1048-92-58 **Eduardo D Sontag*** (sontag@math.rutgers.edu), Dept. of Mathematics, New Brunswick, NJ 08903. *Remarks on Interconnections, Modularity, and Dynamics in Systems Biology.*

For systems made up of interconnected components, it would be desirable to be able to deduce global behaviors through a bottom-up analysis, based on partial knowledge of the input/output behaviors of the individual components. This is particularly important in the field of systems biology, where neither internal descriptions nor complete input/output behaviors are usually available. From a systems and control theory perspective, many new theoretical problems and exciting directions for research arise.

Two sources of difficulty in any modular approach are (a) impedance or "dynamic retroactivity" effects due to resource sharing, (b) feedback loops that expose modes of behavior that were "hidden" when individual subsystems had been studied in isolation, and (c) the lack of sufficient input variation. This talk, which is based on research done in collaboration with David Angeli, Murat Arcak, Domitilla Del Vecchio, and others, discusses mathematical concepts and theoretical results that address some of these issues, including the use of monotone systems theory or passive systems theory to deal with the "hidden behavior" problem and the lack of richness in input classes, and the introduction of a modeling framework to represent dynamic retroactivity effects. (Received January 19, 2009)