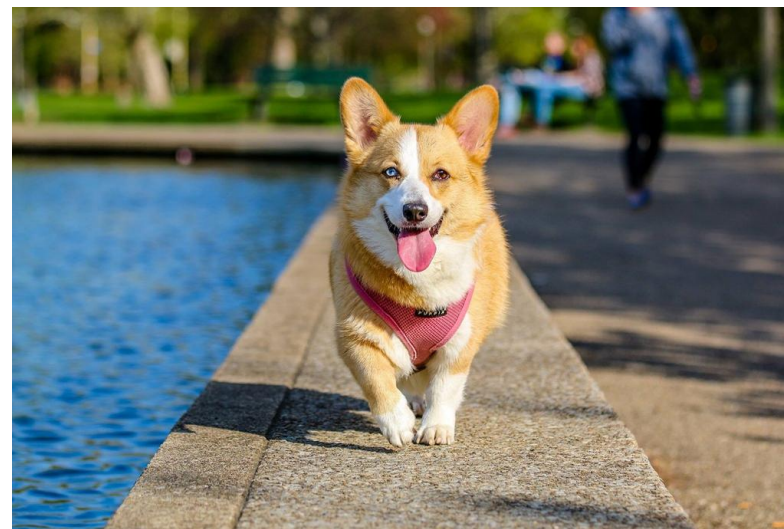- Limited or no user interface
- Requires less power

Holdout Method

Dataset

Randomly divide dataset

Training Set (60%)

Validation Set (20%)

Test Set (20%)

Used to train model (update parameters)

Used to validate model on unseen data

Tweak hyperparameters and repeat training until model performs well on validation data

Model

Model

Final test to evaluate model performance

Think about your data!

Train

Test

Model

Dog?

Training Data

Test Data

Feature Example

2 second window

accX accY accZ

Acceleration (m/s²)

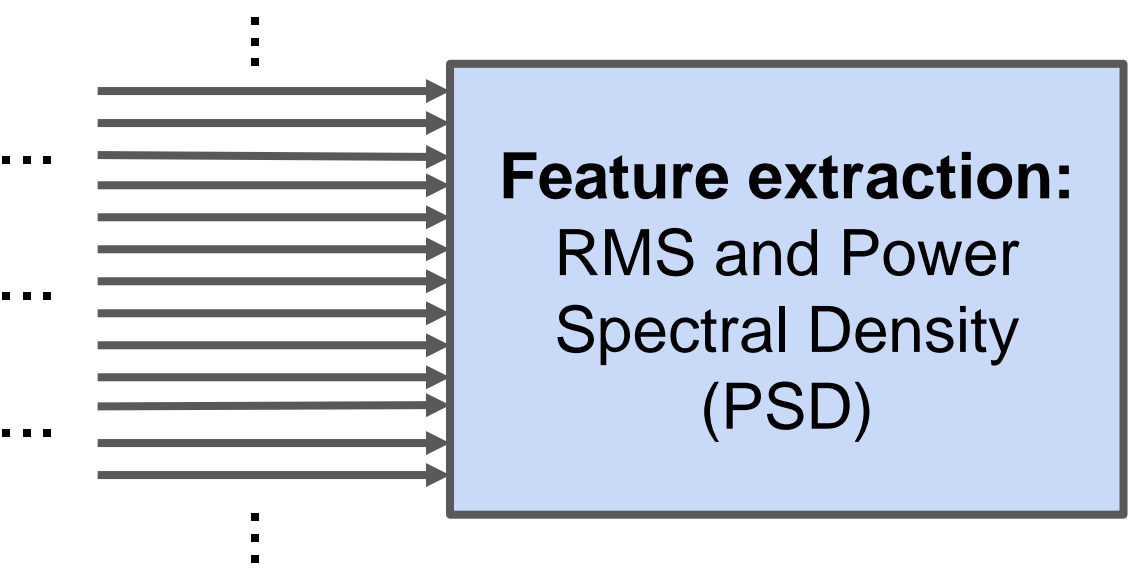| x	-6.8	-5.6	-4.6	-4.1	-3.8	...
y	-0.1	0.2	0.7	0.9	0.7	...
z	10.4	10.3	10.2	10.1	9.6	...

