

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 R²: 0.0050
With Input History R²: 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

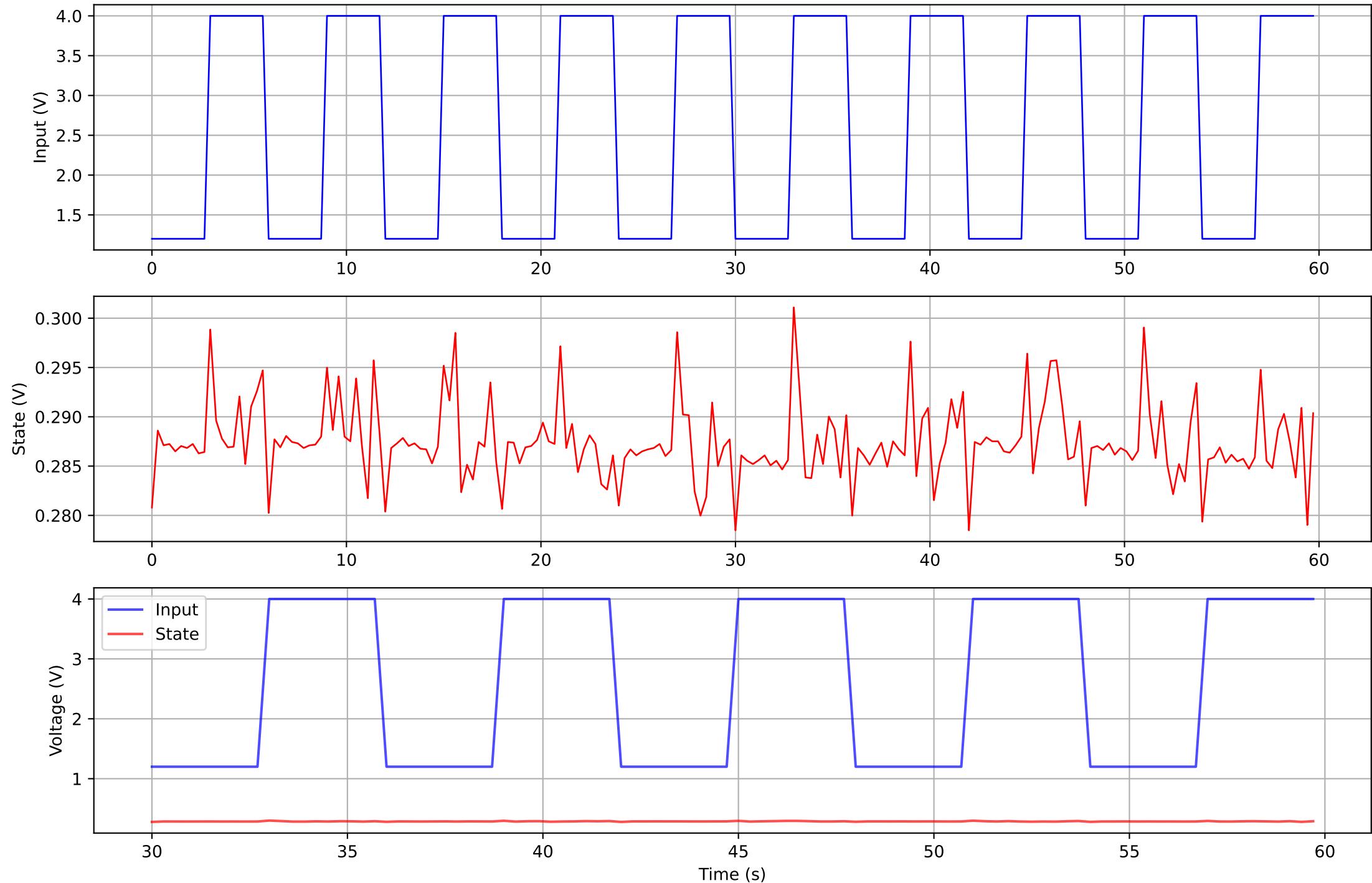
Memory Score: 2/3
★★★

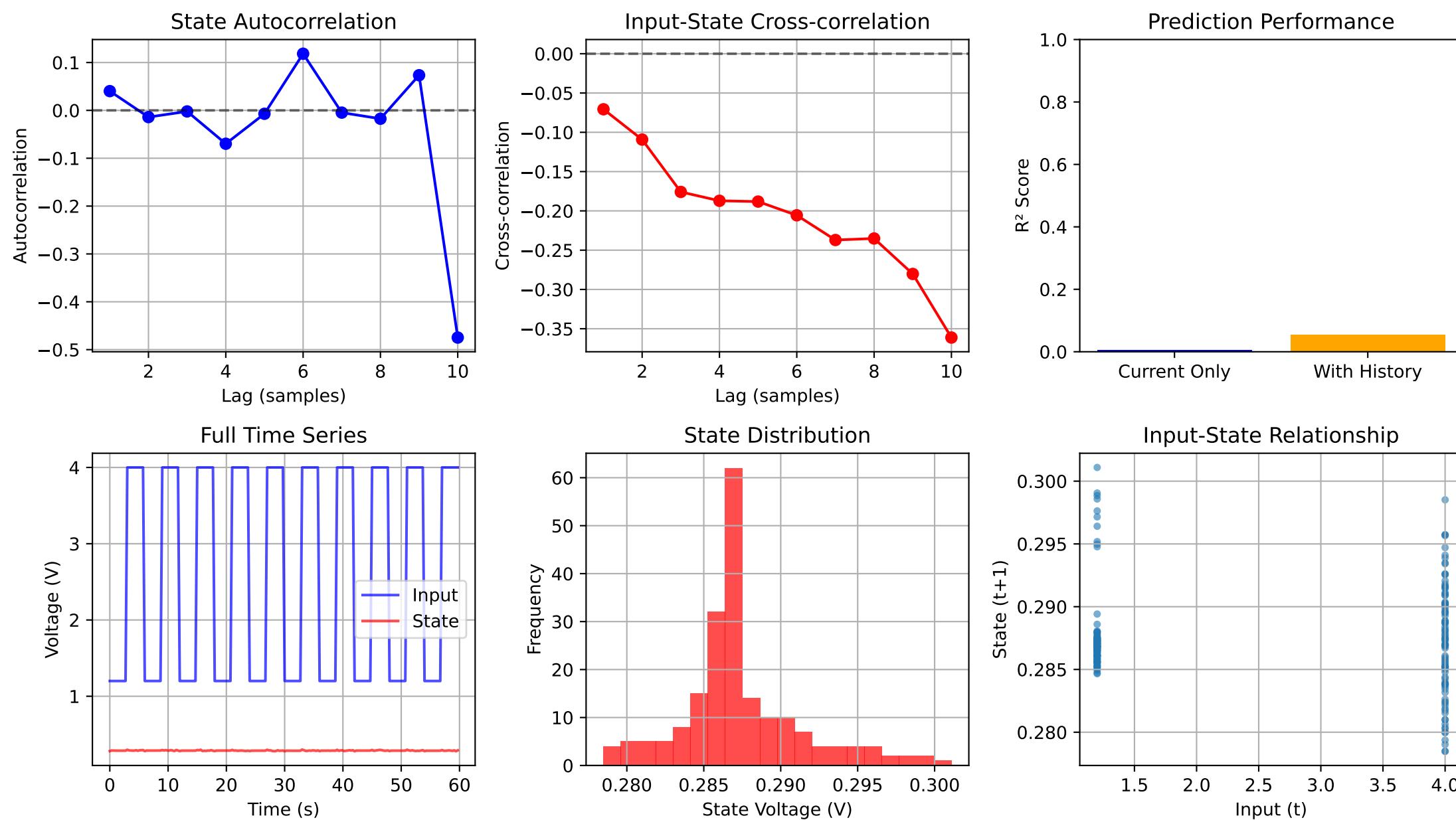
CONCLUSION: Strong evidence of temporal memory effects

RESERVOIR COMPUTING ASSESSMENT:

- ✓ This mycelium sample shows excellent reservoir computing potential

Step Response Test - Sample 200





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