

Visuo-dynamic self-modelling of soft robotic systems: Supplementary Material

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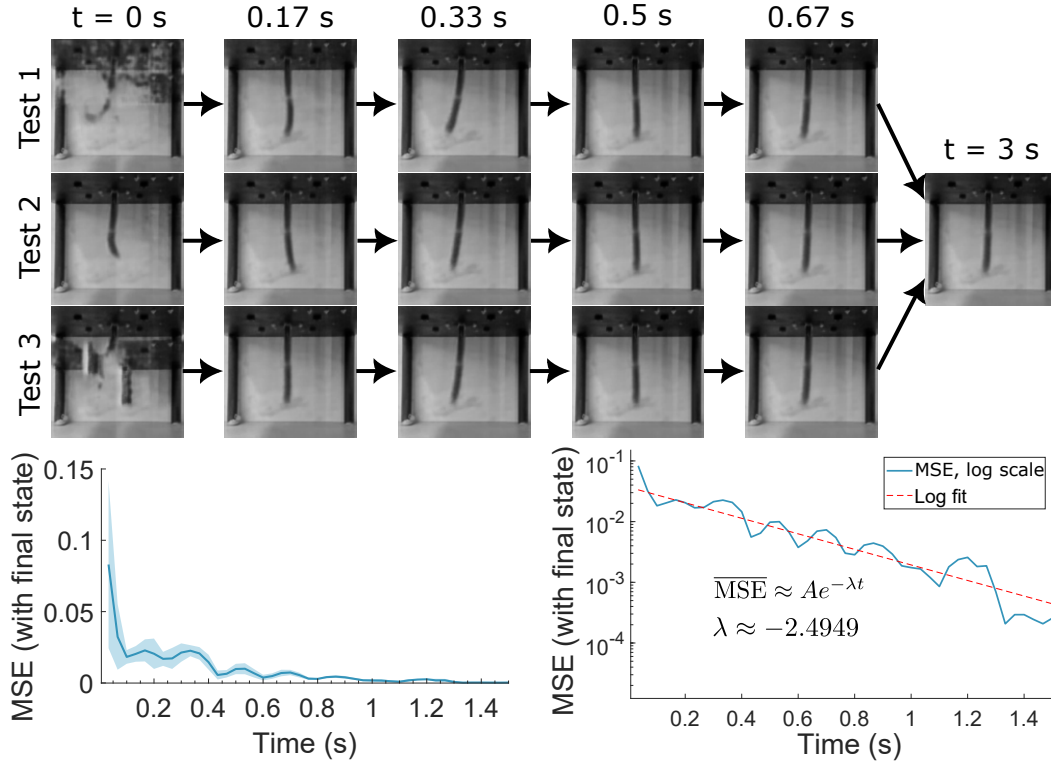


Figure S1: Steady state decay from randomly initialized LSTM state. Data shows that the learned model converges to its initial state irrespective of the starting condition. Bottom left plots the MSE relative to the final state with time averaged for multiple tests, together with the maximum/minimum bounds. Bottom right plots the average on logarithmic scale, allowing for an estimation of the decay parameter.

