SUN TRACKING SOLAR PANEL

ABSTRACT

In this project we aim to help the environment by making the solar cell generate the maximum energy by changing its position to be almost perpendicular to the sun rays all day.

Instructors

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THIS PROJECT IS MADE BY

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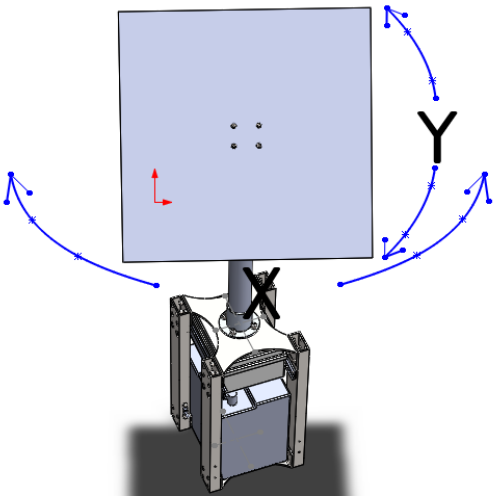
operation protocol

1. Every 12 hours the position of the (x-axis then y-axis) is initialized
2. Scanning sectors (x-axis then y-axis) to get the maximum reading
3. record phototransistor sensor readings on x-axis
4. Set position on x-axis
5. record phototransistor readings on y-axis
6. Set position on y-axis
7. If any phototransistor sensor on any side has lowered the readings x-axis and y-axis stepper motors towards the greater side
8. The periodic scan is done every 1hr



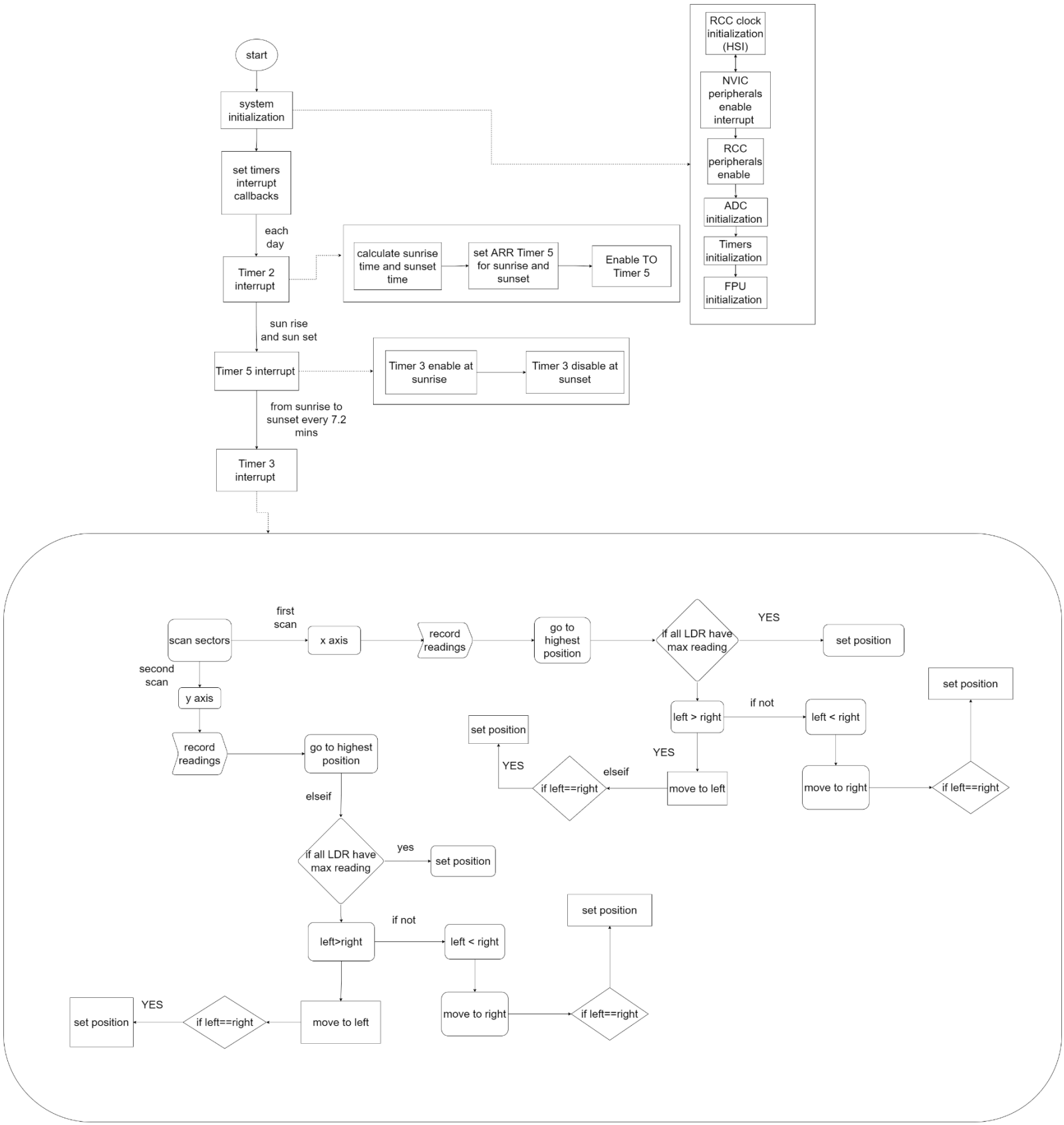
The materials used for this project

1. Stm32f401ve microcontroller
2. phototransistor sensors
3. l293D (stepper motor driver)
4. stepper motors (one for each axis)
5. resistors

Drivers made for this project

1. RCC
2. GPIO
3. NVIC
4. ADC
5. SYSTICK
6. TIMER

flow chart


start
system initialization
set timers interrupt callbacks
each day
Timer 2 interrupt
calculate sunrise time and sunset time
set ARR Timer 5 for sunrise and sunset
Enable TO Timer 5
RCC clock initialization (HSI)
NVIC peripherals enable interrupt
RCC peripherals enable
ADC initialization
Timers initialization
FPU initialization
sun rise and sun set
Timer 5 interrupt
Timer 3 enable at sunrise
Timer 3 disable at sunset
from sunrise to sunset every 7.2 mins
Timer 3 interrupt
scan sectors
first scan
x axis
record readings
go to highest position
if all LDR have max reading
YES
set position
second scan
y axis
record readings
go to highest position
left > right
if not
left < right
set position
YES
if left==right
elseif
move to left
YES
set position
move to right
if left==right
elseif
if all LDR have max reading
yes
set position
left>right
if not
left < right
set position
move to right
if left==right
move to left
if left==right
YES
set position

circuit simulation (performed on proteus v8.0)