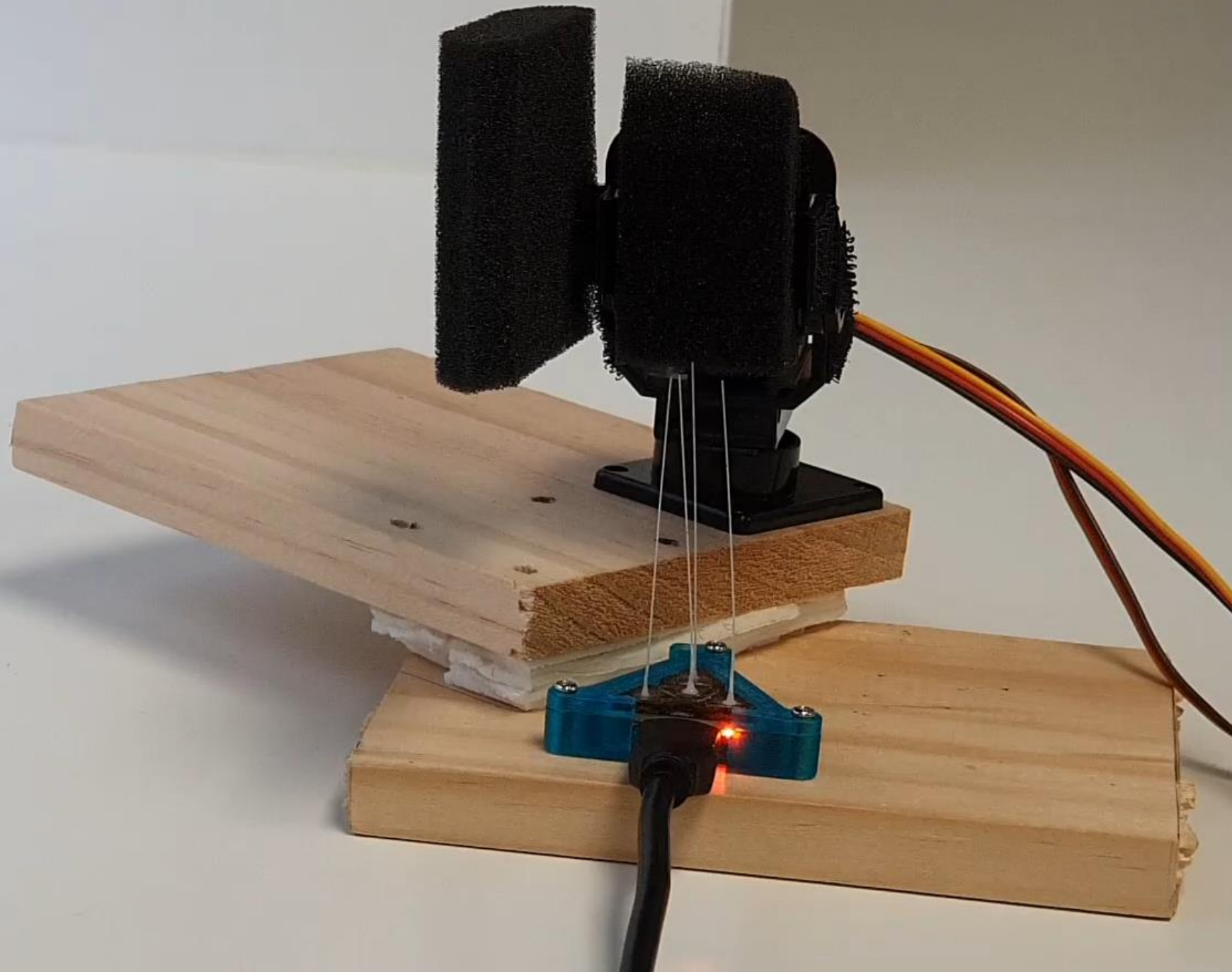
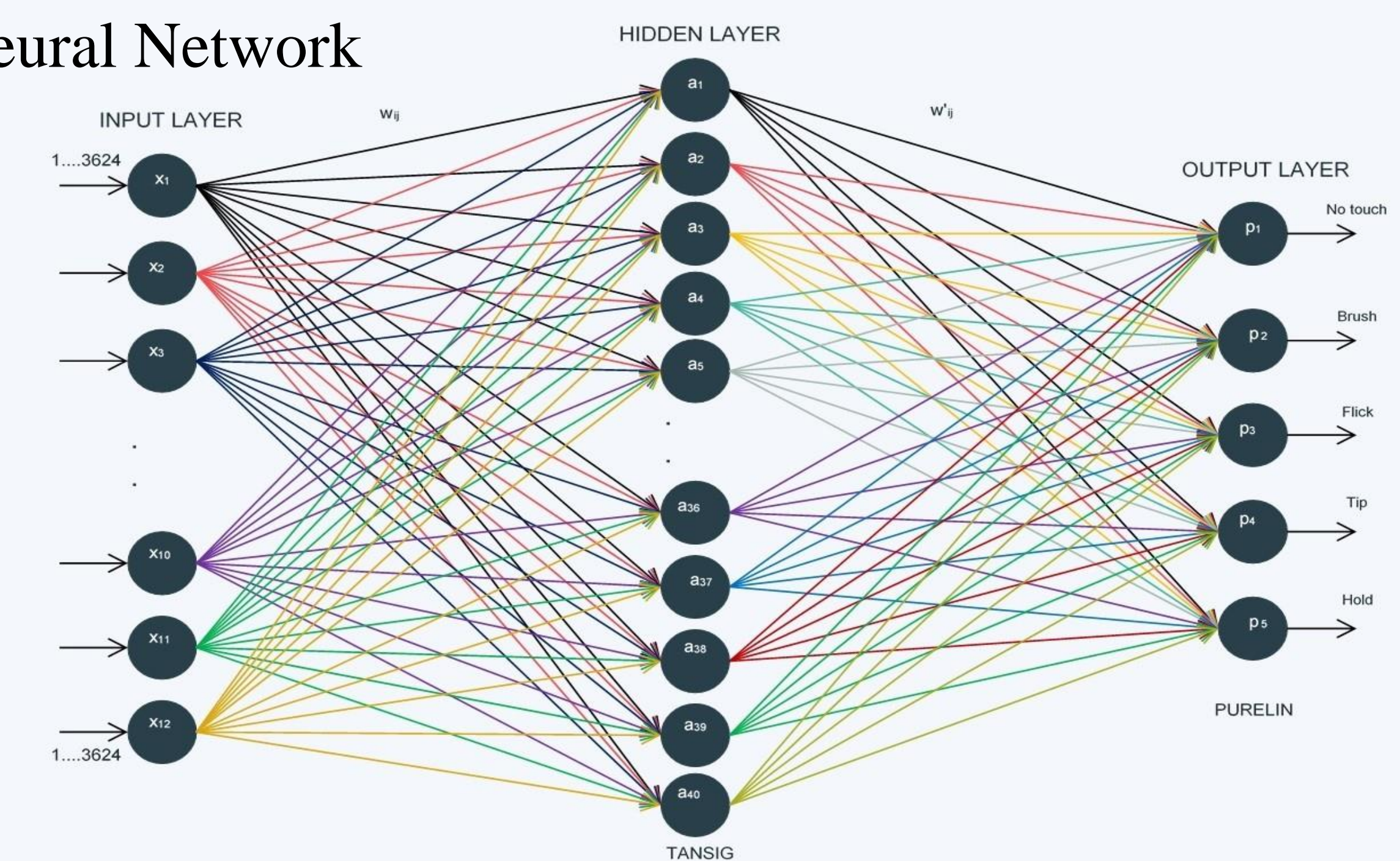


