

Based upon the SVAVISA-1 CMOS sensor, a space-variant digital camera was designed and is now commercially available¹. In this first industrial realization the main objective was to design a flexible and easy to use camera with no specific effort devoted to reduce its overall size and weight. The resulting device (the *Giotto* camera) is shown in the following picture and its main features are summarized in the following table.

Giotto Camera

Software	Windows95, NT 4.0, UNIX	
Interfacing	Parallel port (EPP mode), RS485, RS232	
Transfer Rate	Sensor's Maximum frame rate:	100 frame/sec
	Frame rate through parallel port EPP:	50 frame/sec
	Pixel rate through RS485;	125Kpixel/sec
		(10 bit @ 1,25 Mbit/sec)
	Pixel rate through RS232;	11,5Kpixel/sec
	(10 bit @ 115,2 Kbit/sec)	
Bit per pixel	B/W	8 bit (256 levels)
	Color	24 bit (8 Red, 8 Green, 8 Blue)
Lens	C-mount	
Size	Cylindrical, diameter 65mm, length 75 mm	
Power	12 Vcc @ 0,5 Amax	



The GSM Transmission

Built around the Giotto camera extensive experiments on wireless image transmission were conducted. The set-up was composed of a remote PC running a web server embedded into an application that acquires images from the Giotto camera and compress them following the H.263 recommendation for video coding over low bit rate communication line. The remote station was, in our case, a palmtop PC acting as a client connected to the remote server through a dial up GSM connection (9600 baud). Using a standard browser interface the client can connect to the web server, receive the compressed stream, decompress it and display the resulting images on the screen. Due to the low amount of data to be processed and sent on the line, up to 4 images per second can be transmitted of a traffic scene or a speaking person (see Figure 2). Moreover it is worth noting that the only special-purpose hardware device is the Giotto Camera and all coding/decoding and image remapping is done in software by a Pentium PC. The GSM connection is obtained with an off-the-shelf NOKIA Card connected to the PCMCIA interface of a Toshiba *Libretto* accessing the Omnitel voice communication network. This performance in terms of frame rate, image quality and cost cannot be afforded with systems using conventional cameras.



Figure 1: B/W Image from the Giotto Camera (above) and its remapped version (right). The Giotto image is composed of about 8,000 pixels. The face on right is that of a famous Italian latin lover.

¹ For more information on commercial aspects contact Paolo Questa (pquesta@aitek.it)

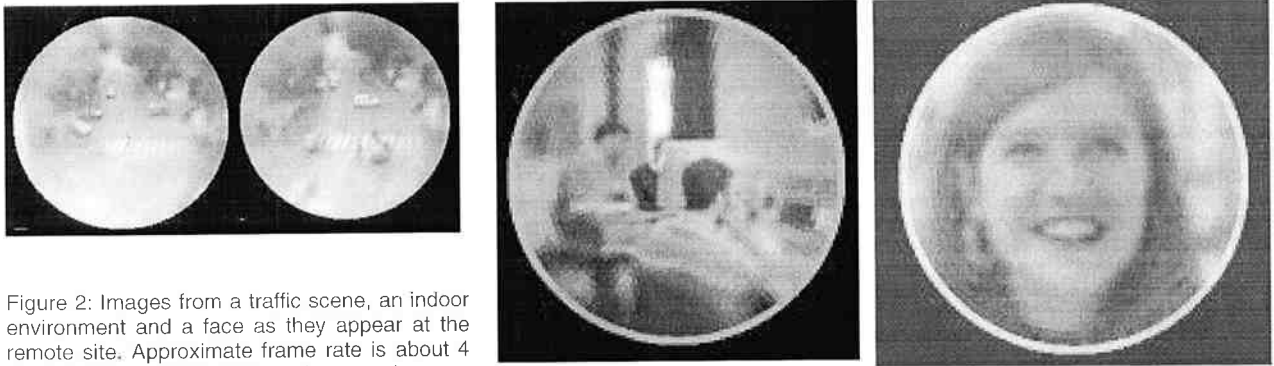


Figure 2: Images from a traffic scene, an indoor environment and a face as they appear at the remote site. Approximate frame rate is about 4 f/sec. using a GSM (9600 baud) connection.

The New SVAVISCA system

The objective of the second phase SVAVISCA project is to realize a miniature, color CMOS space-variant camera with a lens allowing at least 140° field of view and with the maximum number of pixels allowed by a 0.35 μ m technology. The design and fabrication of the new camera is due to finish in August 2000. At the present stage the design of the new version of the retina-like sensor, the lens and the camera is almost completed. It is expected that the new sensor will have at least 30,000 pixels arranged as the currently used sensor. This project is a further step toward the long-term technological and scientific goal of building an electronic camera with a number of pixels, a spatial arrangement, and a field of view comparable to that of the human eye. This is pursued through the integrated design of the solid state sensor, the lens and the driving electronics in a miniature device.

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