Long project : factory of the future

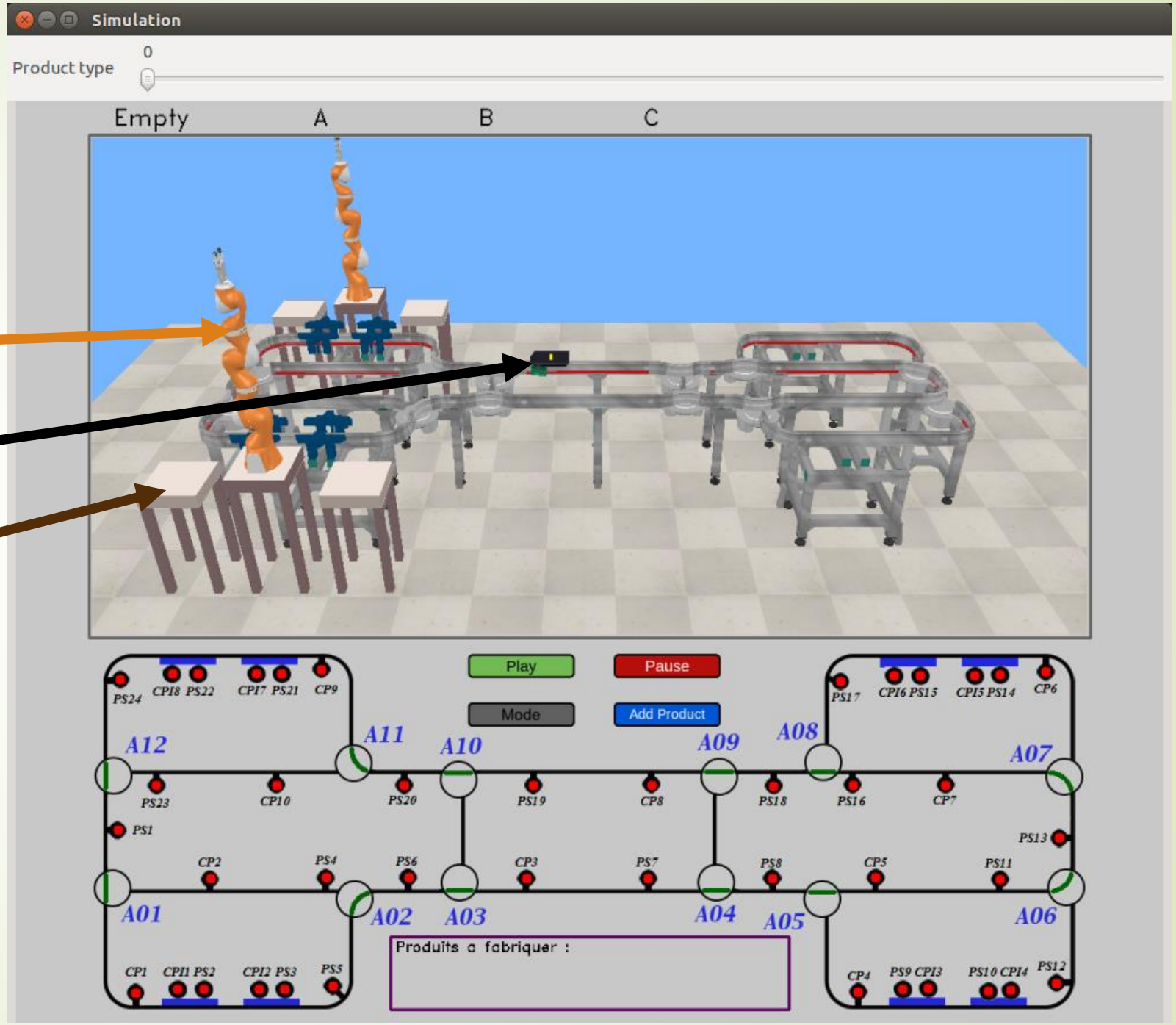
Porziemsky Vincent, Vinel Julien, Folny Clément and Bolzer Baptiste

Aim of our project

- Creating a new subject for future ENSEEIHT students to make them study the command systems including robots

Context

- Robots
- Shuttles
- Workstation



4 Summary

Starting point

What needed to be done ?

What has been done ?

The future of the project

Soft skills acquired

Starting point

Need changes	Working well
/!\Simulation too slow /! - Wrong shuttle management - User interface - Input/Output of products - Glitches in the code	- 3D model - Using of ROS - Coloration of shuttles/tables to simulate a product

What needed to be done ?

Correction of the past version

Adding new functionalities

Development for the future

What needed to be done ?

