# Advancements in Visual Perception: Event Camera, Micro Expressions, and SNN

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**Problematic : How to record real micro expression ?**



Facial movements : smile, blink eyes, frown, contract jaw, nose winkle, open mouth and upper lid raiser.
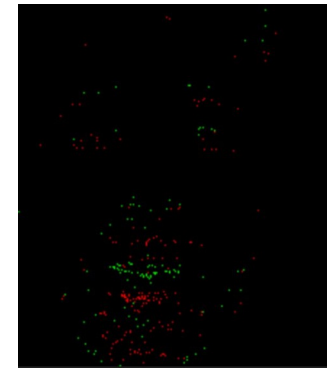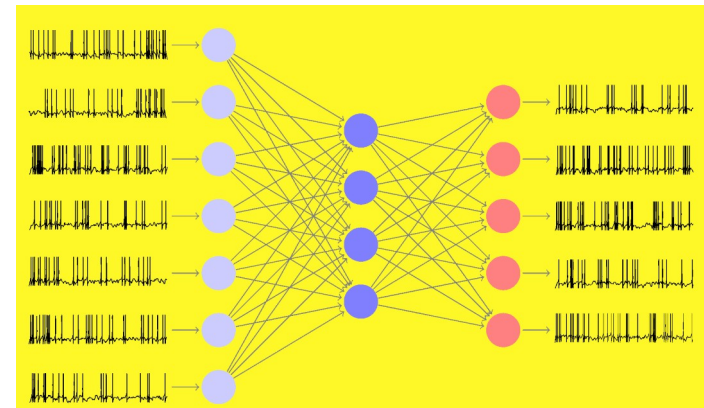
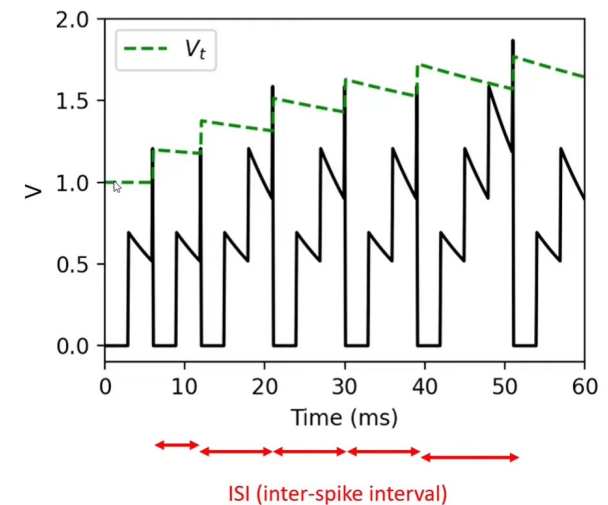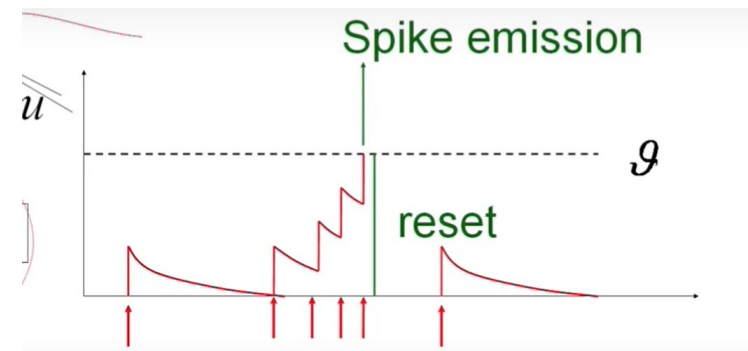# Spiking neural network
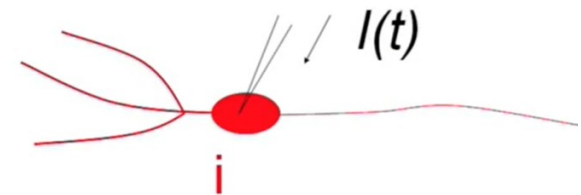
Integrate-And-Fire-Models :

$$\tau \cdot \frac{d}{dt} u = -(u - u_{rest}) + RI(t)$$

$$u(t) = \vartheta$$

2D leaky integrate-and-fire :

