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1003-93-962 **G S Ladde*** (ladde@uta.edu), Arlington, TX 76019, and **J Chandra**. *Estimation and Control of Large-scale Stochastic Hybrid Systems.* Preliminary report.

Control of a large class of interconnected (continuous, discrete, and event driven) dynamical networks such as critical infrastructure systems can be described by the following type of equations:

$$\begin{aligned} dx &= F(t,x,\eta(t),u,y(k)) + G(t,x,\eta(t),u,y(k))dz(t), \quad t \neq t_k, \\ x(k+1) &= I(x(t_{k+1},t_k,x(k),\eta(k),v(k)),k+1), x(0)=x_0, \\ \triangle y(k) &= C(k,y,x(k+1),\eta(k),w), y(t_k)=y(k), t_k, k=1,2,3,\cdots, \\ \eta(k+1) &= M(x,\eta(k)), \end{aligned}$$

where x and y respectively are continuous and discrete time states of the system; u and v are control variables; switching rules are given by functions F, G and C (partial parts of these functions can be considered as "nonlinear uncertainties") that are governed by a finite state right continuous switching process η; $\{t_k\}$ is a sequence of waiting time corresponding to η; z is a normalized Wiener process, and w is a discrete time random process; and η, z and w are independent processes. In this paper we investigate state estimation and control design problems for such large-scale stochastic hybrid dynamical systems utilizing energy/Lyapunov-like methods. (Received October 01, 2004)