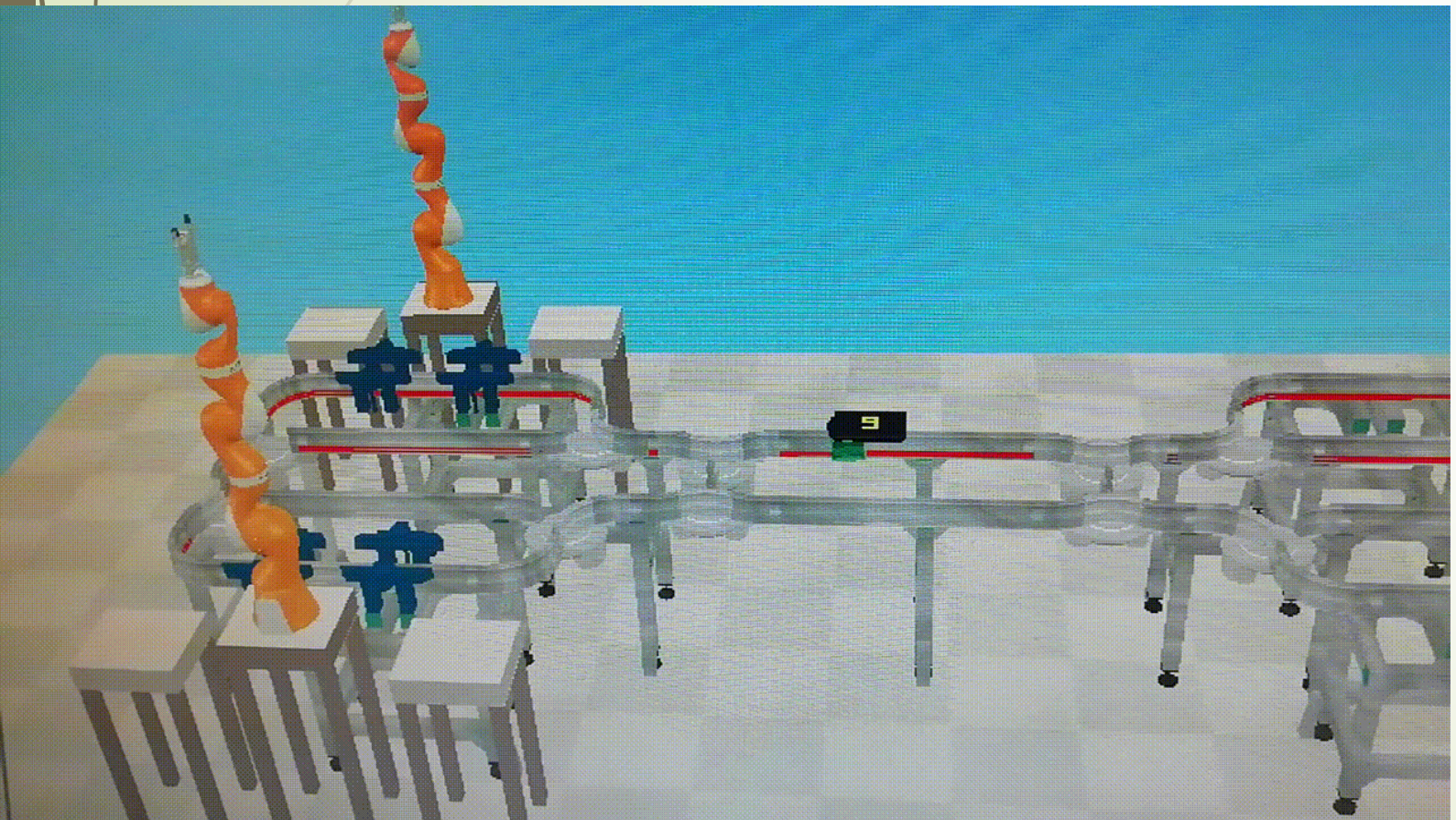
Correction of the past version

Adding new functionalities

Development for the future

Improving simulation speed

- Simulation speed:



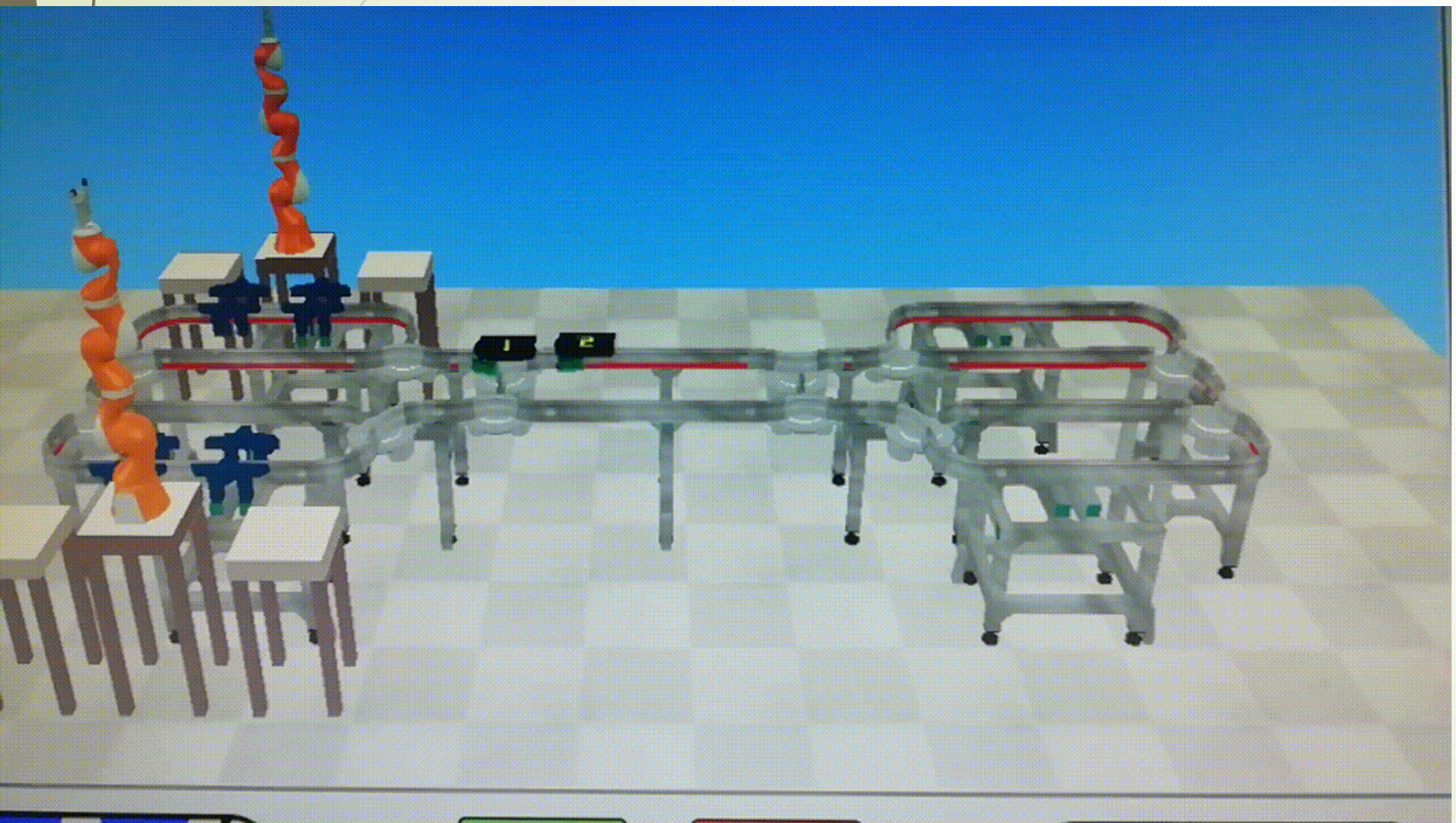
Hypothesis:

