Networked control systems over MANETs

the team doing this research in the technology hub

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Networked Control Systems. Networked Control Systems (NCS) traditionally make use of wired or bus based networks for their real time communication network.

This research looks at using Mobile Ad Hoc Networks (MANETs) for the communication network.

This research looks at the use of a mobile ad hoc network (MANETs) for the real time communication network, looking at the affect of a highly dynamic wireless network on the effectiveness of the NCS.

It will:

- Research into the suitability of the MANET for the real time communication medium in NCS.
- Use MATLAB and OPNET for simulation.
- Develop an interface between MATLAB and OPNET to allow co-simulation.
- Simulate real world environments and multi-hop environments.
- Investigate the dynamics of multi-hop networks on the effectiveness of the NCS.

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what we are doing

Using the existing research works based on the two node point-to-point control systems through wireless networks, we are testing NCS models over ad-hoc networks. The steps of the research project are illustrated below.

- **Literature review**: Investigation of the methodologies, tools, techniques, models and limitations of the existing research works.

- **Control mechanism design**: Implementation of control mechanism such as Proportional plus Integral plus Derivative (PID) control, model predictive control (MPC) etc. based on the plant type and network behaviour.

- **Modelling**: Development of the mathematical models of the plant, the controller and the wireless ad-hoc network.

- **Simulation**: Interactive co-simulation of OPNET and MATLAB. OPNET will simulate the details of the ad-hoc network such as mobile node movement, wireless communication details etc. On the other hand, SIMULIK will simulate the plant and controller mathematical models.

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**basic data**

- **project started:** 02.01.2003  
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