

Agro-dispenser and Indicator

Group: Crodeators

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2.Contribution:

Tejesh Raut: 100%

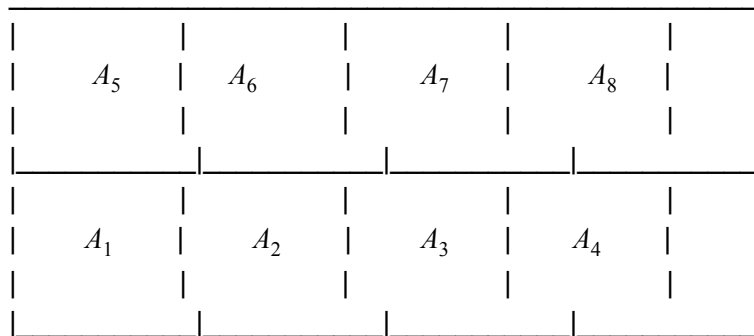
Shrey Kumar: 95%

Gangesh Gudmalwar: 90%

Suyash Bhatkar: 80%

3.High level Architecture:

We will consider a constant area and divide it into 8 parts (A_1, A_2, \dots, A_8)



Each of the area will have two counters (B_1, \dots, B_8)(each a vector of 5 bits) and (C_1, \dots, C_8)(each a vector of 10 bits).

Counter B_i represents the number of days land has been barren for.

Counter C_i represent the number of days since the plants in that area were planted.

The Agro-dispenser will travel along the grid of the particular partition of the area at first and then to the other partition and will update the counter using the clock.

Whenever the Agro-dispenser enters an area block say A_i , it takes input CurrentAreaNumber(3 bit vector), Humidity (H: 3 bit vector) of that area block and the type of crop planted in that area (Cr: 3 bit vector). The Agro-dispenser travels horizontally and then changes the row and thus in this way covers the complete block of area and then shifts to another part of land, say A_{i+1} .

When the agro-dispenser is inside an area block it goes to each crop and then takes as input, the height of that crop(Ht: 3 bit vector) and health of that crop and then decides whether to cut it or not. It gives a 2 bit signal (Cut: 2 bit vector) to cut the crop (00 represents don't cut, 10 to uproot completely, 01 to cut it till height 6 and 11 to uproot and report which will be needed when the duration of the crop is over and it may rot).

4. Description of Functionalities of Blocks

(i) DCM Resetter - It takes CurrentAreaNumber, SDispenser and Reset as input and outputs the signal DCMswitch (8 bit vector), to state which areas DCMcounter should be switched on in.

(ii) BCM Resetter - It takes CurrentAreaNumber, SDispenser and Reset as input and outputs the signal BCMswitch (8 bit) to state which areas BCMcounter should be switched on in.

(iii) Duration Counter Maintainer - It takes the counter all C_i 's, i from 0 to 7, DCMswitch as input and increments all the counters C_i 's which are switched on and if they are switched off(means '0') make them 0.

(iv)Barren Counter maintainer - It takes the counter B_i 's i from 0 to 7, BCMswitch as input and increments all the counters B_i 's which are switched on and if they are switched off(means '0') make them 0.

(v)Current Duration Counter - It takes all C_i 's , CurrentAreaNumber and outputs the DCMcounter C_i corresponding to current area.

(vi)Current Barren Counter - It takes all B_i 's , CurrentAreaNumber and outputs the DCMcounter C_i corresponding current area.

(vii) Check Completed Duration - It takes C_i (current) and CropType as inputs and checks if crop duration has been completed and outputs signal Reset (1 bit).

(viii) Crop Height & Health Checker - It takes the height of crop(Ht: 3 bit vector) and health of the crop(HI: 1 bit, 1 to represent dead and 0 to represent normal) and gives signal(Cut: 2 bit vector either 00, 01(cut till 7) , 10 to cut uproot completely or 11(report and uproot completely) to the controller.

(ix) Humidity Checker and watering system - It takes the humidity (Humidity: 8 bit vector) as input after entering an area block and sends a signal to water (Water1: 8 bit vector to denote the level of tap to be opened to water that area block)

(x) Watering - It takes the counter B_i as input before entering an area block and then give a single bit output(S1: 1 bit) to signal to water and dispense the seeds when the land is left barren for 30 days and it also directs the dispenser to water the soil completely i.e. sends S1 signal to the final watering process.

(xi) Final Watering - It takes the Water1 and S1 as input and then directs the Agro-dispenser to till the soil if land is barren since 1, 3, 5 days (first 3 times on alternative days).

(xii) Seed dispenser - It takes the S1 as input and then decides whether the seeding is to be done or not and switches off the barren counter and starts duration counter.

(xiii) Soil tiller - It takes the counter B_i (no. of days since when the land is barren) as input and then directs the Agro-dispenser to till the soil if land is barren since 1, 3, 5 days (first 3 times on alternative days).

(xiv) Busy-setter (Inside Controller)- It is used to set the busy counter to 1 whenever a process is going on. As mentioned by Ashwin sir no two processes should run at the same time so we kept a busy signal to sequentially execute processes and we kept a priority among the process.

5. Assumptions and Constraints

- The total area is constant ($2 \times 4 = 8 m^2$).
- Only a particular type of crop is grown in an area block.
- Also the dispenser is directed manually.
- All plants of an area block do not die at the same time i.e. majority of the crops in an area block are alive till the complete duration of the crop.
- To prevent the crop from growing beyond height 111 we will cut the crop till 110(6) if the crop-height is 111.
- For simplicity we are assuming a day to be of 8 seconds
- After watering crop, humidity of soil becomes 11111111 (full).
- As mentioned by Ashwin sir we are ignoring the minimum number of crops per square meter and variance.
- No calculation of power consumed.

6. Plan for testing and verification

- Corner case: Say if one crop dies then the cutter should not cut all crops. We will seed in that area along with the all other crops of that area block when the duration is complete.
- We have provided 3 testbenches and screenshots and details of the results are provided in the “others” folder in the main directory.
- Testbench_1_1.png, Testbench_1_2.png and Testbench_1_3.png denote the result of Testbench1.
Testbench_2_1.png, Testbench_2_2.png and Testbench_2_3.png denote the result of Testbench2.
Testbench_3_1.png denote the Testbench3.