1) Program too big ?
→ program simplification

2) 3D model too precise ?
→ Removing robots

Improving simulation speed

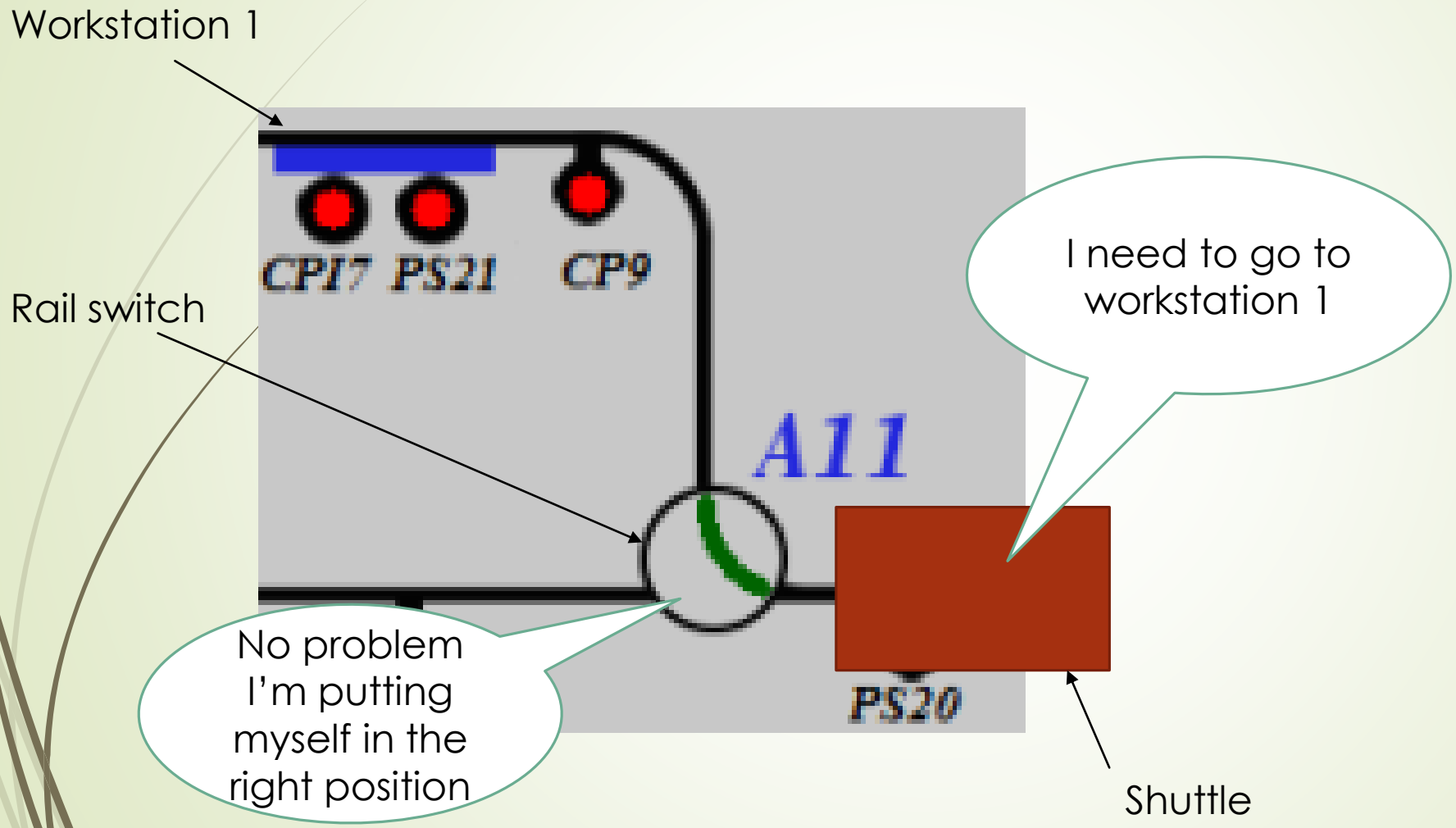
- Result:



Removal of infinite loop by making functions sleep

We can keep the robots !!!

Unrealistic shuttle control



Not possible for the real system !

What needed to be done ?

Correction of the past version

Adding new functionalities

Development for the future

Design new high level functions

For shuttle control

- Direct control of rail switches
- Access to sensors and signal control

Adapting the coloration

- To move the product from the shuttle to the workstation
- Communication for handle

Simulation Configuration

- Choose the parameters at the start of the simulation
- File ProductConfiguration.config

```
Start
nbNavettes : 6
nbLoop : 2
deltaLoop : 5
delta : 2 2 2 5
A : 1 3 4 : 1 1 1
B : 1 4 3  : 1 1 1
A : 1 3 4 : 1 1 1
C : 3 : 10
```

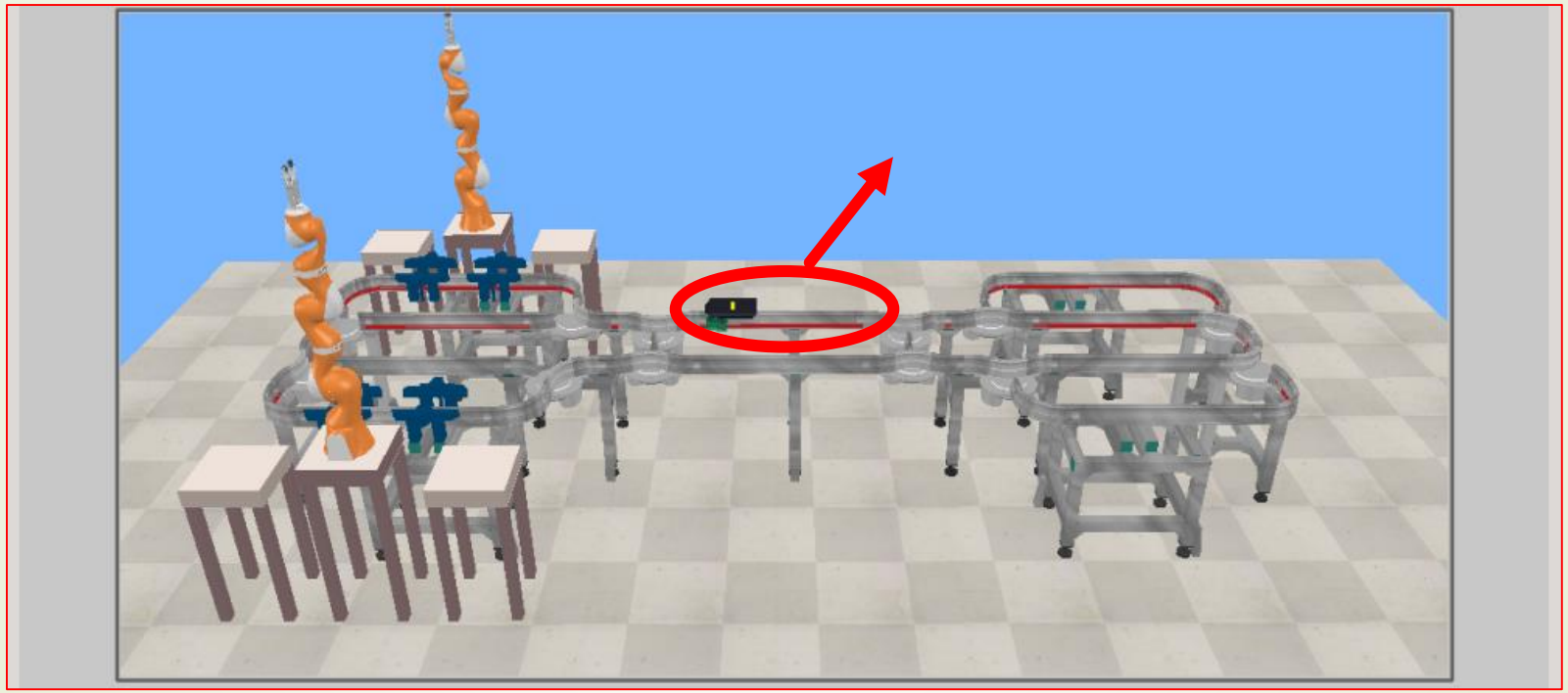
Products inputs

- Challenge : Where should the products appear ?

