



Long project : factory of the future

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Aim of our project

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

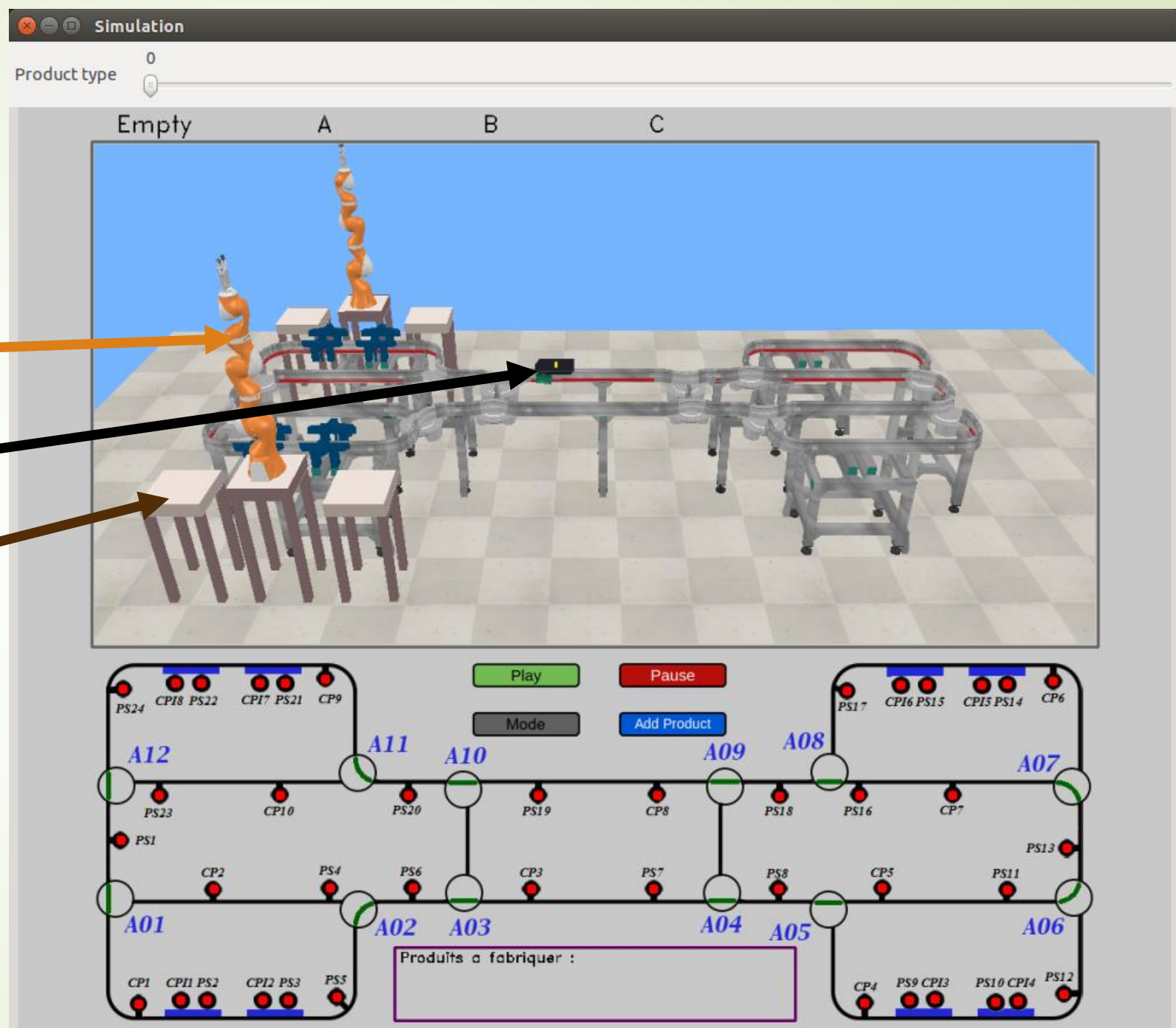


Context

Robots

Shuttles

Workstation



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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
<p data-bbox="389 601 1312 672">!!\ Simulation too slow !!\</p> <ul data-bbox="389 686 1312 972" style="list-style-type: none">- Wrong shuttle management- User interface- Input/Output of products- Glitches in the code	<ul data-bbox="1350 601 2267 886" style="list-style-type: none">- 3D model- Using of ROS- Coloration of shuttles/tables to simulate a product

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What
needed to
be done ?



