

# In-Home Daily-Life Captioning Using Radio Signals

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# Captioning daily life is important in healthcare and behavior analysis



*08:30am: Grandma wakes up and walks to bathroom*

*10:30am: Grandma eats breakfast*

*⋮*

*02:00pm: Grandma is watching TV*

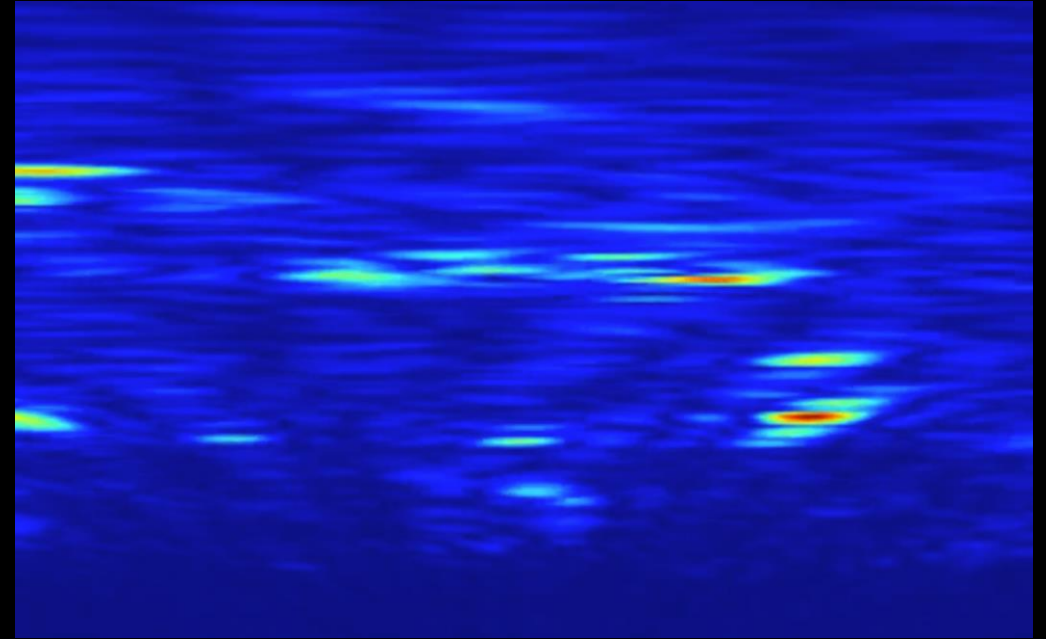
However, deploying cameras in home can bring severe privacy concerns