- Solution : On workstation 2

Products outputs

- Challenge : Where should the products disappear ?

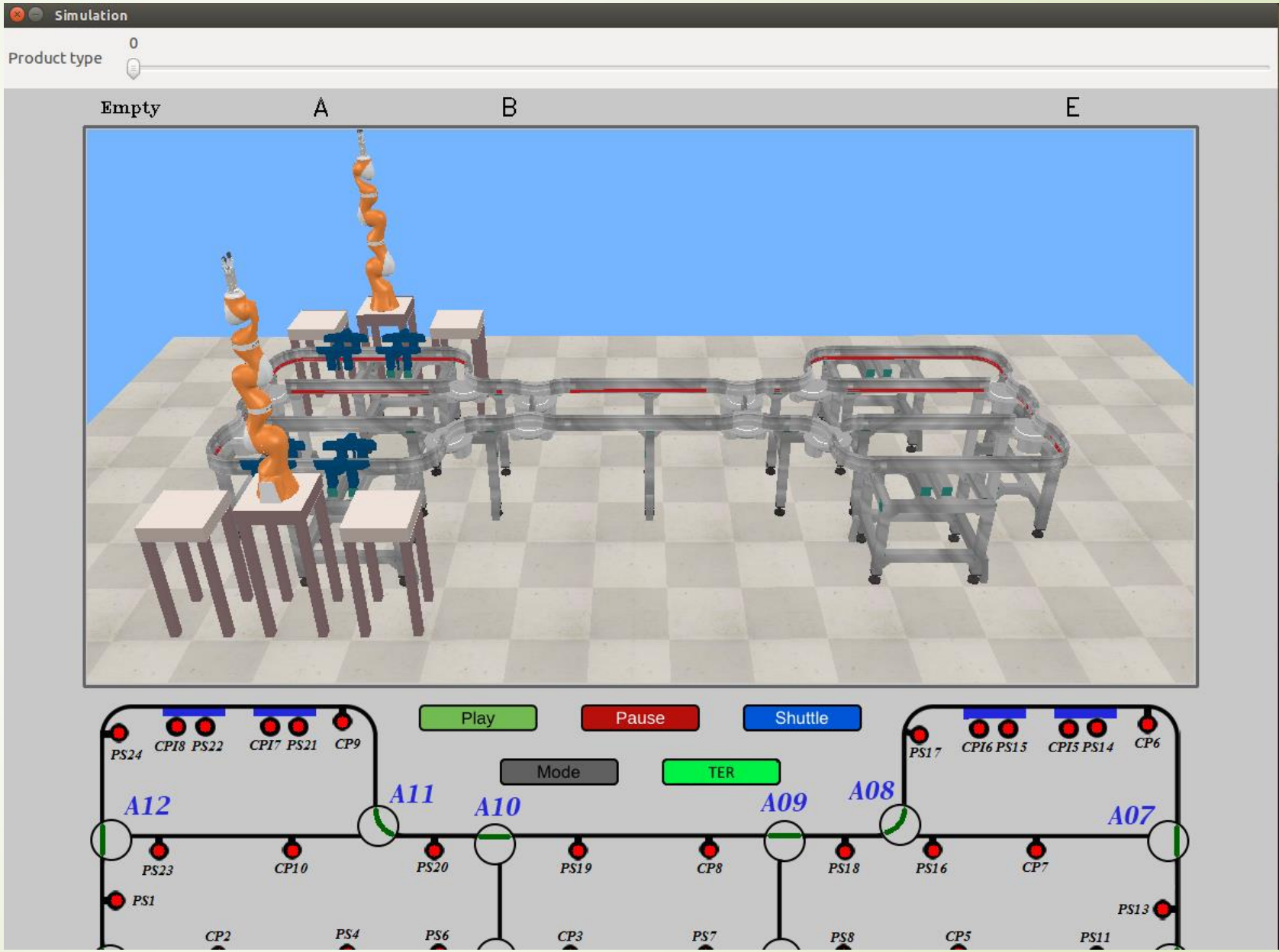


- Solution : After a specific sensor

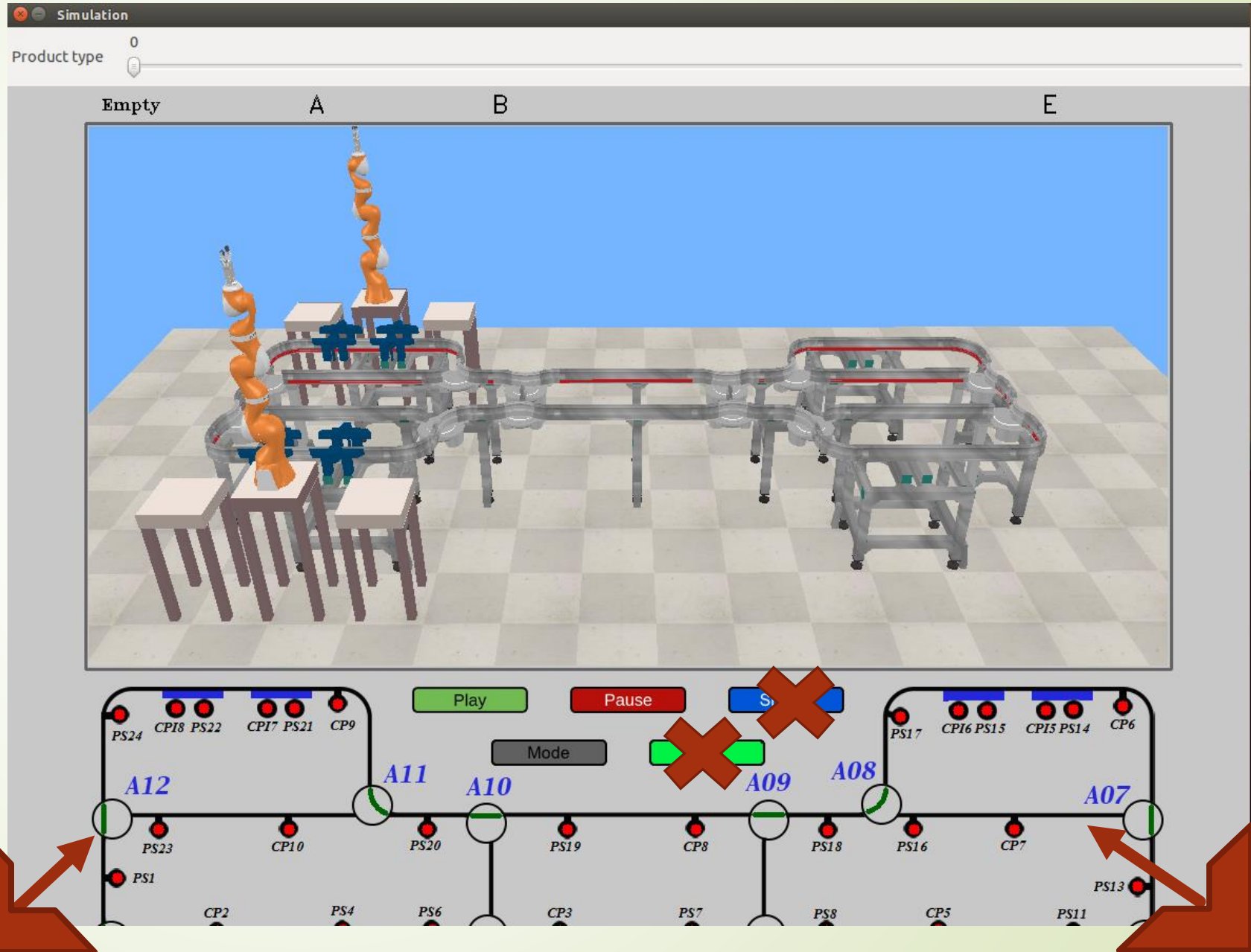
User Interface

- Issues :
  - We don't see all the rail switches
  - Useless buttons

- Before :