FLICK



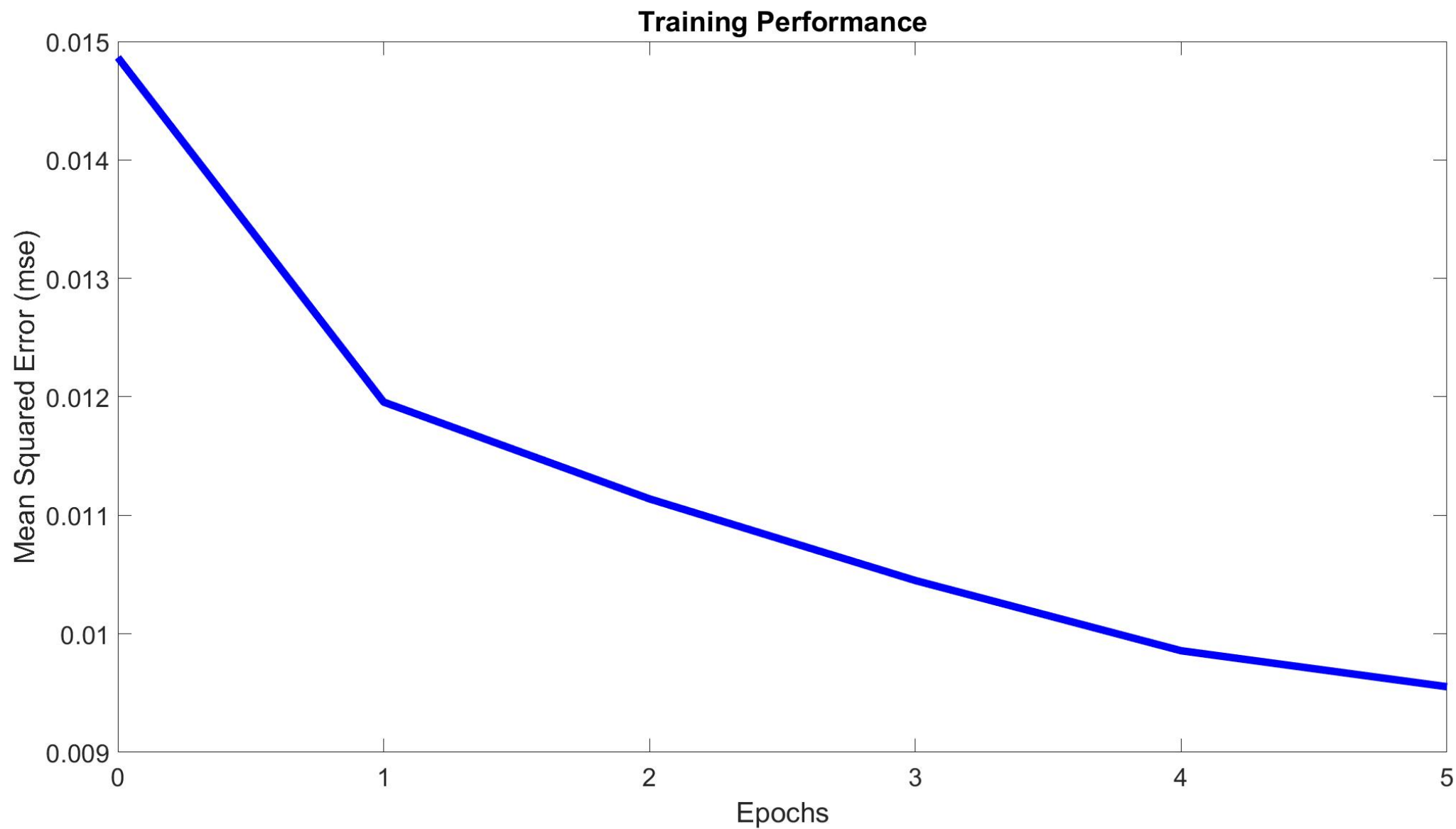
Neural Network



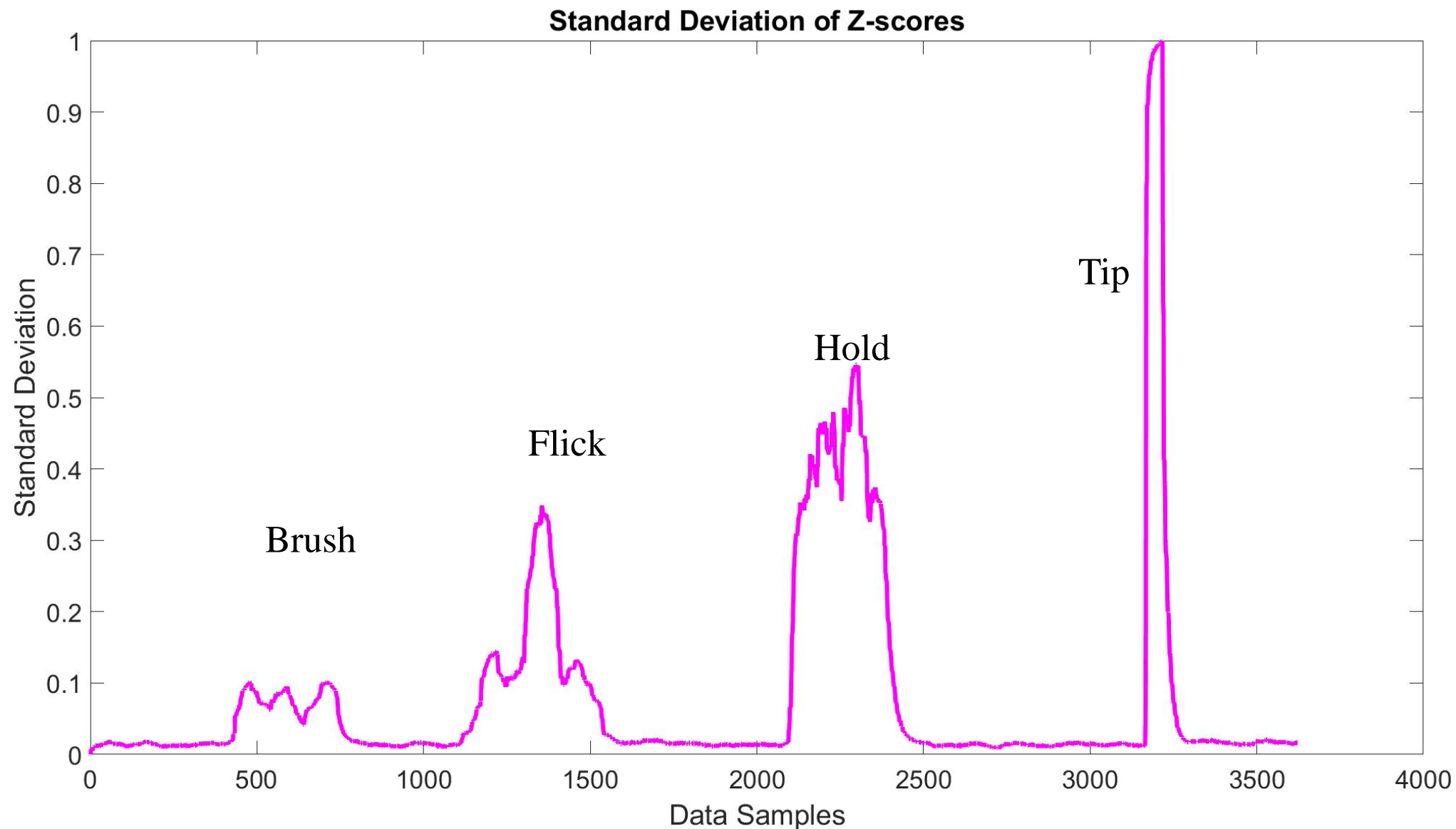
Neural Network

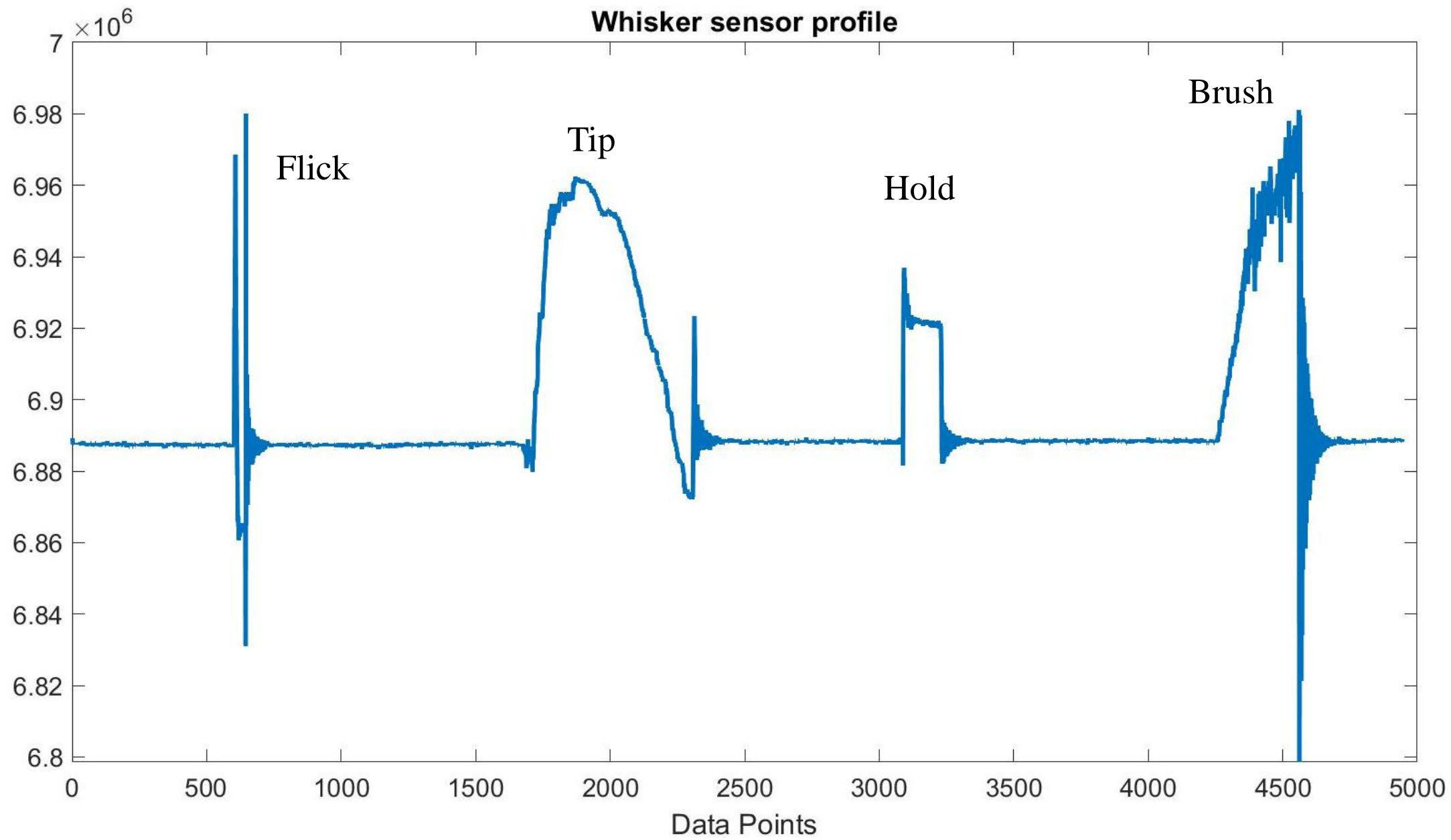
- 12 inputs (1-4095 sample points)
 - 3 sensors for each whisker
 - 4 whiskers
 - 12 sensors
- One hidden Layer (40 units)
- 5 outputs
 - 1 – no touch
 - 2 – flick
 - 3 – tip
 - 4 – hold
 - 5 – brush

