Université de Liège

INFO2055-1 Embedded Systems Project

Sensor and actuators validation
Sunflower solar panel

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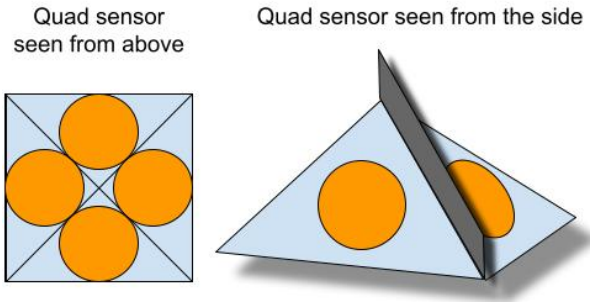
1 Prototype idea

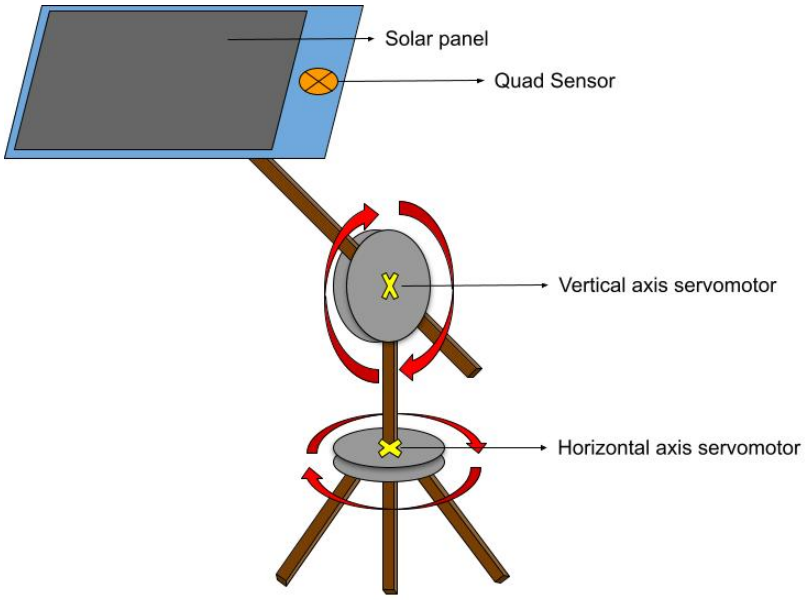
Below is a schematic version of the system to understand how it will work.
First we have a quad sensor composed of four LDRs. Two of them will be used to get the horizontal direction of where the light is coming from and the other two will be used to get its vertical direction.
Then, we have a representation of the complete system, containing the quad sensor we just mentioned. Three main components are important to be noticed here. Two of them are the servomotors (one rotating at 180° and the other one at 360°). These will be important to rotate the third component which is the platform containing the solar panel and the quad sensor, which will regularly send data to the microcontroller in order to adjust the angle of the solar panel.

Representations :

Quad sensor :



Full prototype :



2 Software architecture

We decided to go with a Round Robin with interrupts architecture
Our set of tasks will be composed of :

- τ_1 Compute horizontal resistances of the quad detectors.
- τ_2 Horizontal servomotor movement.
- τ_3 Compute vertical resistances of the quad detectors.
- τ_4 Vertical servomotor movement.

We also have one interrupt routine :

1) $Timer_1$ triggered every X[1] minutes (for now) which will put Boolean for τ_1 at True.

This will cause a chain reaction leading to horizontal and then vertical movement of the servomotors.

Here is the pseudo-code of what the actual code canvas should look like.

```
volatile BOOL ready1 = 0, ready2 = 0, ready3 = 0, ready4 = 0;

interrupt void timer_task1(void)
{
    ready1 = 1;
}

void main(void)
{
    for(;;)
    {
        if(ready1)
        {
            !! Compute horizontal resistances of the quad detectors.
            ready2 = 1;
            ready1 = 0;
        }
        if(ready2)
        {
            !! Horizontal servomotor movement.
            ready3 = 1;
            ready2 = 0;
        }
        if(ready3)
        {
            !! Compute vertical resistances of the quad detectors.
            ready4 = 1;
            ready3 = 0;
        }
        if(ready4)
```

1. not determined yet

```
        {
            !! Vertical servomotor movement.
            ready4 = 0;
        }
    }
}
```

3 Where we are now

As you can see, the report we deliver here does not contain any section on our sensors and actuators validation yet. This is because we did not manage to test our components yet and we are still trying to figure out how to properly use MPLAB X and how to program our microcontroller.