The Solar Sun Chaser

Group 3 Presentation

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Project Overview

- The MSP430 will be used to continuously reorient a solar panel array towards the sun.
- Repositioning the solar panel throughout the day will maximize the amount of energy collected.
- Photoresistors will be used to determine when the stepper motor should move the array.

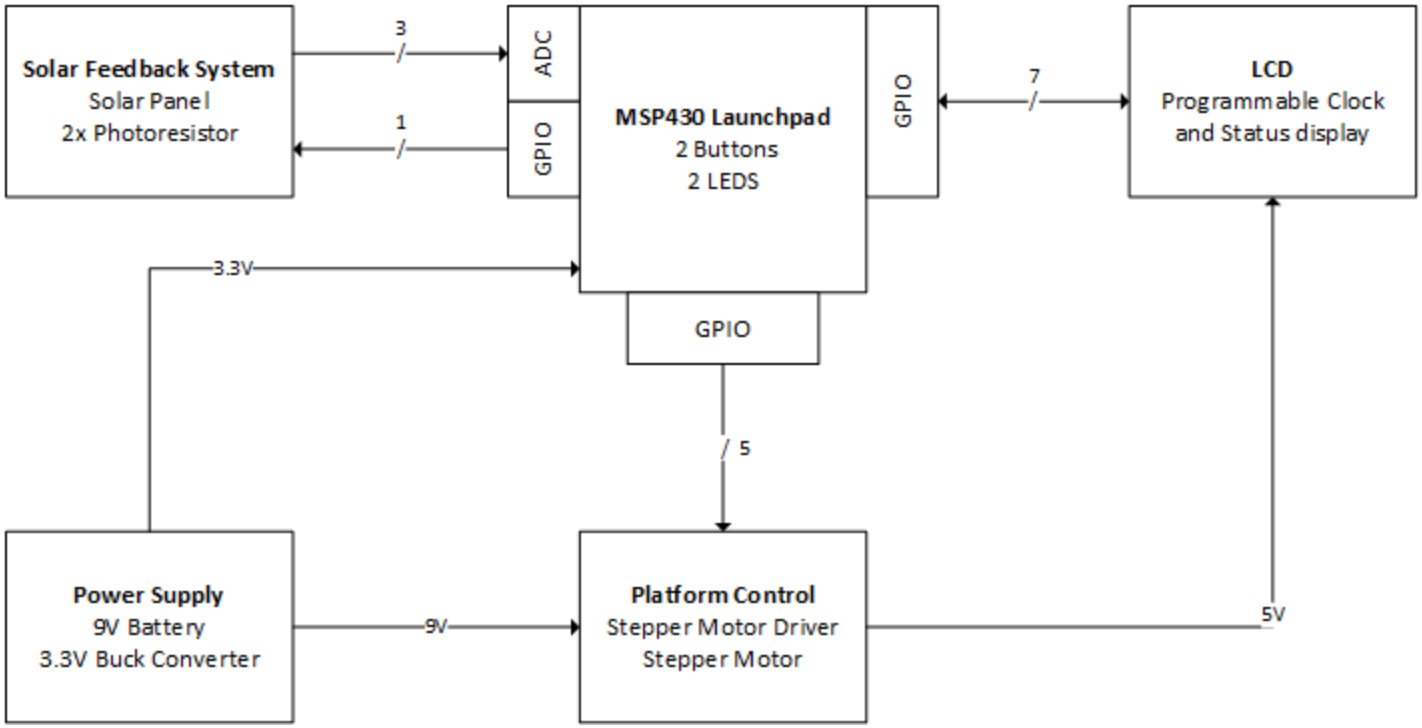
Motivation

- Provides an efficiency gain for a useful process – the collection of Solar Energy
- Photoresistor network was a simple and effective approach to tracking
- Fair and easy division of labor among team members
- Used hardware the team already owned: LCD, Stepper Motor Controller.

Why the MSP430?

- Low-power capability complements the idea of improving the solar panel's efficiency
- Can interface with a wide variety of components
  - Motor
  - LCD
  - Redundancy
- Platform for Extendibility
  - Solid state compass
  - GPS
  - Data or Metric processing

Block Diagram

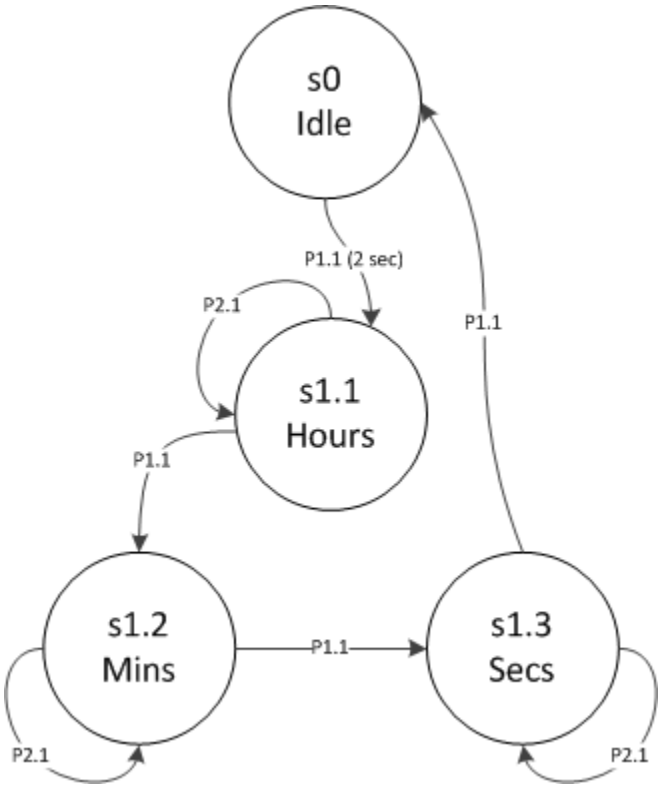


Hardware Description

- Solar Feedback System:
  - A solar panel with two photoresistors oriented 45 degrees away from each other
- Rotating Platform:
  - All components mounted an a Lazy Susan platform
  - A stepper motor rotates the base and solar panel
- Control and Status:
  - MSP430 Launchpad F5529 controls all peripherals
  - Programmable LCD with current time and voltage

Software Description

- Real Time Clock subsystem used to sleep MSP430
- Every second an interrupt from the RTCA triggers the main processing loop
- The main loop updates the LCD screen with current time
- Two buttons on the launchpad allow setting the current time



Software Description – ADCs

- The main loop also triggers operation of the solar panel subsystem
- The solar panel and photoresistor voltages are read using a single-sequence capture of the MSP430 ADCs
- The solar panel A/D voltage is converted to actual volts for display on the LCD
- The photoresistor voltages are subtracted and compared against a threshold to determine if there is more light in either direction
- If the clockwise direction has more light, the software triggers the stepper motor to move the platform ~4 degrees clockwise

Results

- It works!
- Some issues:
  - Wheel occasionally slips, could be resolved with better construction
  - LCD screen flickers while driving the motor.
  - Flashlight too close confuses the sensors.
  - Light source directly behind.

Demo

Questions?