Training Performance

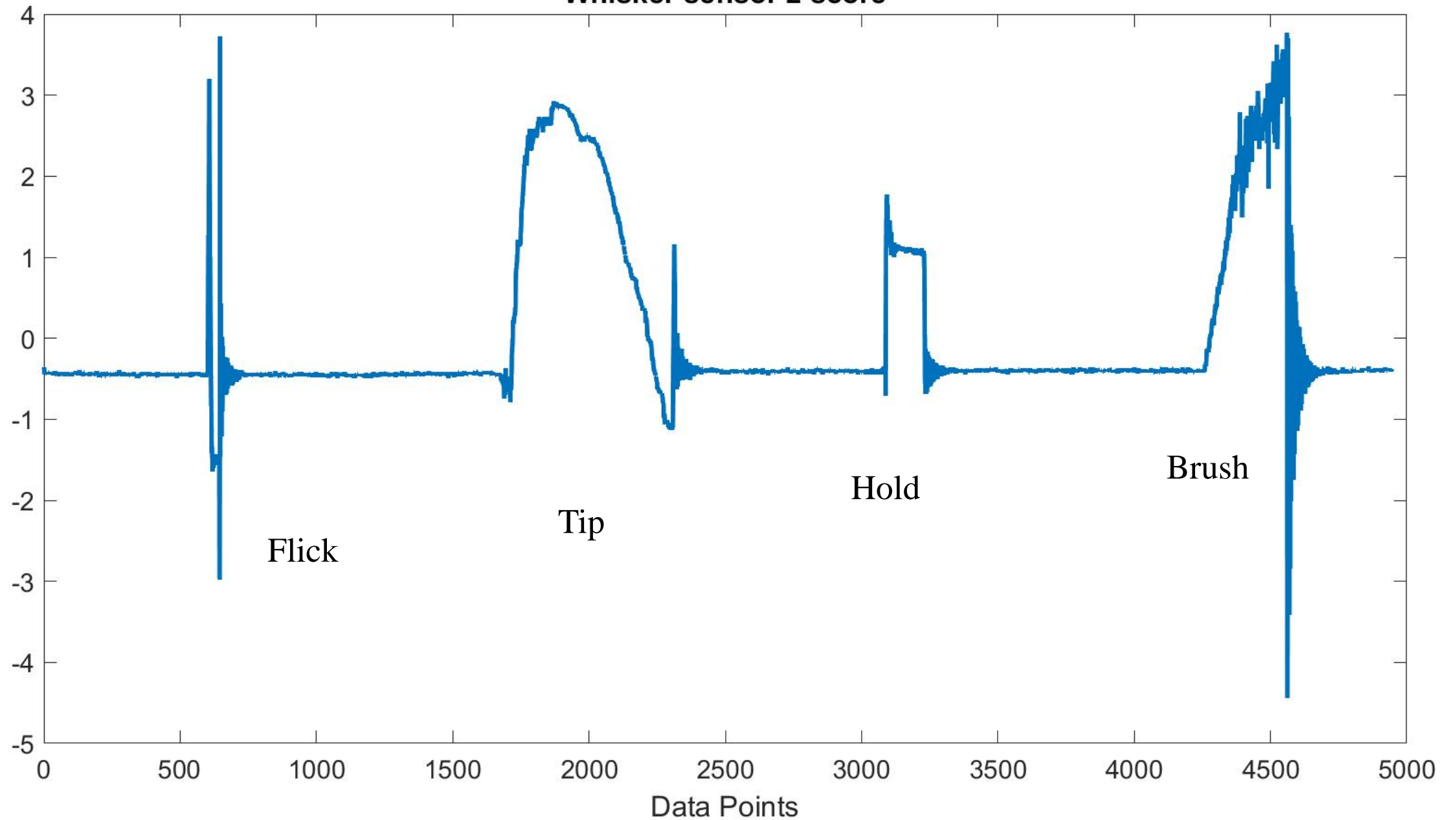


Pre-processed inputs (manual data)