# RF signals are privacy-preserving ...



**RGB Video**

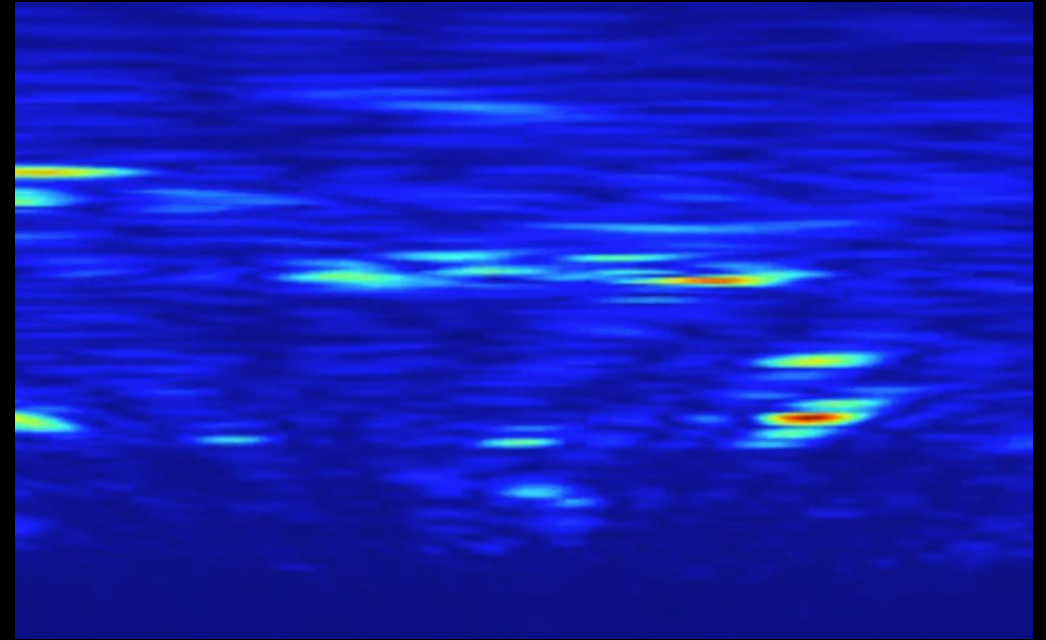


**RF Signals**

but are capable of capturing people's movements and activities

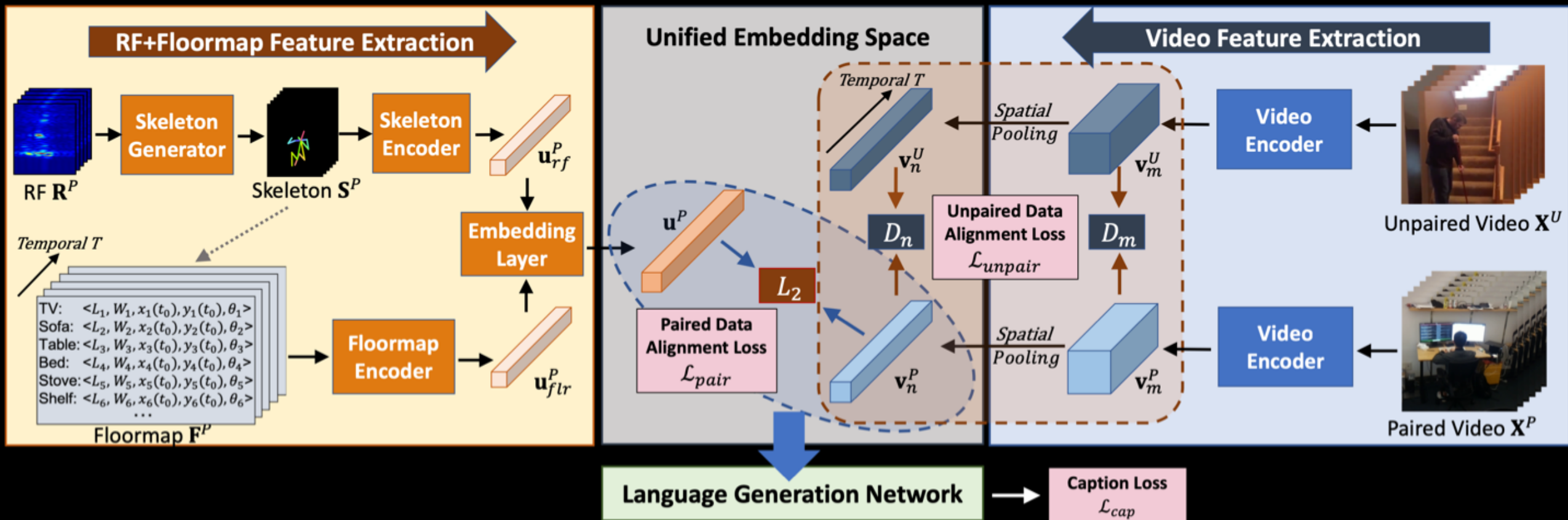


**RGB Video**



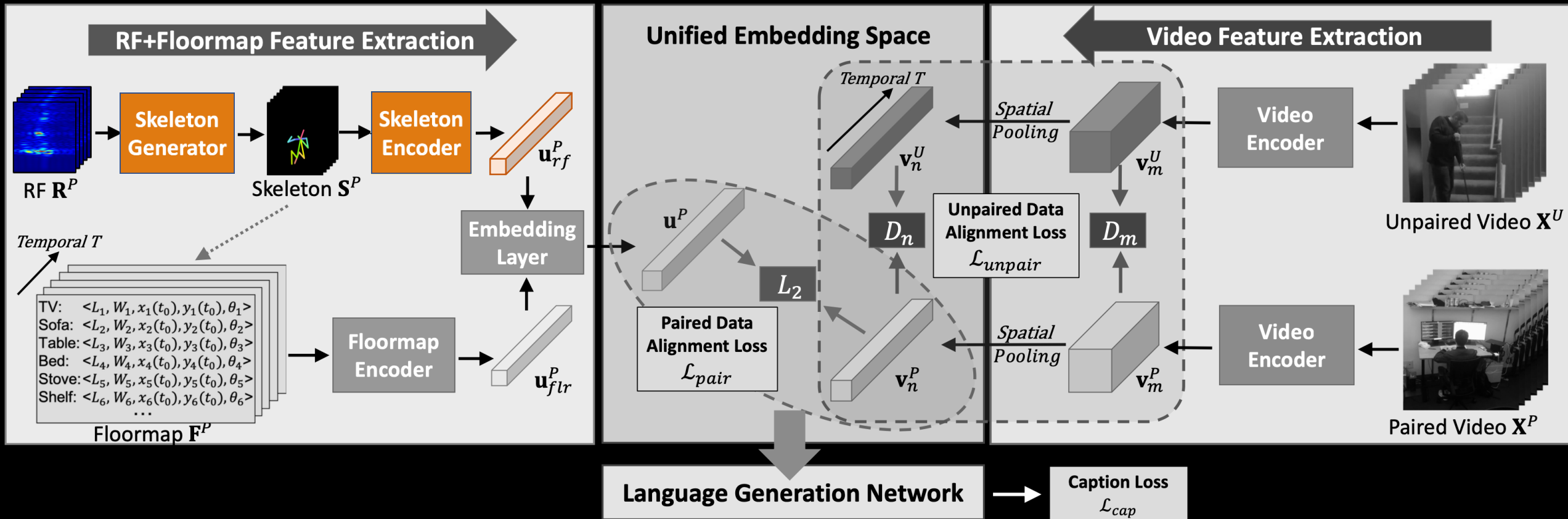
**RF Signals**

# We propose RF-Diary for in-home daily-life captioning from wireless signals ...