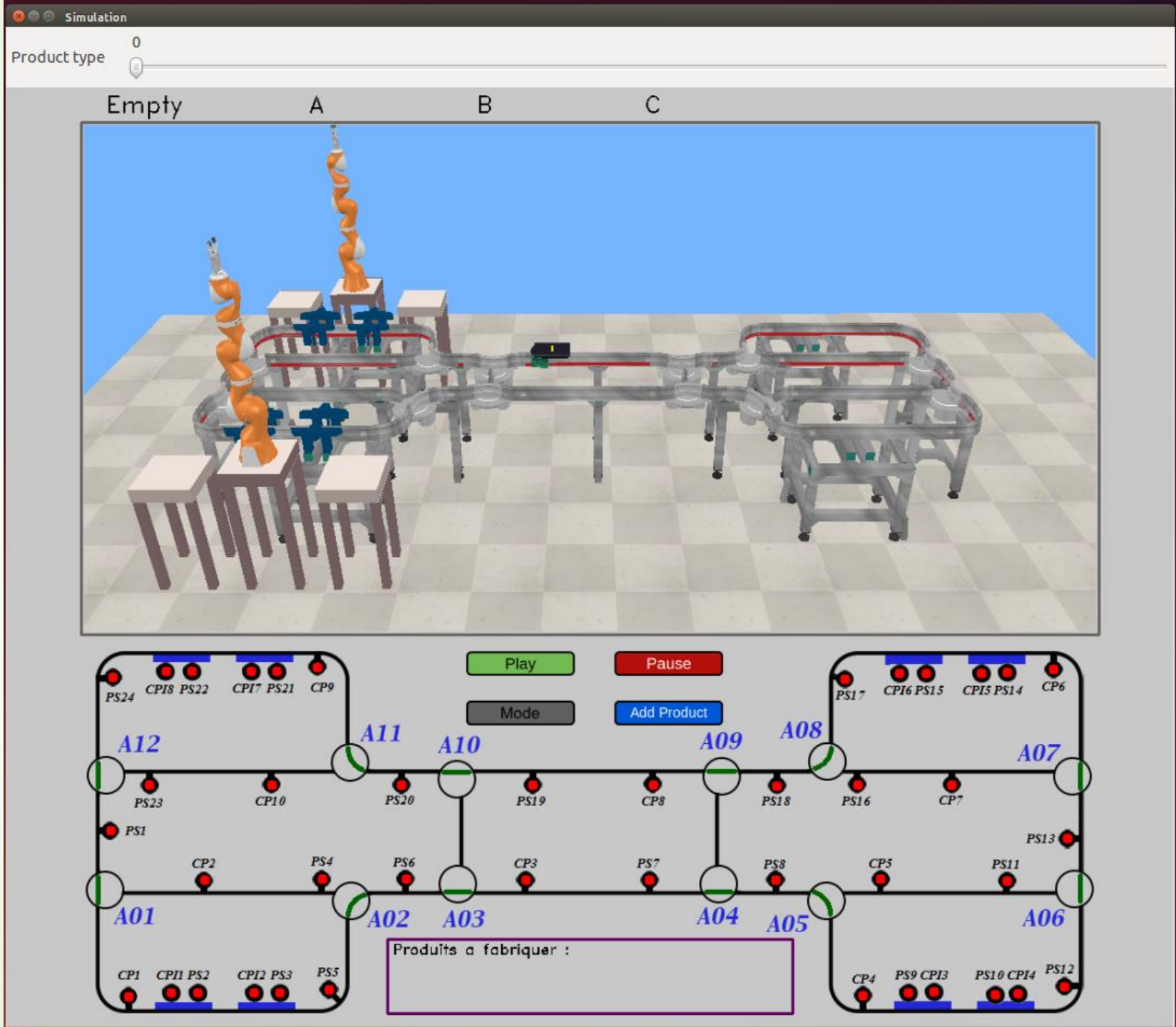


User Interface



User Interface

- New UI :



What needed to be done ?