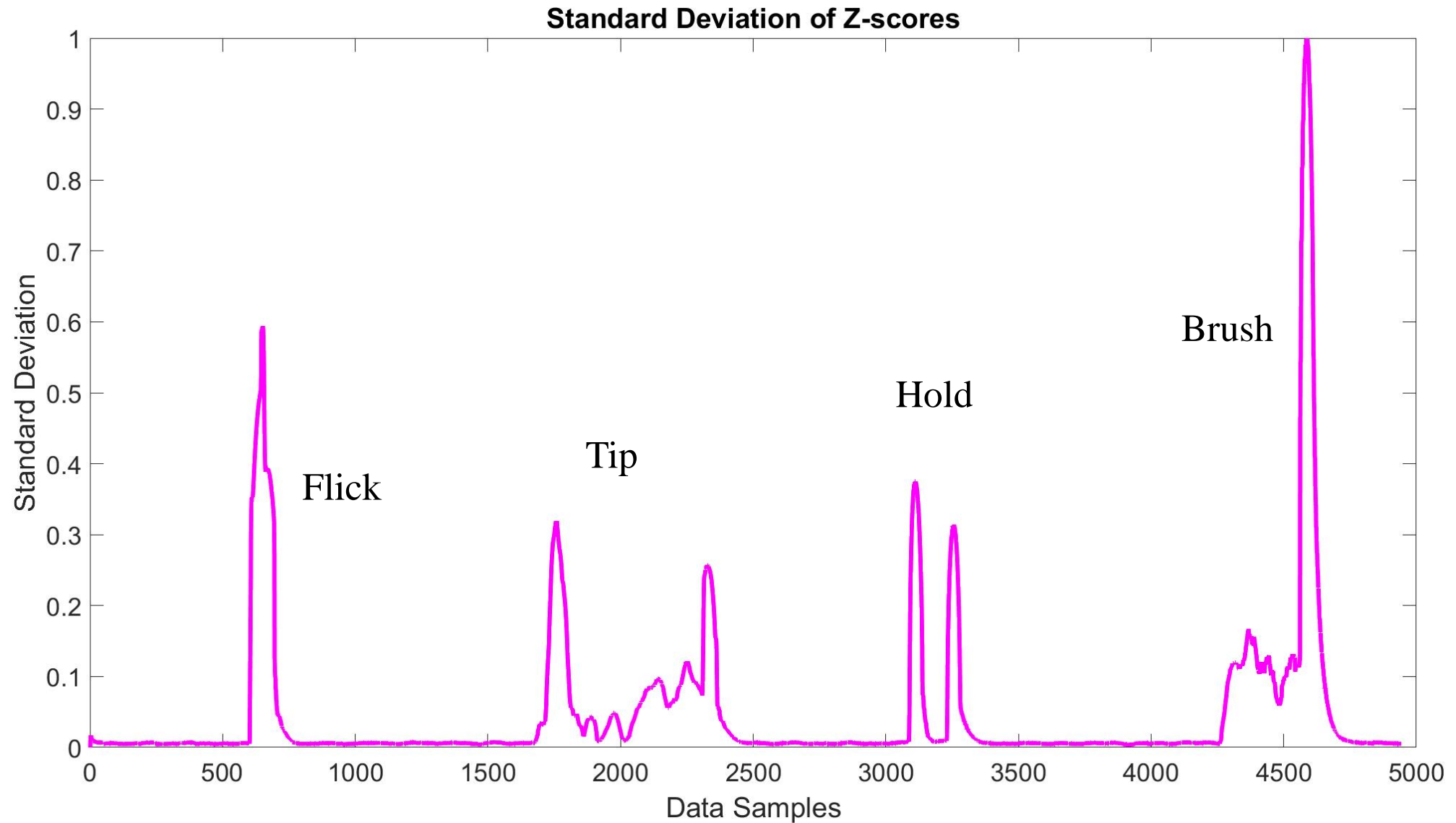




Whisker sensor z-score

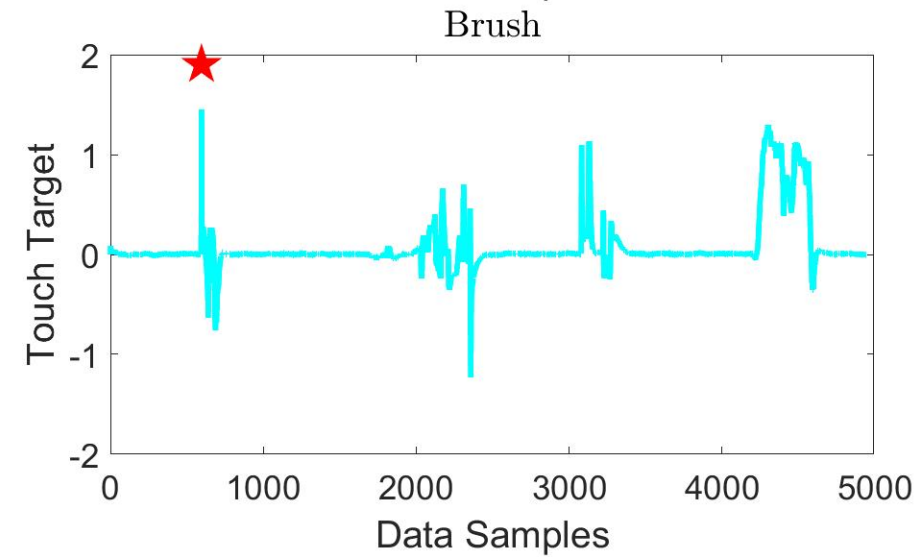