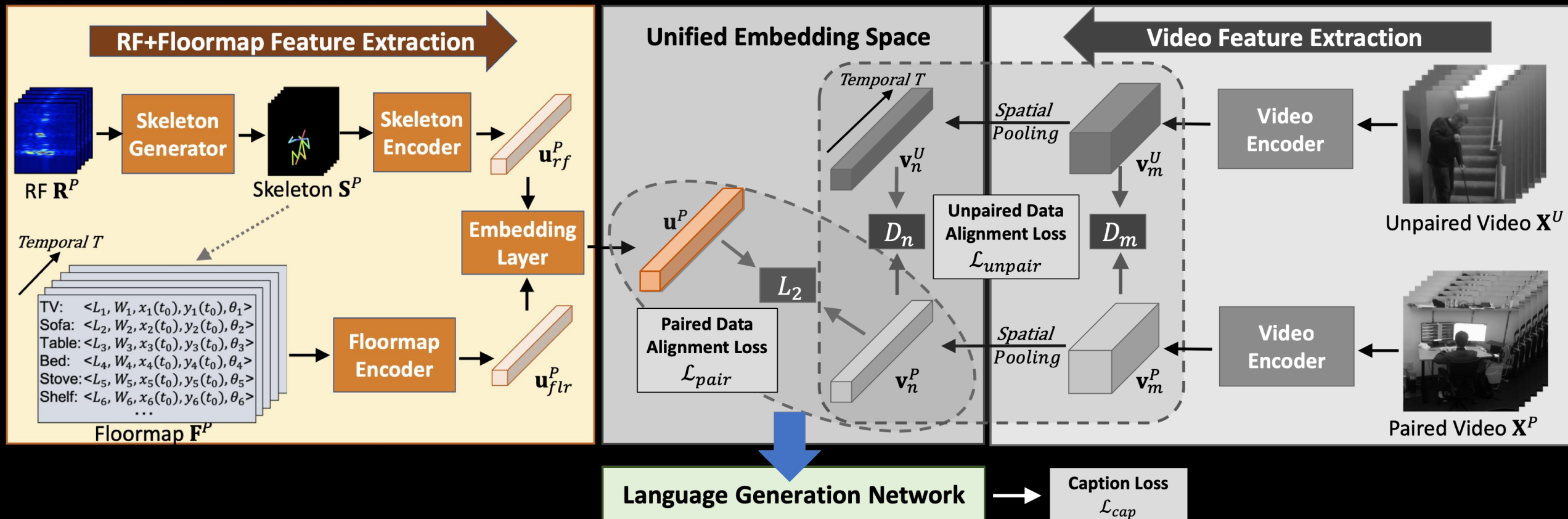




# It first extracts human skeletons and generates features from wireless signals ...

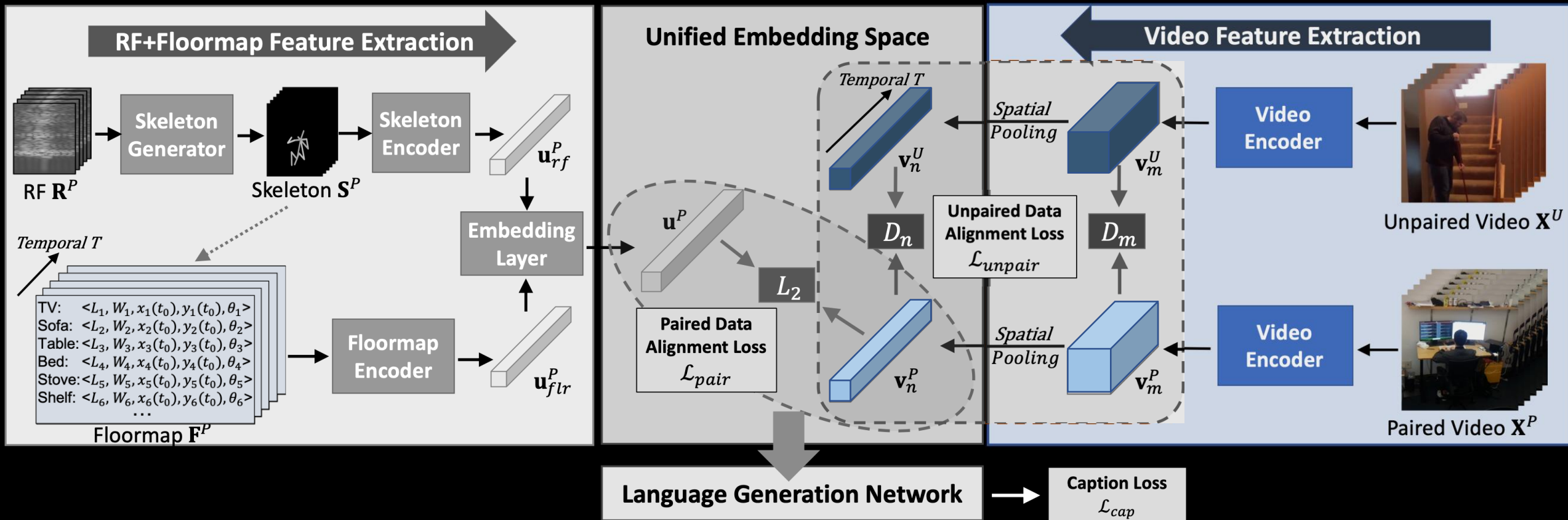


# Then extracts features from Floormaps, and combines with RF features to generate captions ...

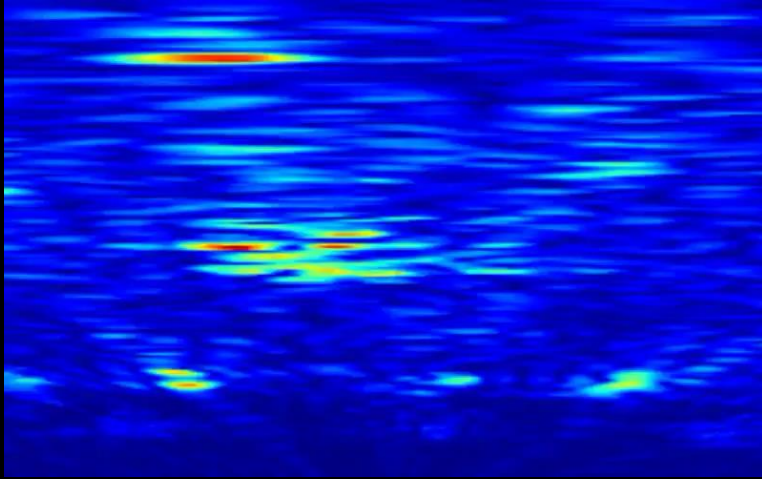