375 raw values

Feature extraction:
RMS and Power Spectral Density (PSD)
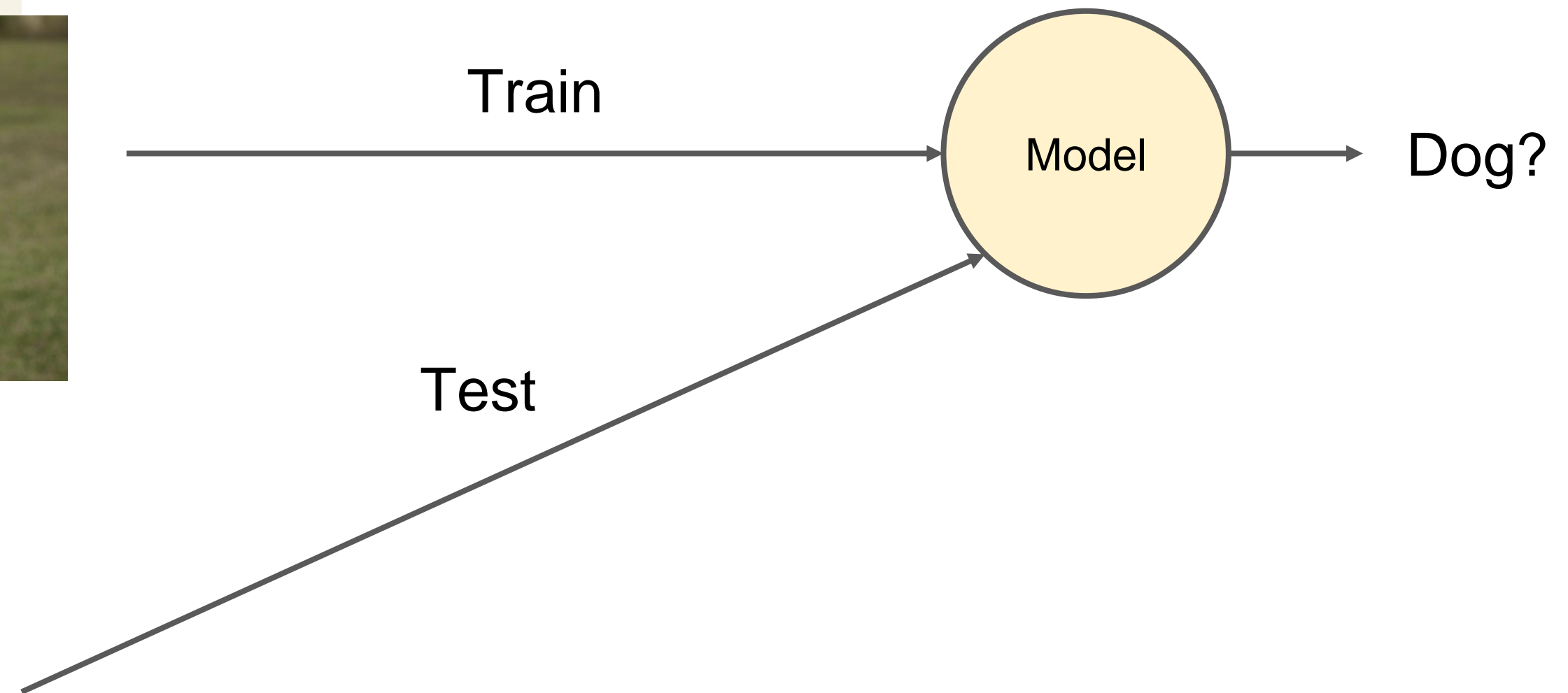
33x features

11 features per axis: RMS, 3x peak amplitudes from PSD, 3x peak frequencies from PSD, 4x spectral bins