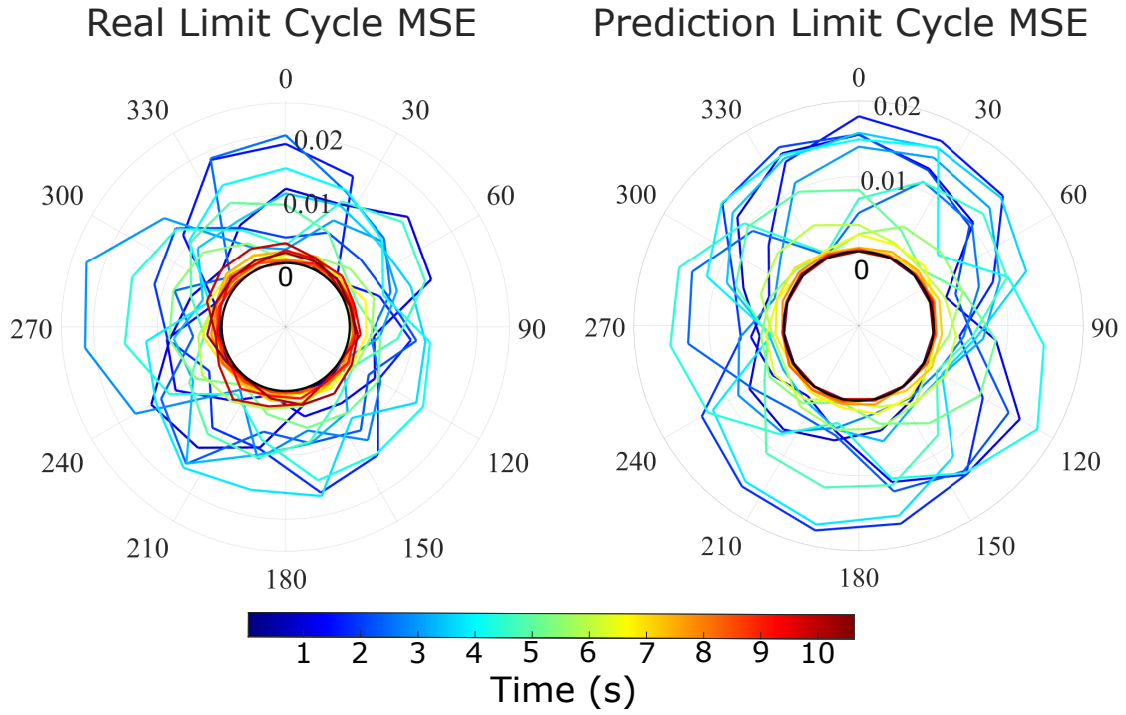


Figure S2: Limit cycle stabilisation in real robot and prediction model. Model and real robot are subjected to two periodic trajectories with initial starting noise. The relative MSE between the two motions between model and model, real and real, are plotted in the radial plots above. Results show that the arm exhibits very stable limit-cycle behaviors and is well captured by the learned model. One cycle of the radial plot equals to 0.5 s.

