CPE 186 Computer Hardware Design

EMI & EMC

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EMI Overview

- Noise Sources:
  1) Man-made noise sources — digital electronics, transmitters, switches, etc.
  2) Natural disturbances — sunspots and lightning
  3) Intrinsic noise sources — related to random fluctuations from physical systems such as thermal and shot noise

EMI Transmission

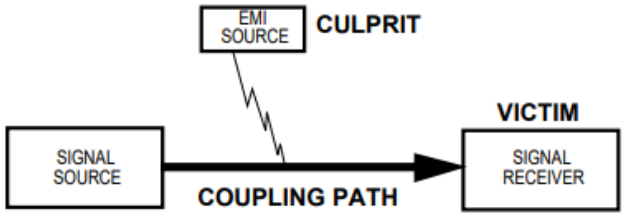

Figure. EMI Passway

EMI Sources

- Sources of EMI include microprocessors, microcontrollers, electrostatic discharges, transmitters, transient components, AC supplies, lightning, etc.

Coupling Paths

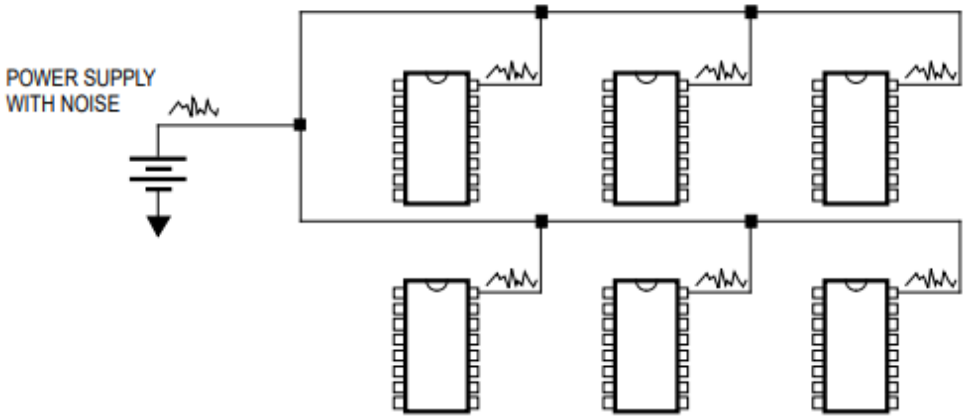

Figure . Conductor Coupled Noise

Coupling Paths

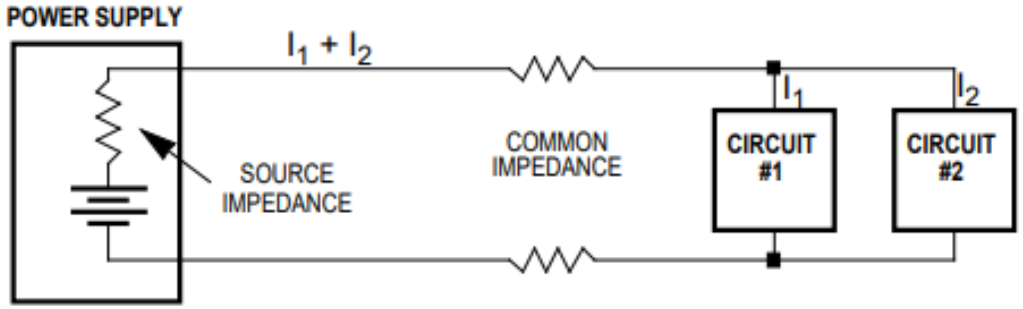

Figure . Coupling through Common Impedances

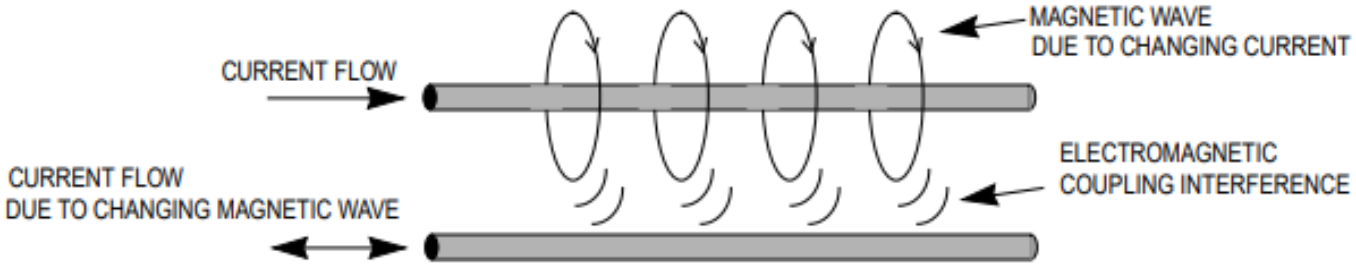

Figure . Coupling through Electromagnetic Radiation

Receptors

- All electronic circuits are inherently receptive to EMI transmissions.

Designing System Solutions for EMC

- Electromagnetic compatibility (EMC) should be approached as a systems specification.
- A circuit is electrically compatible if it does not affect or become affected by its environment.
- Some regulatory agencies have set standards for general computing equipment such as the Federal Communications Commission (FCC), the military, and international agencies.
- Although there are many remedies to EMC/EMI problems, they can be summarized by two different methods: decrease emissions and increase immunity.