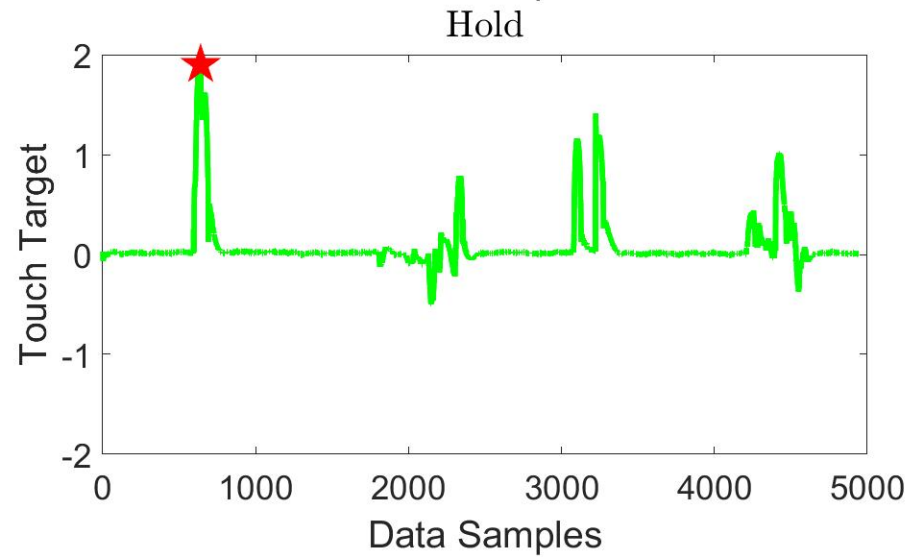
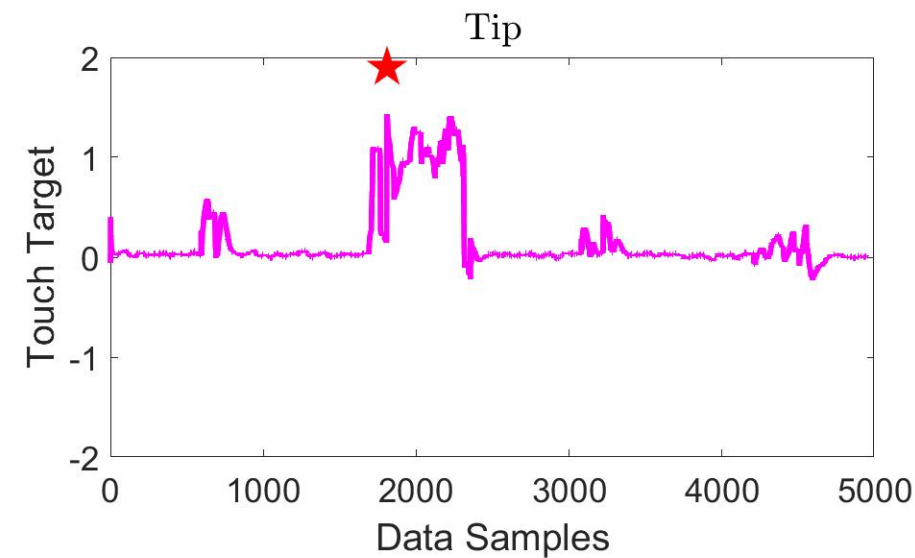
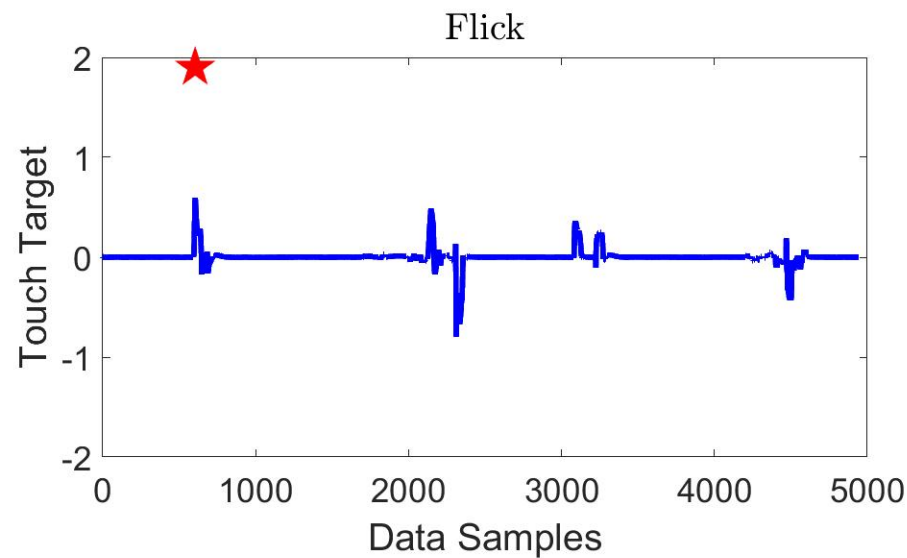


