

Mycelium Temporal Memory Analysis Report

EXPERIMENT OVERVIEW

Date & Time: 2026-02-20 18:02:43
Report Generated: mycelium_memory_analysis_report_20260220_180243.pdf

TEST CONFIGURATION

Test Type: Step Response Test
Sample Delay: 300 ms (0.3 seconds per sample)
Test Duration Setting: 60 seconds
Actual Test Duration: 60.0 seconds
Input Amplitude: 4.0 V (voltage range applied to mycelium)
Max Correlation Lag: 10 samples (3.0 seconds lookback)
Total Data Points: 200 samples

DATA COLLECTION SUMMARY

Input Voltage Range: 1.20V to 4.00V
State Voltage Range: 0.278V to 0.301V
State Voltage Mean: 0.287V ± 0.004V
Data Quality: ✓ Good

HARDWARE CONFIGURATION

Device Mode: Real Hardware
Input Device: Digilent Device 1
Measurement Device: Digilent Device 2

Temporal Memory Analysis Results

TEMPORAL MEMORY ANALYSIS RESULTS

AUTOCORRELATION ANALYSIS

Maximum Correlation: 0.1184
Optimal Lag: 6 samples (1.8 seconds)
Memory Persistence: Weak
Interpretation: States show weak temporal structure

CROSS-CORRELATION ANALYSIS

Maximum Input-State Correlation: 0.3612
Optimal Lag: 10 samples (3.0 seconds)
Input Memory Effect: Strong
Interpretation: Past inputs strongly influence current states

STATE PREDICTION ANALYSIS

Current Input Only R^2 : 0.0050
With Input History R^2 : 0.0543
Temporal Improvement: 0.0493
Temporal Benefit: Moderate
Interpretation: Input history moderately improves prediction

RESPONSE DECAY ANALYSIS

Number of Transitions: 19
Average Settling Time: 0.433 seconds
Interpretation: Fast response dynamics