After a spike:

$$V \leftarrow 0$$
$$V_t \leftarrow V_t + \delta V_t$$

# Spiking neural network

-Conversion of the event videos
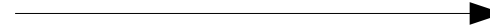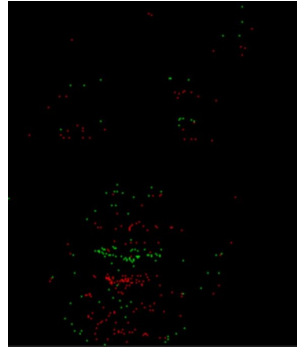


```
1711202383492021 220 58 0
1711202383492028 161 179 1
1711202383492075 336 171 1
1711202383492097 334 144 0
1711202383492199 7 207 0
1711202383492226 203 253 0
1711202383492251 335 213 1
1711202383492254 103 248 1
1711202383492310 206 131 1
1711202383492352 107 214 1
1711202383492390 208 239 0
1711202383492405 204 237 0
1711202383492405 92 242 1
1711202383492408 130 54 1
1711202383492422 137 219 0
1711202383492460 208 250 0
1711202383492515 335 212 1
1711202383492520 224 224 0
1711202383492522 322 250 1
```

- spikingjelly based on pytorch (https://github.com/fangwei123456/spikingjelly)

```
nn.Sequential(
    nn.Flatten(),
    nn.Linear(28 * 28, 10, bias=False),
    nn.Softmax()
    )
```

```
nn.Sequential(
    layer.Flatten(),
    layer.Linear(28 * 28, 10, bias=False),
    neuron.LIFNode(tau=tau, surrogate_function=surrogate.ATan())
    )
```

- SNN model : https://github.com/fangwei123456/Spike-Element-Wise-ResNet

# Dataset

Protocol :

1) Positioned 30 cm from both cameras
2) Look at event camera
3) Be neutral
4) Use a paper to synchronize both camera
5) Raise your hand when the actor has to make his movement ( mouth opening, frown...)

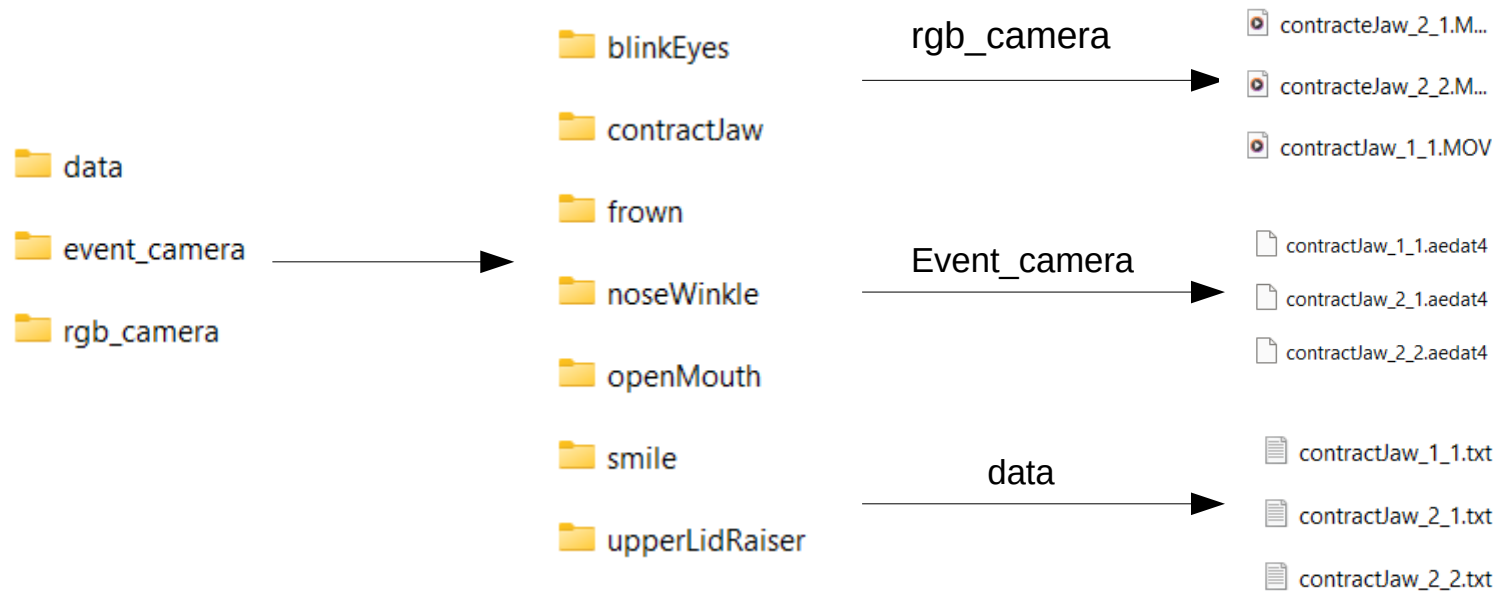# Dataset

Informations :

-30 persons (someone 2-3 times, with
and without glasses, men/women,around
7-8s on 7 facial expressions ).

- Every data is sorted/labellled.

- RGB, Event and Text data.

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# Dataset

Structure :



Format label : facialMovement_id_number_(noiseOrNot)