Model

Left-right
Up-down
Circle
Idle

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Collect data → Preprocessing → Feature extraction → Model → Class 1, Class 2, Class 3, Class 4
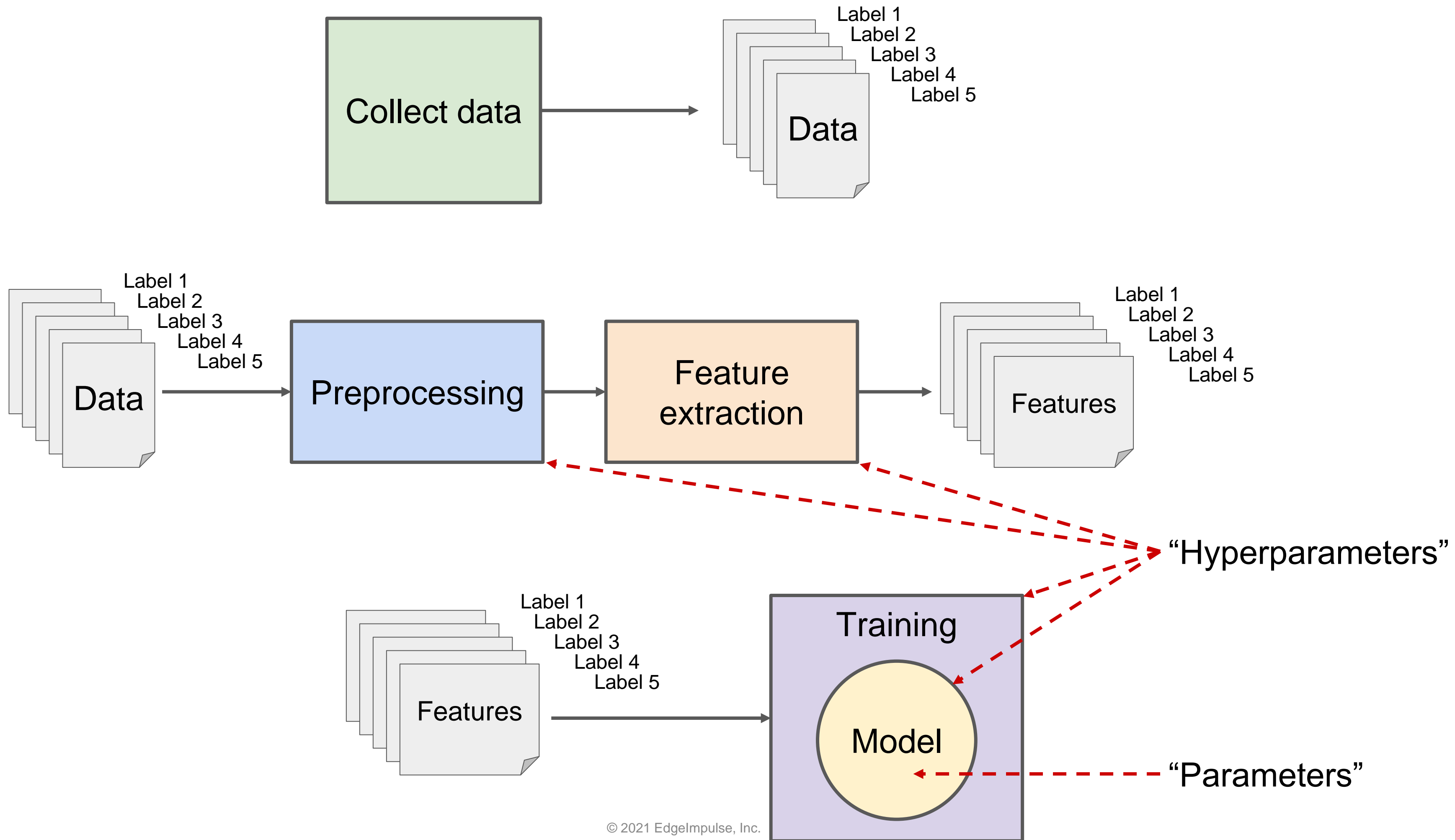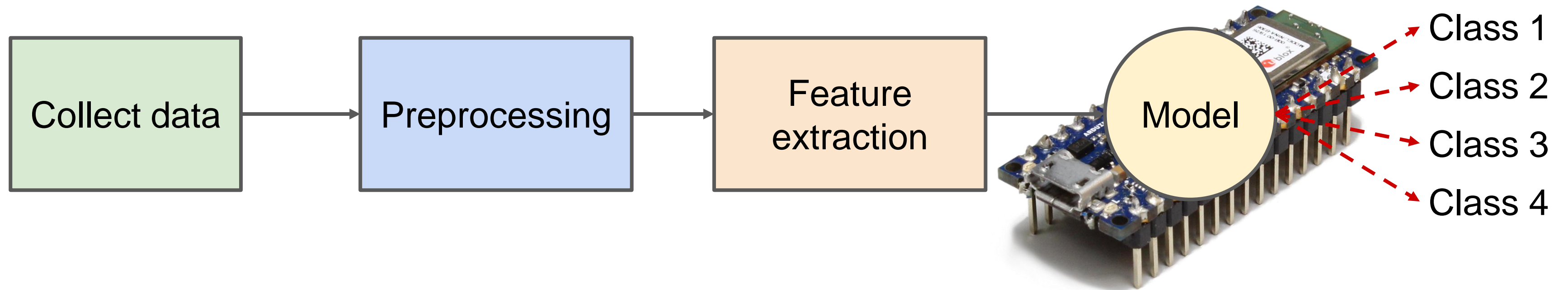
Inference: using the machine learning model to make predictions on unseen data in the wild