Configurable Solar Tracking System User’s Guide

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# Installation

## Raspberry Pi and Shield

The 40-pin shield header and 40-pin raspberry pi header should be chosen to allow both GPIO access on the shield and a solid connection between the shield and the PI. A solid connection is important to maintain contact between the pi and the components on the PCB, and external GPIO access is important to connect the motor control board to the pi.

The approach used in the prototype was soldering extra-long, double-sided pins to the PCB shield with the plastic strip on the top side of the PCB, and the solder connections on the bottom side of the PCB. A female header (a male header with a female-female connector could also be used) was soldered to the raspberry pi itself, and the underside of the shield was connected to the top of the pi header. This approach was taken due to the PCB process used for the prototype, which did not allow for plated through-hole pads, so soldering the connector to the underside of the shield was imperative.

## Shaft Encoder

The cui AMT11 series shaft encoders are used in this design, and specifics of the mechanical mounting can be found in the AMT11 Datasheet (included in the repository). The shaft size is variable, ranging from diameters of 2mm, 3mm, 3.175mm, 4mm, 4.76mm, 5mm, 6mm, 6.35mm, and 8mm, so the azimuth and elevation motor/movement shafts must have a diameter that is compatible.

## Sun Sensor

The CAD files necessary to 3-D print the sun sensor assembly are included in the repository. The photoresistors must be inserted into the receptacles on the assembly so they are flush with the surface. The leads of the 4 photoresistors must be connected to the divider resistors and voltage measurement wires in accordance with the schematic included in the repository. Perfboard soldering is the recommended method for creating this assembly.

# Software Initialization

Directions for software installation and initialization are given in the project github repository.

# Operation