



Nanopore Signal Processing and System Identification for Faster Event Detection

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Motivation

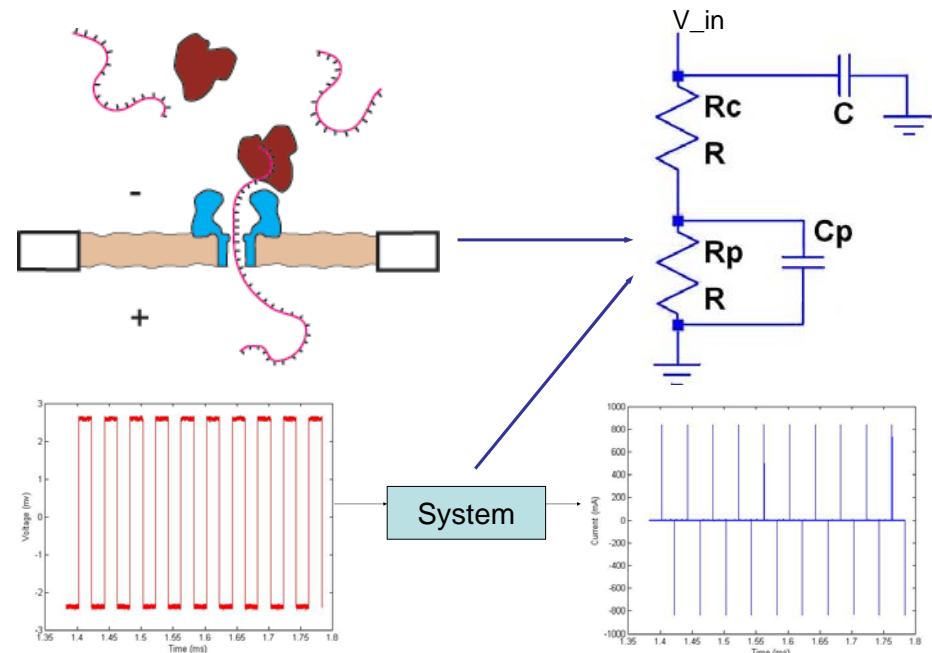
- Due to sensitive instrumentation, data collected from nanopores tends to contain significant amounts of noise
- To perform system identification on data requires there be minimal unexplained noise
- Currently there are no good models for nanopore signal frequency spectral composition

Signal Processing

- Process the data to resemble that found in *Noise in Solid-State Nanopores*, R.M.M. Smeets et al. (2007)
- Use as a starting point for characterizing the system, spectral composition and further processing
- Data filtered with a low-pass Butterworth filter

- It is still unclear if there is non-linear distortion in our signal that might prevent signal processing
- There appears to be less noise when the undesired sinusoidal noise amplitude is smaller, possibly implying unrecoverable loss of information

System Identification



- Translate nanopore system into a linear circuit representation
- Uses real data input and output to determine values for the different elements

Next Steps

- Determine if there is a non-linear component forming the AC noise
- Continue to improve signal processing methods used on data
- Apply system identification to the RC network to get a first model
- Determine nanopore signal frequency spectral composition and explore possible uses of this information

