

# The Invention and Early History of the CCD

George E. Smith  
*Bell Labs, Retired*

As the first practical solid state imaging device, the invention of the Charge Coupled Device has profoundly affected image sensing technology. They are used in a wide range of applications both as area and linear imaging devices starting with the replacement of imaging tubes used in commercial TV cameras and cam-corders. The rapid rise of their use in digital cameras has initiated the demise of film photography and created vast new markets with great economic benefit for many. Other uses include a wide variety of scientific, surveillance and scanning applications. The inception of the device at Bell Labs by Willard S. Boyle and George E. Smith in 1969 was strongly influenced by several unique factors existing both within Bell Labs and the current world state of technology. These factors and their relevance will be discussed along with the train of thought leading to the invention. Early experimental devices and their initial applications were vigorously pursued and will be described. Mention of current applications will be given.