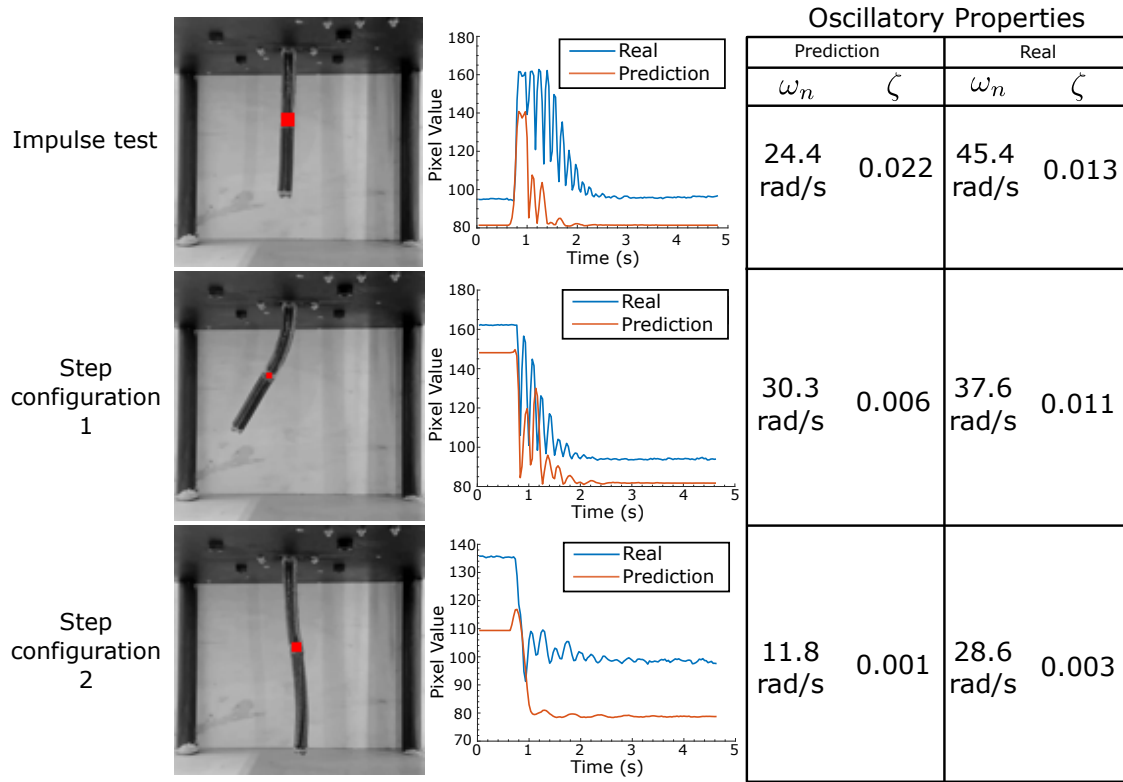


Figure S3: Oscillatory analysis of robot motion. The average pixel brightness at the robot's half length point is measured for its final configuration after an impulse/step. This is plotted for both real and model motions, with the table on the right providing the estimate for both stiffness and damping factors at each configuration.

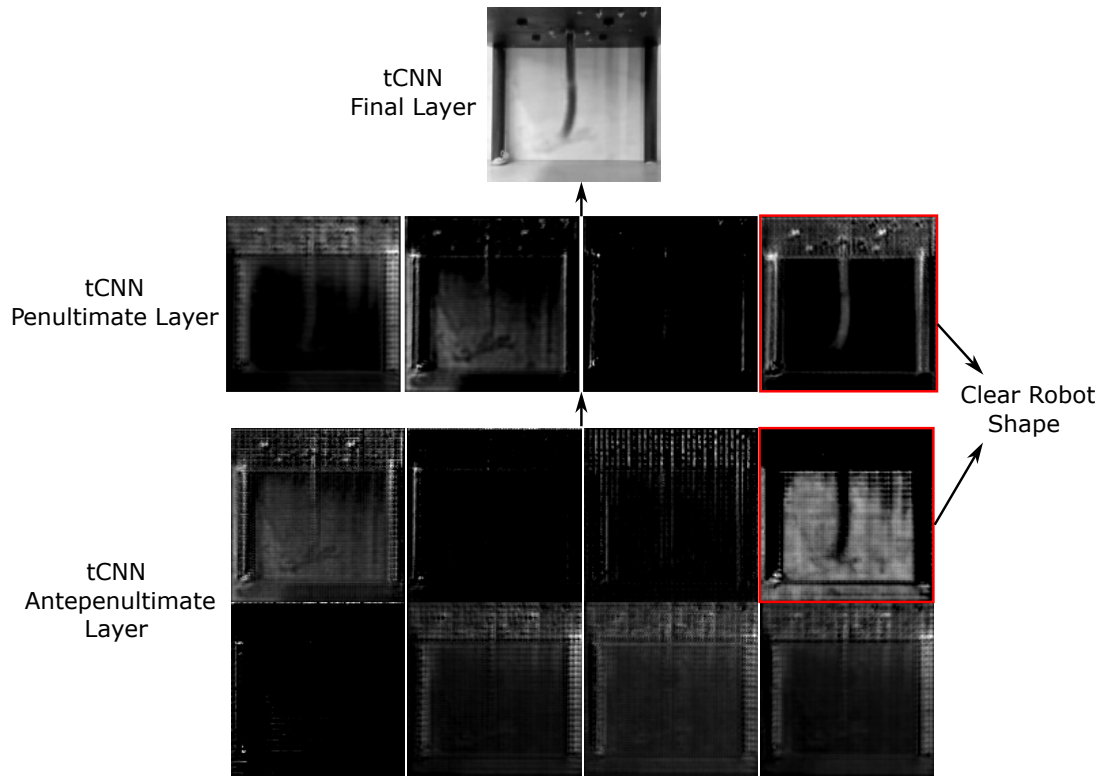


Figure S4: Visualization of the intermediate transpose CNN layers. The last layer has one grayscale channel, obtained via the transpose convolution of the previous 4 channel layer. The layer before that (antepenultimate) has 8 channels. The robot's shape is clearly segmented in the penultimate layer, opening up better methods to calculate MSE between two images, rather than the Otsu threshold used in this work.