

System Requirement Specification for Digital Camera Project

System Description

This specification describes and defines the basic requirements for the interface of a digital camera to a microcontroller. The camera is to be mounted on a moveable turret. The horizontal and vertical movements of the turret allow the camera to pan and tilt. The microcontroller must control the pan and tilt of the camera so that it can track the movement of a white spot on a black background. The pan and tilt operations should be performed automatically when tracking but there should be provisions for a user to position the camera manually by way of commands. In addition to the tracking operation the camera should optionally be capable of taking a low resolution photograph. The microcontroller is not required to have a large memory so all image processing and capture must be done on the fly.

Specification of External Environment

The camera is to operate in normal room light. When tracking a white object on a black background, it is not guaranteed to operate properly in direct sunlight or in low light conditions. If the ability to take a photo is implemented, normal room light is again assumed. The system is to be operated indoors, so no protection against moisture is required. The system should allow power to be supplied by a 12v DC wall transformer or a 12v battery pack.

User Interface

The only external input to the system shall be provided by the user in the form of commands provided serially over an asynchronous serial communication port. The commands will include instructions to read/write the camera registers, control the position of the turret and track a white object on a black background. The commands shall be sent by the user by way of a computer keyboard (the computer should be running a terminal emulation application) or (optional) a Graphical User Interface.

Commands entered by way of the keyboard should be echoed back to the terminal monitor as they are entered. There shall be two commands used to access the camera registers,

RR xx (Read Register xx)
WR xx value (Write Register xx value)

where *xx* is the register number and *value* is the value to be written. Both the register number and the value shall be in hexadecimal.

When reading from a camera register, the contents of the register is to be displayed on the monitor in the form,

Register xx = value

The register number, *xx*, and the register contents, *value*, shall be displayed in hexadecimal on a new line. The commands that specify a turret position shall be of the form,

Pan xx (Pan the camera)
Tilt yy (Tilt the camera)

where *xx* is the x (horizontal) coordinate of the turret and *yy* is the y (vertical) coordinate. The value *xx* is to be a number between 0 and 176 and the value *yy* is to be a number between 0 and 144. These ranges correspond to the resolution of the camera which will be adjusted by to 176x144 by the application software (Note that this can also be accomplished by way of the WR command). This is the lowest resolution of the camera. The only visible output will be the movement of the turret and camera. The command to have the camera track a white object on a black background shall be,

Track

Once given this command, the camera shall continue to track until a system reset is issued.

Commands entered by way of a GUI shall be typed in a command line and the results returned should appear in a text box. Commands to pan and tilt the camera shall be provided by two slider bars, one for pan and the other for tilt. Commands to track and take a photo should be done by way of buttons.

The white object being tracked shall be a one inch by one inch square (or less) at a distance from the camera of approximately one foot. The system should be able to track a white object at a rate of at least one inch per second.