5-1

INVITED: AN OVERVIEW OF CHARGE COUPLED DEVICES

G. E. SMITH

BELL LABORATORIES
600 MOUNTAIN AVENUE
MURRAY HILL, N.J. 07974

A current description of charge coupled device technology will be given. The emphasis will be in three areas; - our understanding of the basic device physics, the types of device structures currently being used, and a discussion of various applications of CCD's. The principal concern of the basic device is the ability to transfer as much charge as possible from one site to the next. This charge transfer efficiency is governed by intrinsic transport phenomena and by trapping in surface and bulk states. Our understanding of this is relatively good and will be reviewed. Various cells are currently being used and are typically a compromise between available technology, a desire for high transfer efficiency, and the need to have close charge coupling between one site and the next. Several recent cells will be discussed and compared. CCD's have rather unique properties which make them particularly suited to imaging, analog delay, and time compression applications. This is because they are basically analog devices and their delay time can be varied by varying the clock driven frequency. This is not so in digital memory applications where there are several competing technologies. Arguments that CCD's will indeed find a place in memory systems will be made.