SELF CHARGING BOT

GROUP MEMBERS:

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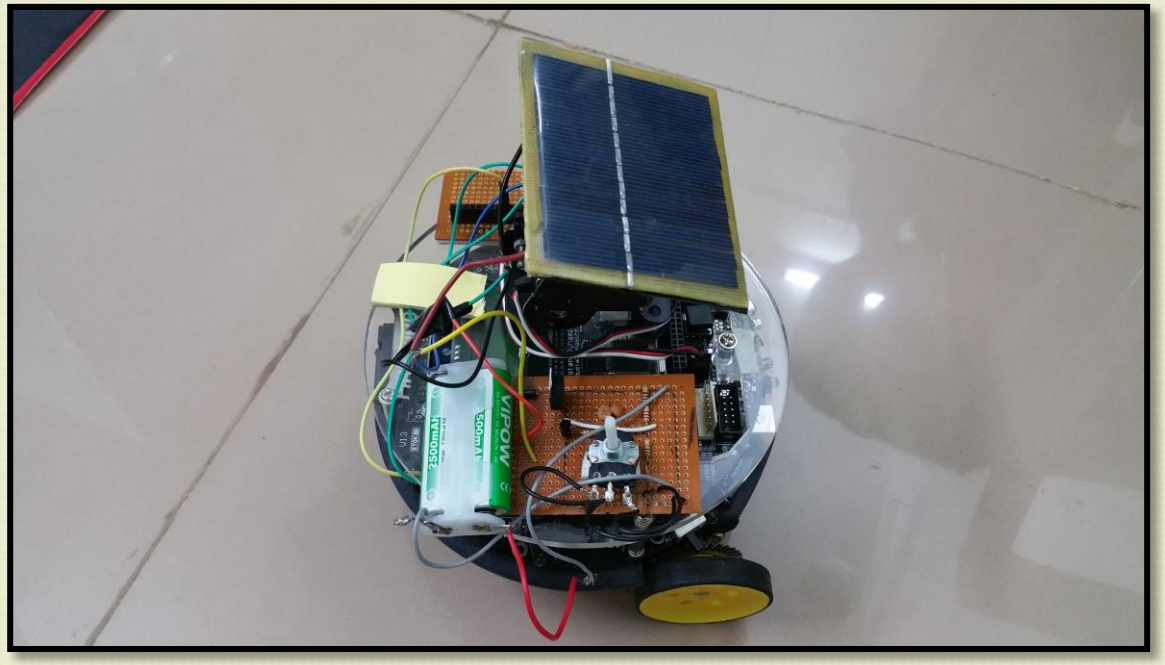
PROBLEM STATEMENT

The aim of the project is to charge the bot with solar power with maximum efficiency.



Implementation

1) The bot will follow white line to reach the predefined points
2) After that, the bot will rotate itself as well as the solar panel to find the direction of maximum intensity of light.
3) The bot will align itself at the angle at which it has found the maxima.
4) The solar panel would be aligned at the angle of maximum intensity.
5) After some user defined duration of time, the bot realigns its position and the same process is repeated for further points.

PROJECT VIDEO

- https://youtu.be/bZWvSDTRLRo

CHALLENGES AND SOLUTIONS

Problems faced:

(1) **Time Delay:**

- For rotation of bot by 5 degree time delay given is 61.9ms (calculated using hit and trial) with stabilization time of 400ms. Hence total time spent for aligning the bot was (61.9+400)*(360/5)=33.25 s.
- For rotation of servo by one degree delay time IS 400ms. so total time for one full rotation is 66 s. Hence total time for every 5 degree is 72*66=79.2minutes.
- Therefore total time required to check is (79.2 MIN+33.25 S) 80.30 minutes.

CHALLENGES AND SOLUTIONS

SOLUTION:

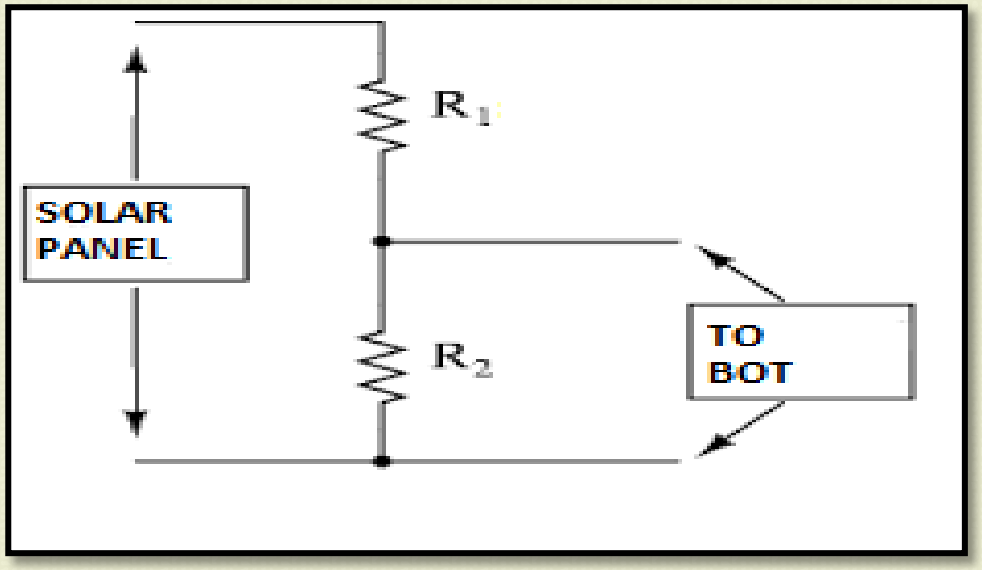
- To overcome this problem we came up with a solution which reduced the time duration drastically to 3.30 minutes only.
- We decided to identify the plane of maximum intensity first and then align the panel only in that plane.
- Hence the time delay of servo rotation in each plane was curbed.

CHALLENGES AND SOLUTIONS

2) Maximum voltage that can be given to bot as input is 5V but the panel can generate voltage up to 9V.

SOLUTION:

We used a voltage divider circuit to ensure the voltage drop across bot is 4V maximum. The resistors used are 68 KΩ AND 150 KΩ.



CHALLENGES AND SOLUTIONS

3) The third challenge was measurement of voltage from solar panel .

SOLUTION:

We used ADC channel number 10 to input the voltage from solar panel. Initially this channel was used for sharp IR sensors.

CHALLENGES AND SOLUTIONS

4) Power variation due from battery.

Solution:

Auxiliary power was used instead of batteries to avoid voltage fluctuations and hence to rotate the DC motor with uniform velocity

CHALLENGES AND SOLUTIONS

5) **White line sensitivity:**

In presence of high intensity light source bot sometimes did not recognise the nodal point.

SOLUTION:

The black plastic coated surrounding of white line was covered with black chart paper so as to reduce the reflection from plastic.

CHALLENGES AND SOLUTIONS

- (6). **Charging the battery**

  The maximum voltage given out by the panel was 9V at around 2p.m

  Since the voltage required for charging the battery of bot is 12 V, it was not possible to charge the battery with this solar panel.

  Solution:

  We decided to demonstrate the project with two external rechargeable batteries.

CHALLENGES AND SOLUTIONS

FUTURE WORK

- The bot can be used to charge mobile batteries with some additions.

- The bot can charge itself while doing other activities. Example: In urban agriculture, the bot would charge itself while irrigating the plants.

INNOVATION

- Panel was given two degrees of freedom.
- No light intensity sensor or LDR was used. The voltage from the panel was directly used to identify the maxima.