OVERALL MEMORY ASSESSMENT

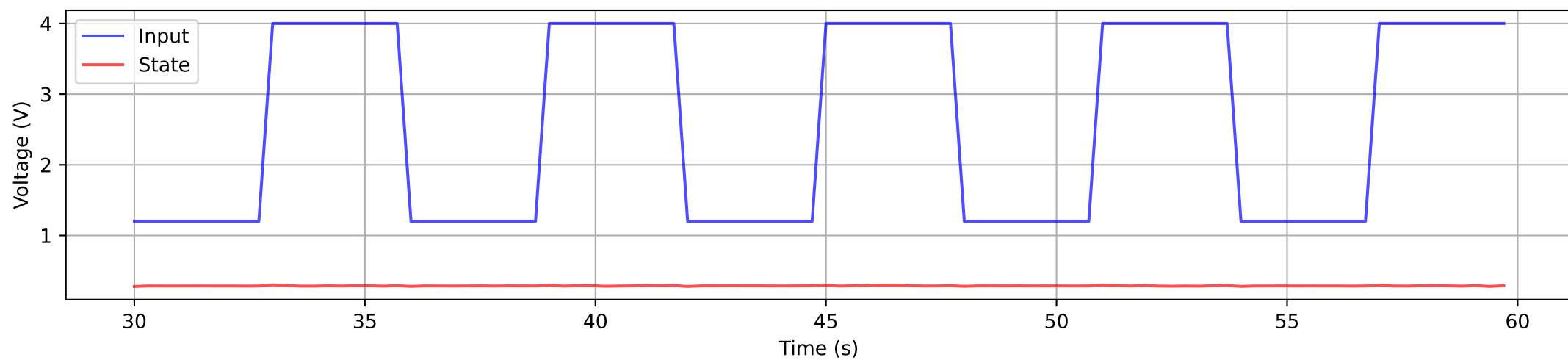
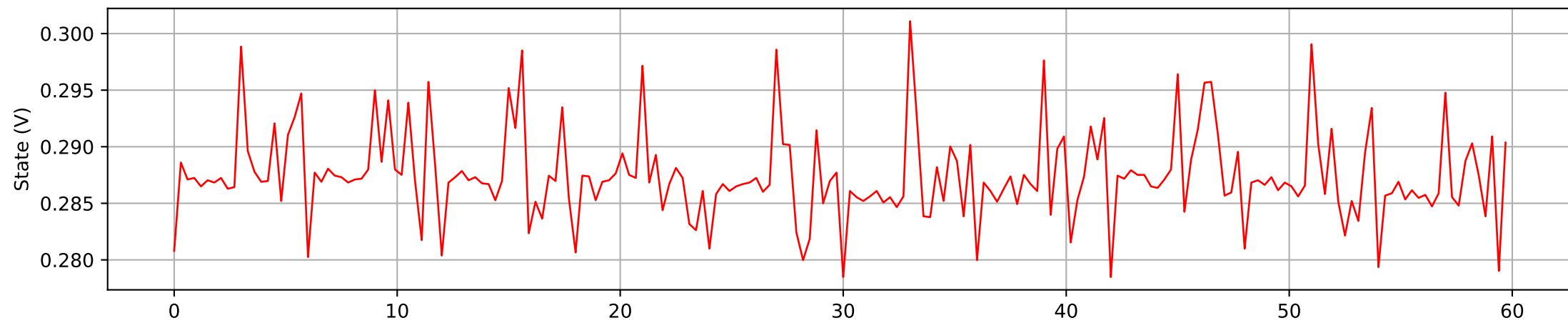
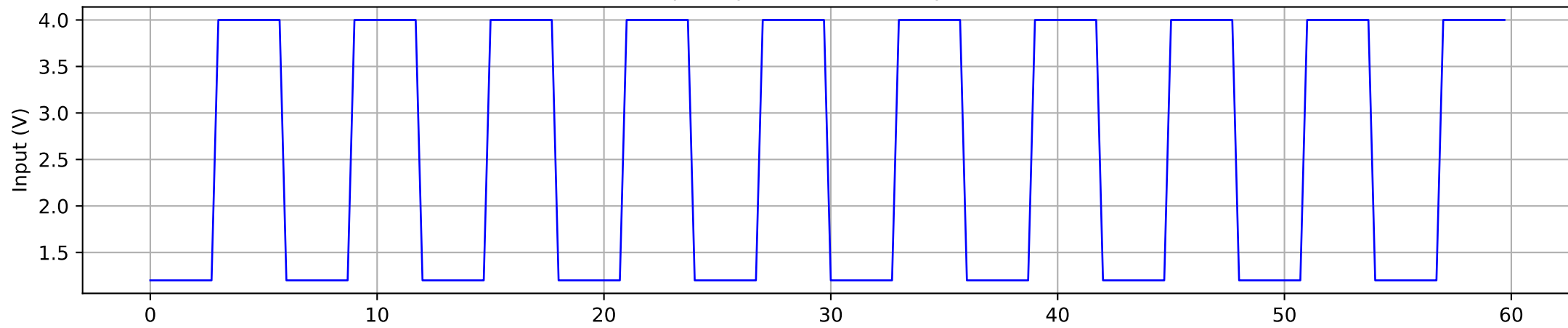
Memory Score: 2/3

CONCLUSION: ☐ Strong evidence of temporal memory effects

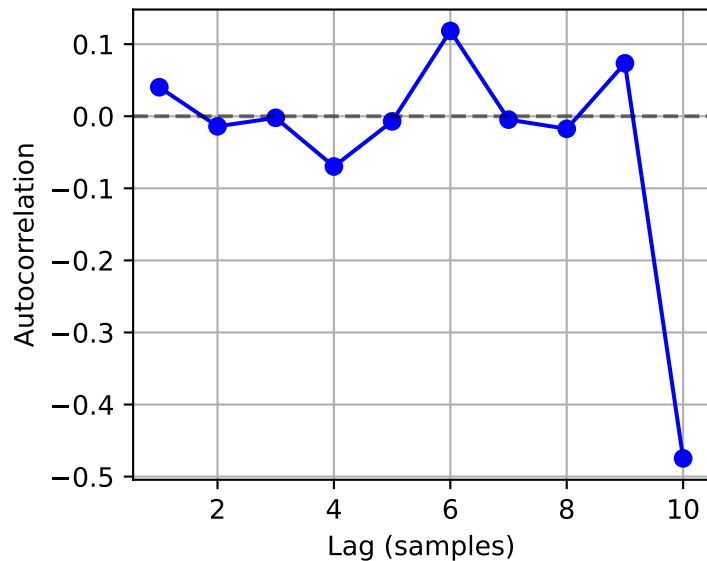
RESERVOIR COMPUTING ASSESSMENT:

