

The Solar Panel Model

Overview

The Solar Panel model allows you to explore the operation of a real solar panel.

Features of the solar panel model are:

- 30mmx30mm solar panel
- 330 degrees of directional rotation
- 4-phase stepper motor and driver
- Hall-effect transducer to detect home position
- Arduino ATmega 328 based processor with USB serial-power connector
- Pre-installed Arduino sketch with API commands for monitoring and control



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Connecting the Solar Panel model

The Solar Panel model can be connected directly to your computer's USB connector through a standard USB C connector. Simply plug in a USB cable to your computer and then the USB C connector into the Solar Panel model.

Upon connecting the Solar Panel model to your computer, the solar panel model is now ready for monitoring and control.

Monitoring and Controlling the Solar Panel model

The Solar Panel model (SPm) has a set of pre-programmed commands for you to interface with it. When these commands are issued to the Solar Panel model, it will carry out the requested action. If you issue a command to the SPm that it does not recognize, that command will be ignored.

There are several ways to send commands and receive responses to the SPm. One way is to address it through a serial terminal like those found in the Arduino IDE or in apps. Other ways to control the model is through programming languages like LabVIEW, Matlab, Python, C, or anything that can send and receive serial strings through a USB serial port.

The first two commands that the SPm recognizes are:

****ID? and getCommands***

The ***ID?** function. Sending the ***ID?** string to the SPm will prompt it to respond with its identification string. The SPm responds with the string "solartracker".

The **getCommands** function. Sending the **getCommands** string to the SPm will prompt it to respond with a list of the commands that it understands. This is the list of functions and their meanings that the SPm will return when it receives **getCommands**

Overview of Solar Panel model Commands

Command	Description	Sent or Returned
init	This moves the panel to hits home position and start state	
runScan	Initiates a 320 degree scan and determines the maximum light level and positions the panel at that angle	
trackOn	Initiates a tracking routine to seek and follow the brightest light source	
trackOff	Exits the tracking function	
goHome	Returns the panel to the home position	
goMax	Rotates the panel to the last know maximum light position	
go1Q	Rotates the panel to the 9 o'clock position	
go2Q	Rotates the panel to the 12 o'clock position	
go3Q	Rotates the panel to the 3 o'clock position	
go4Q	Rotates the panel to the 6 o'clock position	
moveCW	This will rotate the panel clockwise a given number of steps. The "1" signifies that it requires one number after the moveCW command is issued. To run this command, type moveCW then a CR/LF and then a single number afterwards with another CR/LF	1 sent
moveCCW	This will rotate the panel counter-clockwise a given number of steps. The "1" signifies that it requires one number after the moveCCW command is issued. To run this command, type moveCCW then a CR/LF and then a single number afterwards with another CR/LF	1 sent
lookCW	This will rotate the panel clockwise and if the light level is greater, the panel will remain there, else the panel will return to its original position	
lookCCW	This will rotate the panel ccounter-lockwise and if the light level is greater, the panel will remain there, else the panel will return to its original position	
getVal	This returns the current voltage value being generated by the solar panel	
getKW	This returns the current kilowatt value being returned by the solar panel.	
getCarbon	This returns 0, the level of carbon emissions from the solar panel	
getMax	This returns the position of the maximum light level.	1 returned

getlAll	This returns seven numbers from the Solar Panel. These are: Solar Panel kilowatt capacity, the current KW level being generated, the load allocated to the solar panel, the difference between what's being generated and the load assigned to it, the type of energy (1=renewable, 0=non-renewable, and -1 meaning neither like a houseload, and line voltage	7 returned
getPos	Returns the current position of the panel	1 returned
setSteps	Sets the number of steps the runScan, lookCW and lookCCW functions use to determine how far ahead to look	1 sent
setLoad	Sets the KW load assigned to the solar panel	1 sent
on	Enables the solar panel to send its current power values	
off	Sets current power value to 0	
eoc	Indicates end of command list	