Correction of the past version

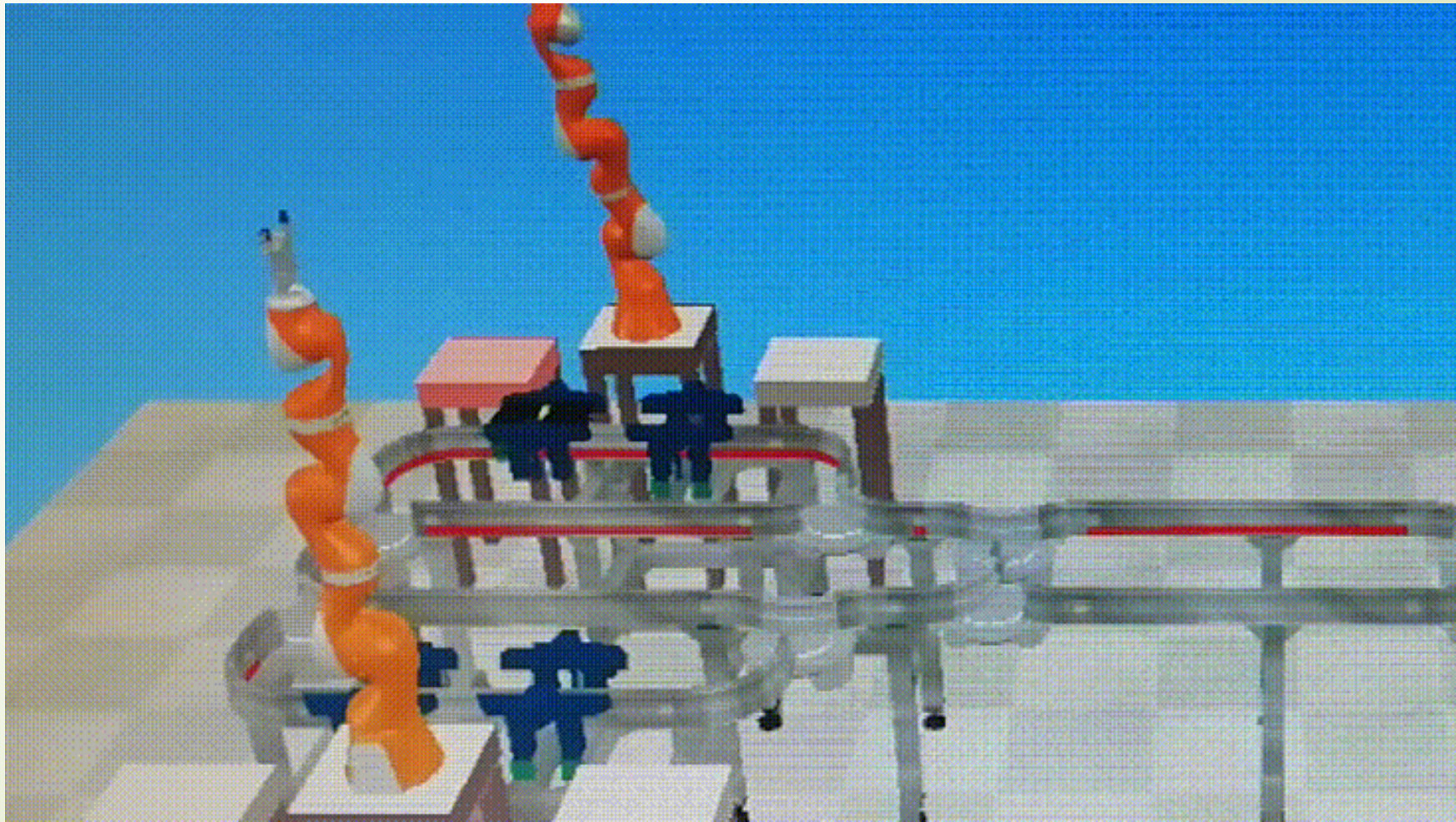
Adding new functionalities

Development for the future

Improving 3D model

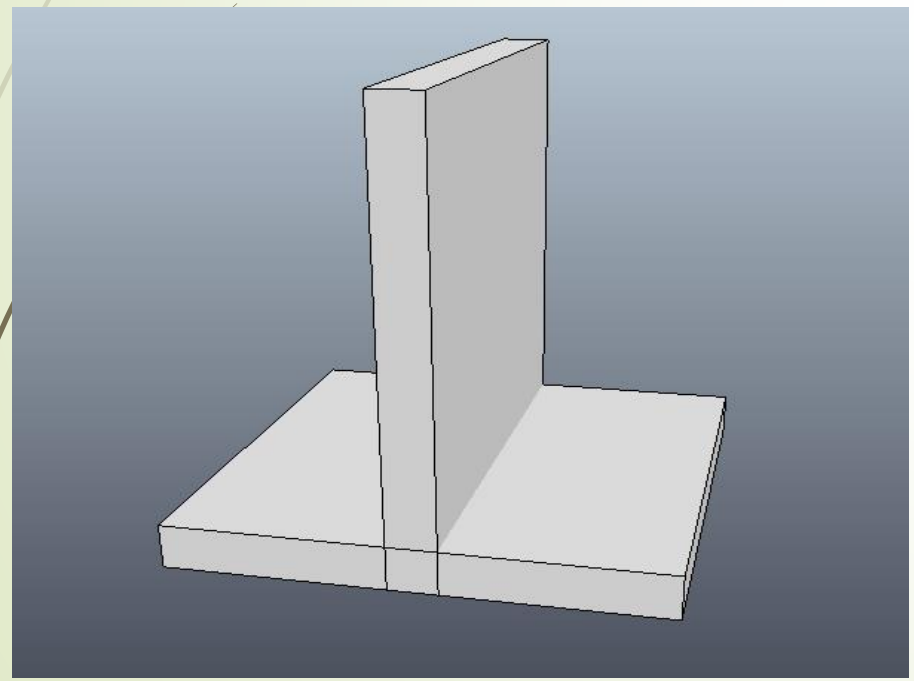
- Challenge : using 3D models instead

- System using colors

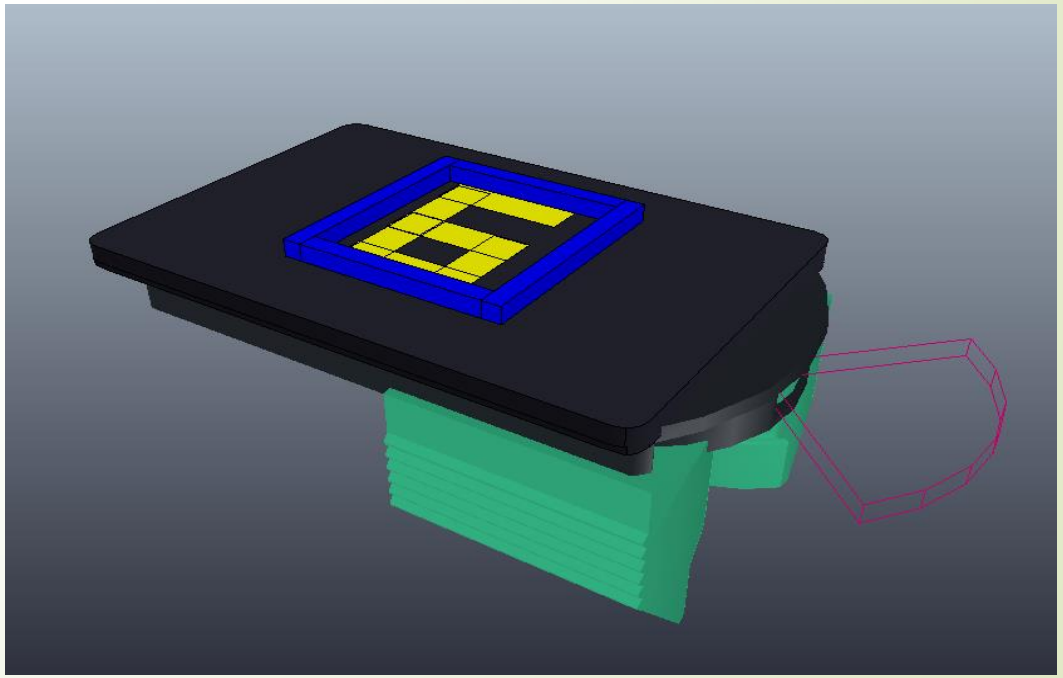


Improving 3D model

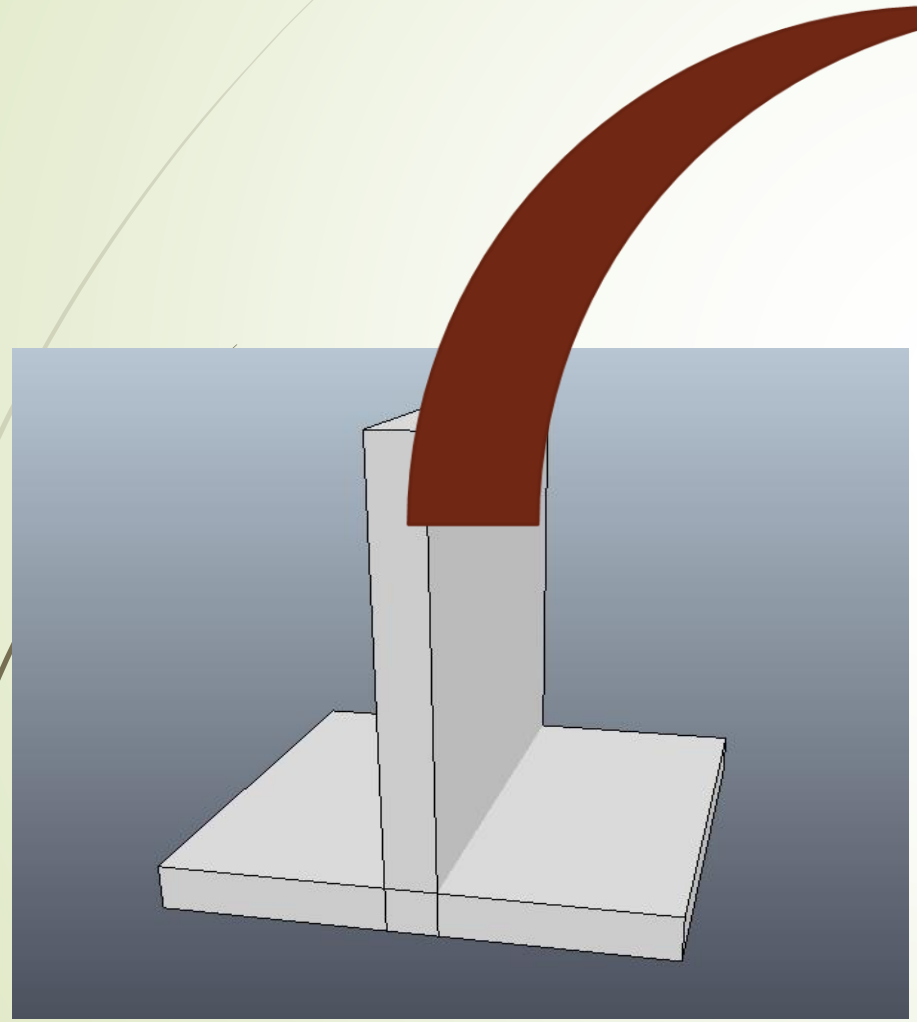
New 3D product shape

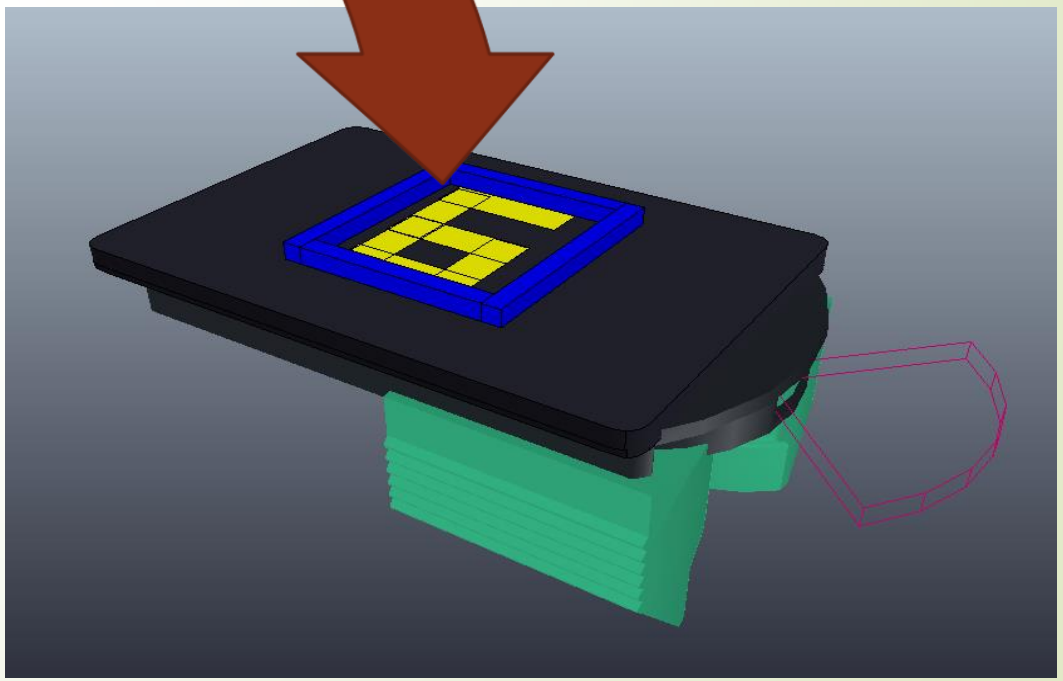


New shuttle shape



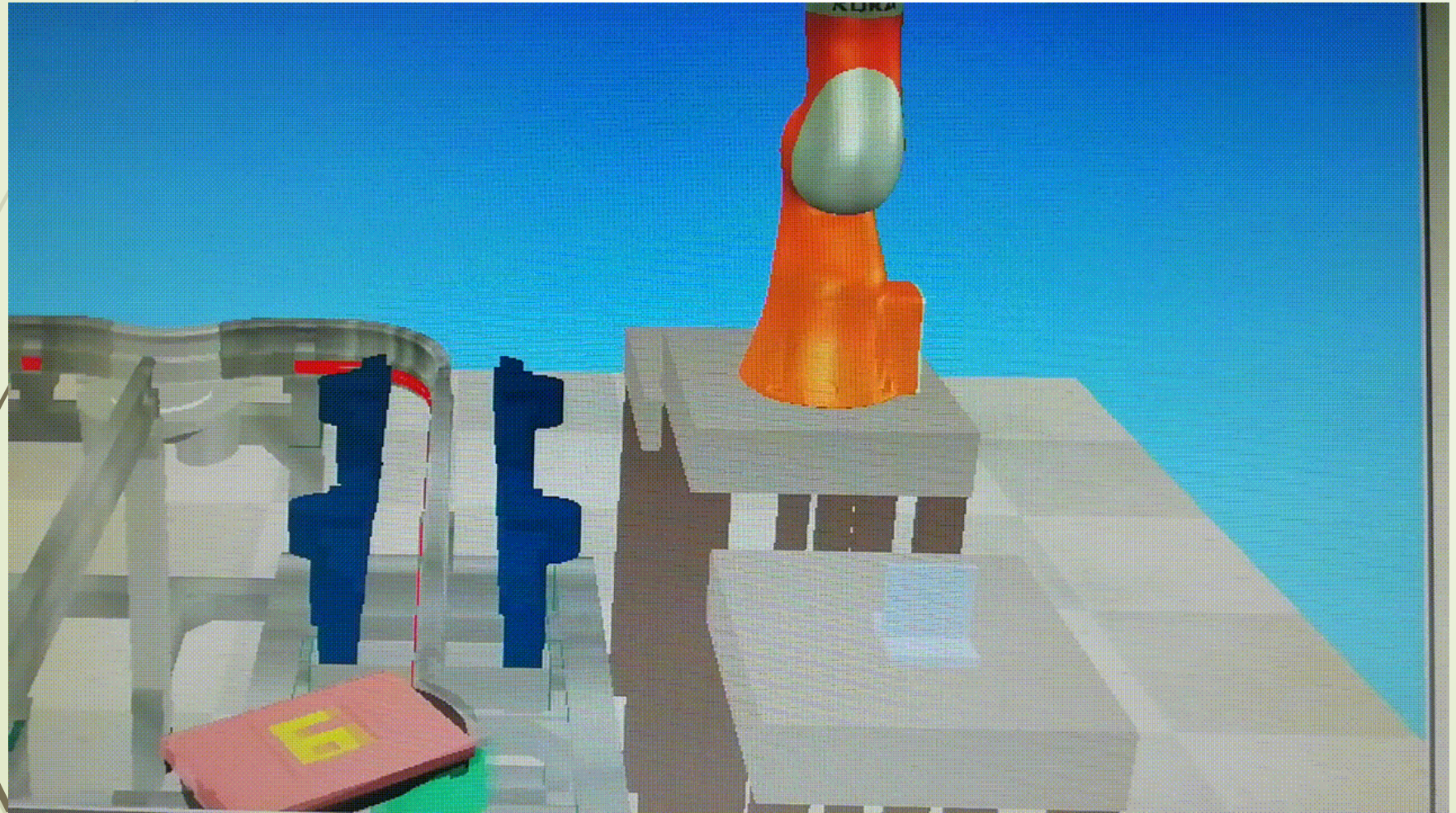
Improving 3D model





Improving 3D model

- System using 3D model



Improving 3D model

- But we still have some issues …