Pre-processed inputs (automated data)



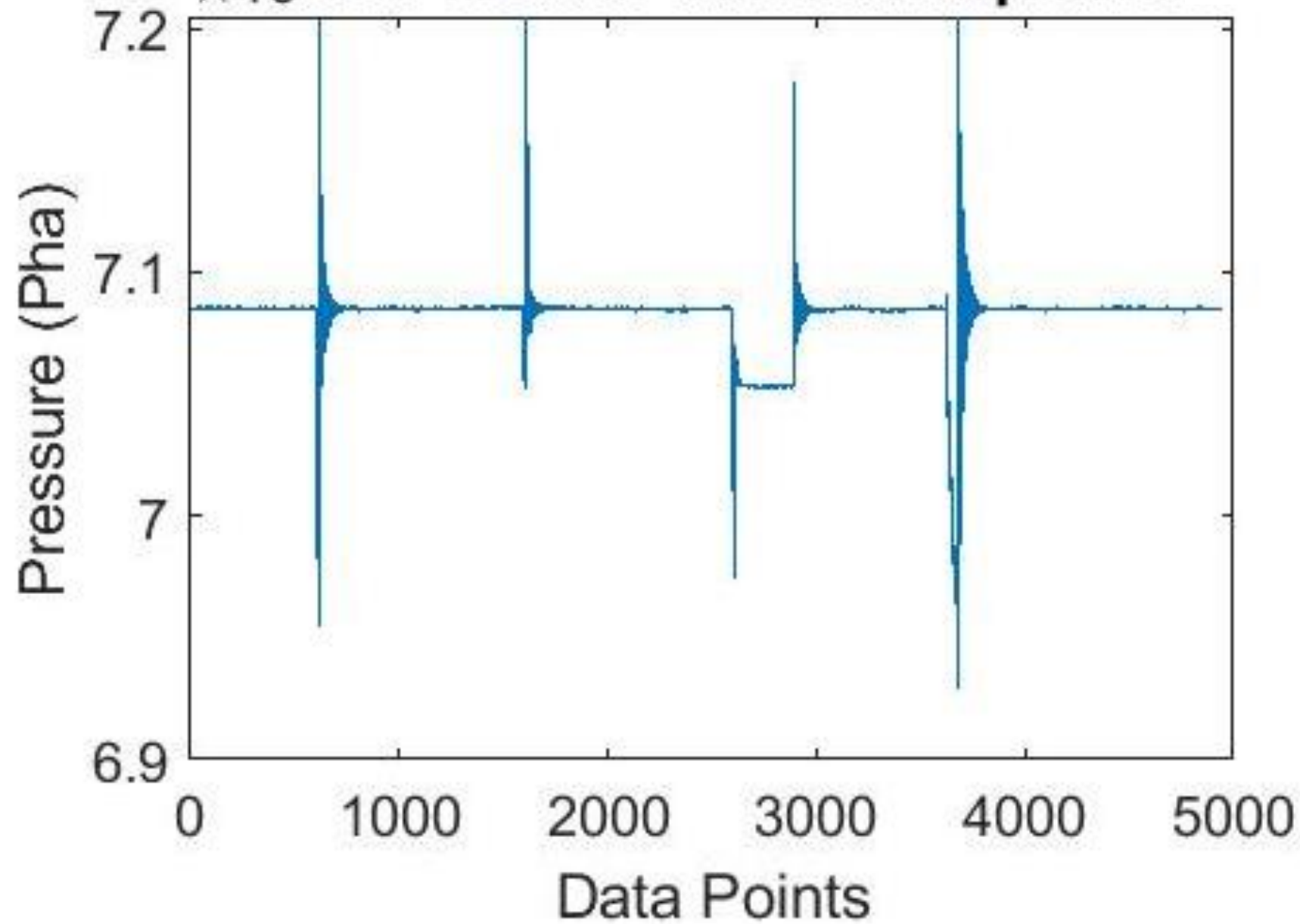
SET	Best Training MSE	Training Accuracy	Test Accuracy
1	0.0226	96.6	97.0
2	0.0132	96.9	79.9
3	0.0119	97.3	93.7
4	0.0125	97.2	91.9
5	0.0117	97.5	96.1
6	0.0127	96.7	90.7
7	0.0151	96.6	91.5
8	0.0150	96.9	91.3
9	0.0131	96.6	93.8
10	0.0111	97.4	91.4
11	0.0123	97.3	88.4
12	0.0098	97.6	91.5
13	0.0103	97.7	93.6
14	0.0141	97.5	90.3
15	0.0095	97.5	80.2
16	0.0103	97.8	93.7
17	0.0095	98.0	93.0