✓ This mycelium sample shows excellent reservoir computing potential

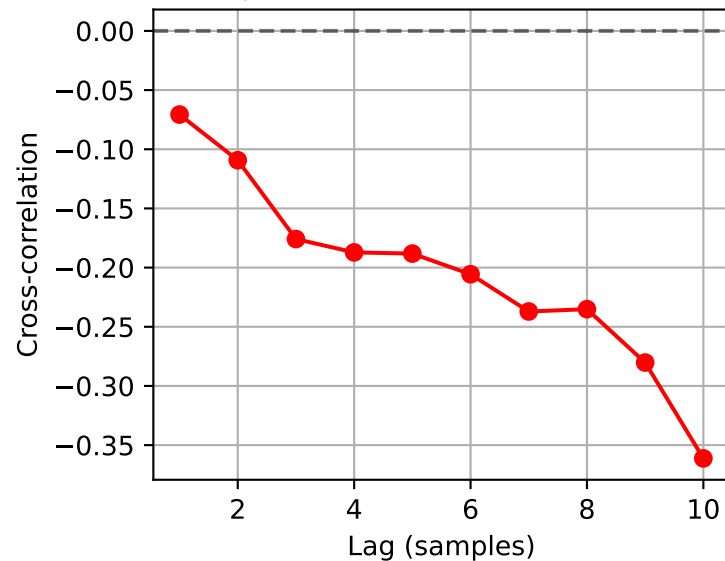
Step Response Test - Sample 200



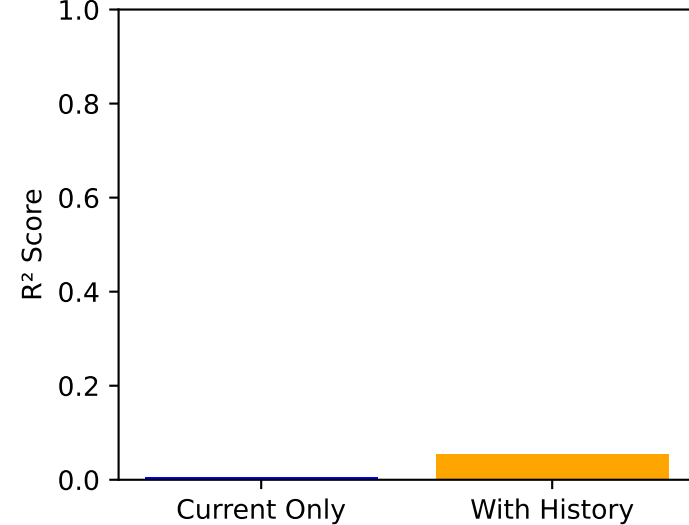
State Autocorrelation



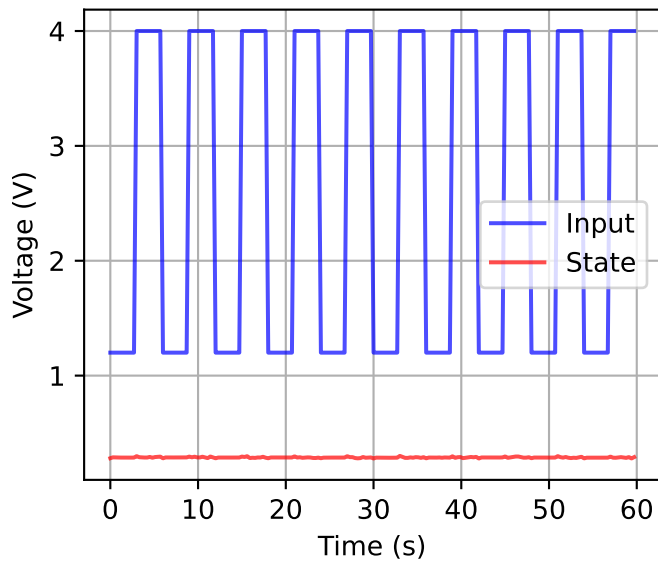
Input-State Cross-correlation



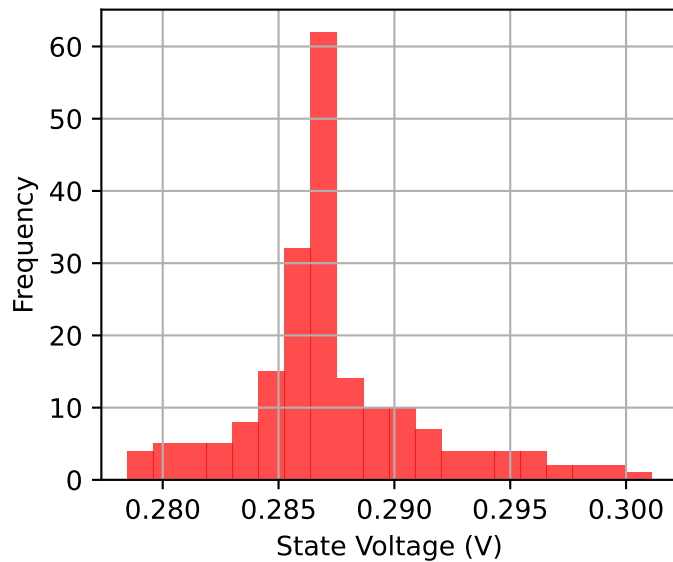
Prediction Performance



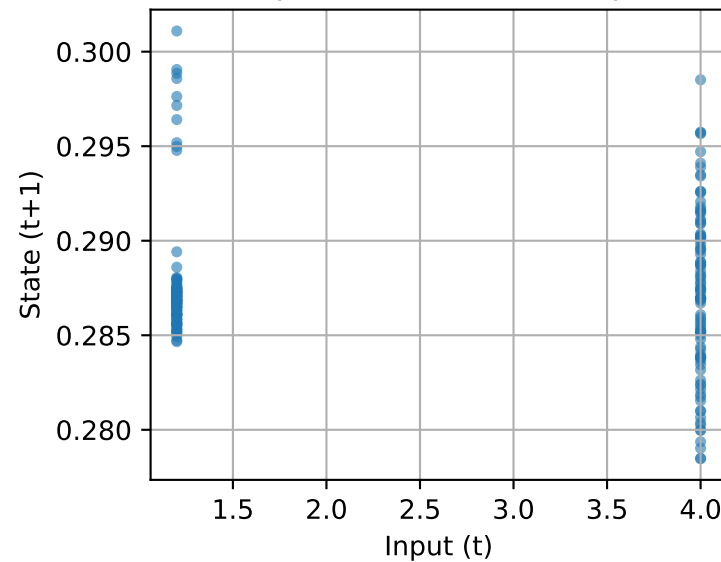
Full Time Series



State Distribution



Input-State Relationship



Data Summary Tables

Parameter	Input (V)	State (V)
Mean	2.600	0.287
Std Dev	1.400	0.004
Min	1.200	0.278
Max	4.000	0.301
Range	2.800	0.023

Lag (samples)	Lag (seconds)	Autocorr	Cross-corr
1	0.3	0.040	-0.071
2	0.6	-0.014	-0.109
3	0.9	-0.002	-0.176
4	1.2	-0.070	-0.187
5	1.5	-0.007	-0.188
6	1.8	0.118	-0.206
7	2.1	-0.005	-0.237
8	2.4	-0.017	-0.235
9	2.7	0.073	-0.280
10	3.0	-0.475	-0.361