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Abstract
In this project, we introduce small, low power consumption, real-time image processing engine capable of tracking colorful objects. The goal of our project is to provide simple vision capabilities to small embedded systems using low cost 8-bit microcontroller in the form of an intelligent sensor. Our system uses Atmel AVR 8-bit microcontroller ATmega64, which was connected directly to the C3088 camera module using the Omnivision OV6620 CMOS image sensor, and the third traditional main part of a vision system, a frame grabber, is eliminated for reducing cost. This means that on this modest hardware architecture, we will implement simple computer image processing algorithms, previously needing a considerable amount of computing resources, consuming a lot of power and out of reach for this kind of small, cheap hardware. With careful attention to the software algorithm and applying “Fast Image Segmentation”, efficient fast color objects tracking is accomplished using commodity low cost hardware. In the RGB color space with the resolution of 8-bit for 1 color channel and 88x144 pixels/frame, our system can track 8 different color objects at the maximum speed of 30 fps. It is a functioning vision system, with a well-defined interface that is accessible through a standard serial port, providing high-level, post-processed image information to a primary system (PC, another microcontroller, etc.). This avoids the difficulties of performing the image-processing on the main system, and allows the developer to concentrate on how to use the high-level image data to perform the task at hand.
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