# During training, RF-Diary also uses videos for knowledge distillation



# RF-Diary can caption people's daily life in home ...



RF Signals



RGB Video

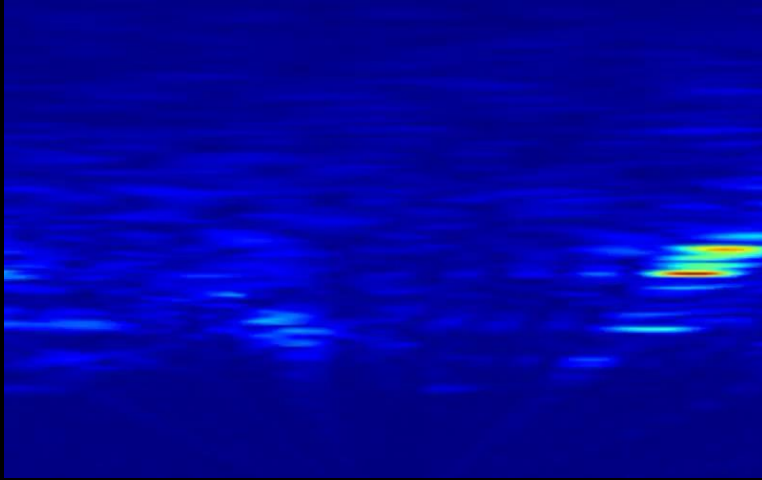


Floormap

A person enters the kitchen. He takes off his clothes, sits at table and starts playing laptop.

