Keynote speech

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Neural network fault tolerant control for robot systems

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Abstract. This paper proposed a novel fault diagnosis and fault tolerant control framework for nonlinear affine systems, especially robot systems. In this structure two neural networks are used as on-line estimators to reconstruct fault dynamics and compensate for the impact of the faults on post-fault dynamics. The neural network learning algorithms are derived using the Lyapunov method, so that the neural estimators are guaranteed to converge to the fault to be diagnosed, while the entire closed-loop system stability is guaranteed with all variables bounded. Moreover, with the fault compensation the system performance is maintained after fault occurs. A simulation example is used to demonstrate the design procedure, and prove the effectiveness of the method. The simulation results are compared with two existing methods and the superiority is demonstrated.