Automated data testing result (maximum value)

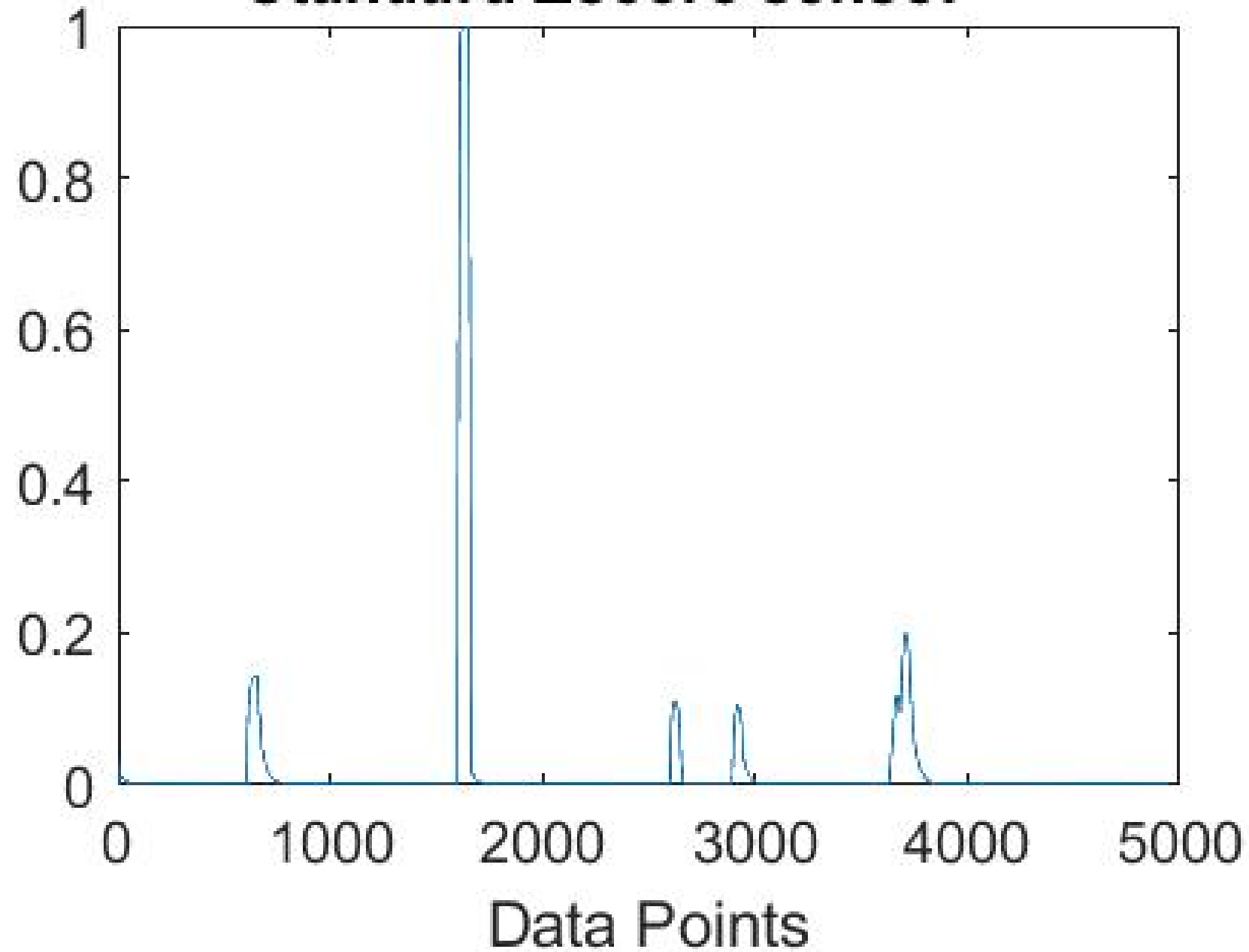


Whisker sensor movement profile

Similar touch types



Standard Zscore sensor



Similar touch types

SET	Best Training MSE	Training Accuracy	Test Accuracy
1	0.0223	95.3	91.2
2	0.0183	96.2	90.1
3	0.0140	96.9	89.4
4	0.0128	97.1	93.3
5	0.0124	97.2	92.1
6	0.0137	96.7	93.5
7	0.0136	96.9	91.9
8	0.0128	97.1	90.9
9	0.0128	96.5	95.8
10	0.0112	97.4	87.8
11	0.0120	97.4	90.6
12	0.0100	97.6	96.0
13	0.0119	97.5	98.2
14	0.0126	97.6	97.0
15	0.0114	97.4	79.9
16	0.0110	98.0	93.7
17	0.0096	98.2	91.9