RF-Caption

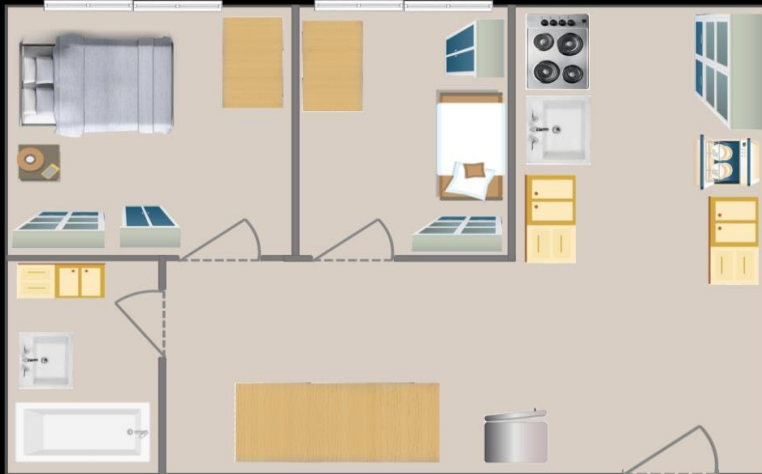
# Even when the light is off ...



RF Signals

*Not Applicable*

RGB Video

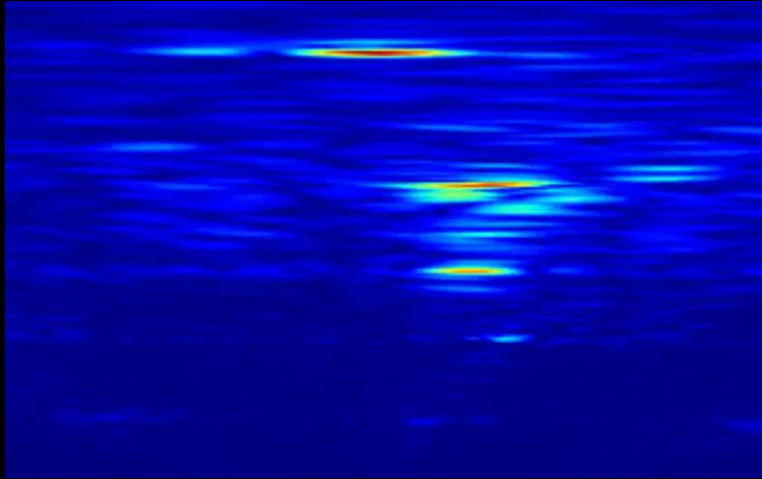


Floormap

A person walks to the kitchen. He then pours water into a cup and drinks from it.

RF-Caption

# Or the person is occluded ...



RF Signals



RGB Video

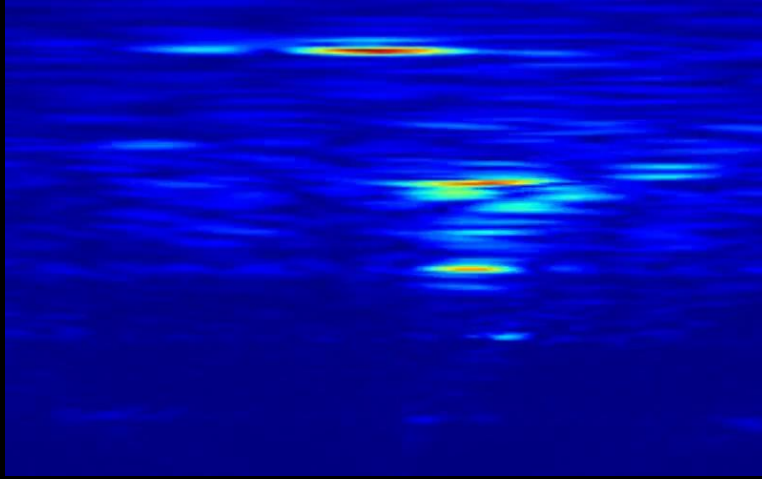


Floormap

A person stands up from bed. He then enters the bathroom and brushes hair.

RF-Caption

# So only one device is needed to perform daily-life captioning for the entire home



RF Signals



RGB Video



Floormap

A person stands up from bed. He then enters the bathroom and brushes hair.

RF-Caption

For more information, please visit our webpage:

<http://rf-diary.csail.mit.edu>