How to check if a solution works well ? (1)

- Creation of a Log file
- Note the important events that a product goes through
  - Product Arrival/Departure
  - Shuttle Occupied/Free
  - Robot Occupied/Free

How to check if a solution works well ? (2)

- Analysis of the Log file
- Creation of the checker
  - Check the routing
  - Check the processing time at each workstation
  - Check the sharing of resources

Conclusion

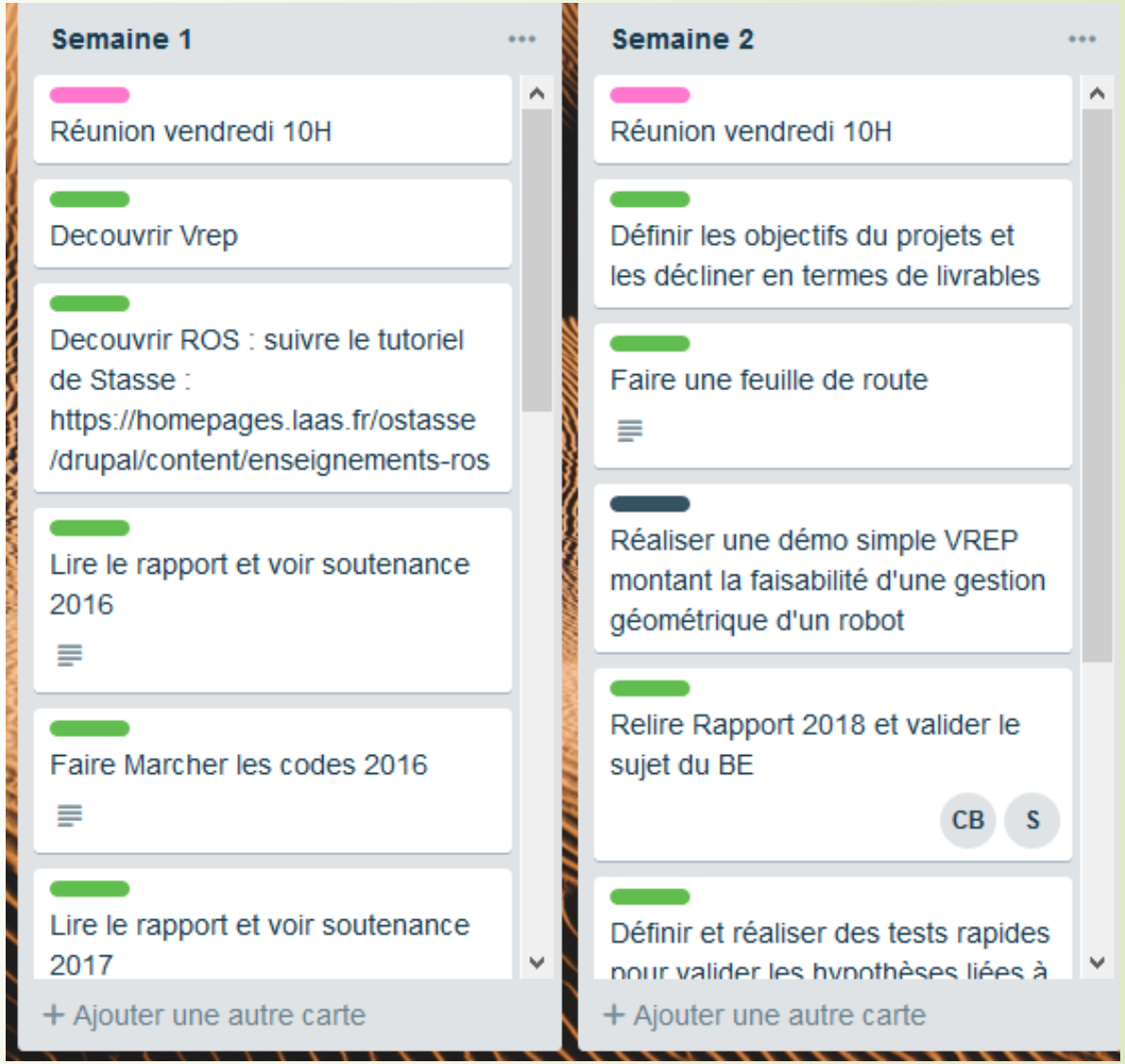
- The main objective (simulation speed) was successfully achieved
- Good progress towards realistic simulation and specification
- Working ideas for future teams

Personal review

- Difficulties :
  - Hard to understand the work of several years
  - New tools : ROS and V-rep
- Softskills acquiered:
  - Work organization
  - Project Management

Communication with client

- Using trello
- Weekly meetings



What would be the next step of the project ?

- Giving access to future students of the data to making products (time for each workingstation, which product is at the entrance etc..)
- Making the Petri command like future students will have to do
- Implement the program in the real system

Thank you for your attention