Correction of the past version



Adding new functionalities



Development for the future

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What
needed to
be done ?



Correction of the past version



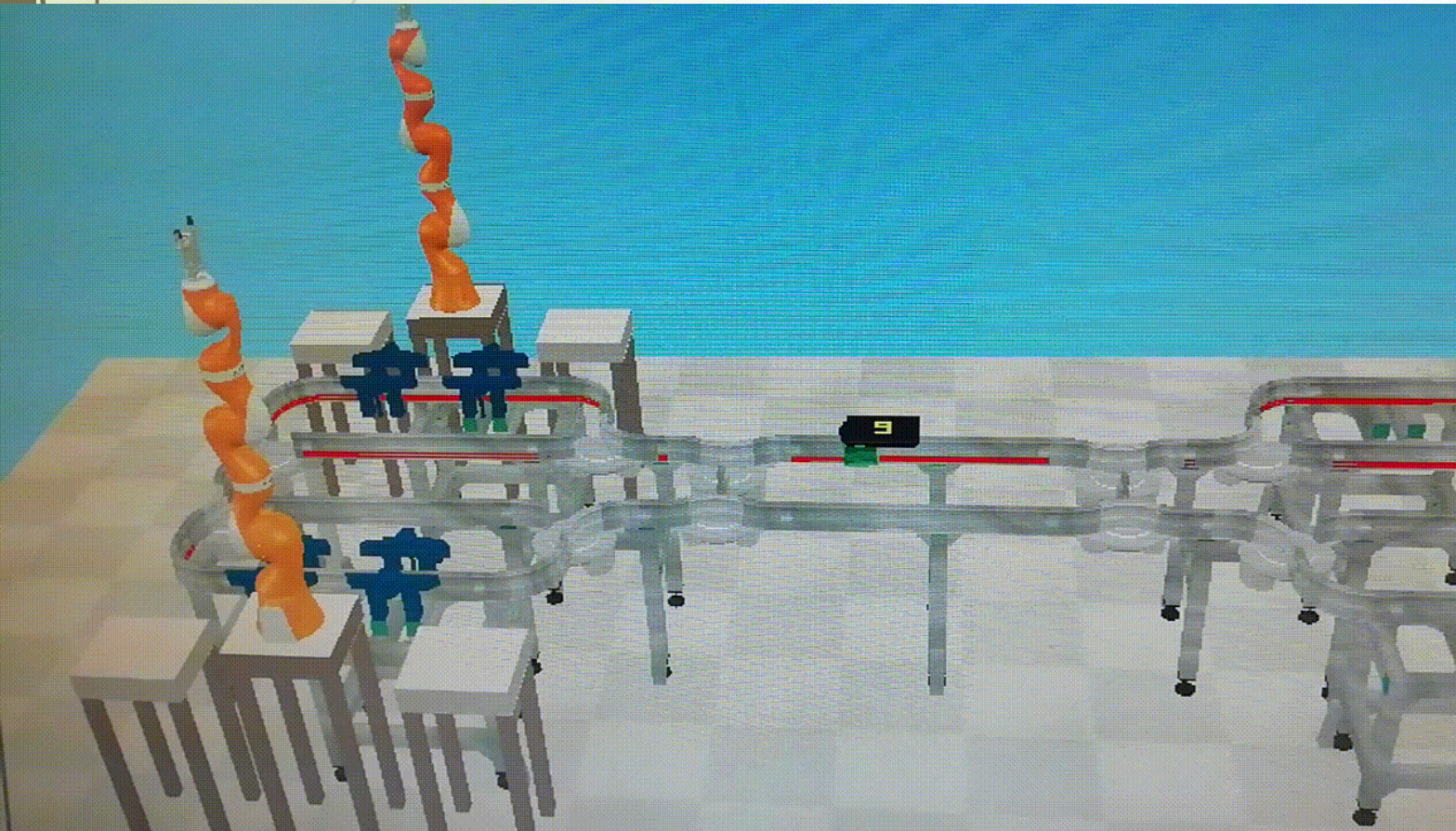
Adding new functionalities



Development for the future

Improving simulation speed

► Simulation speed:



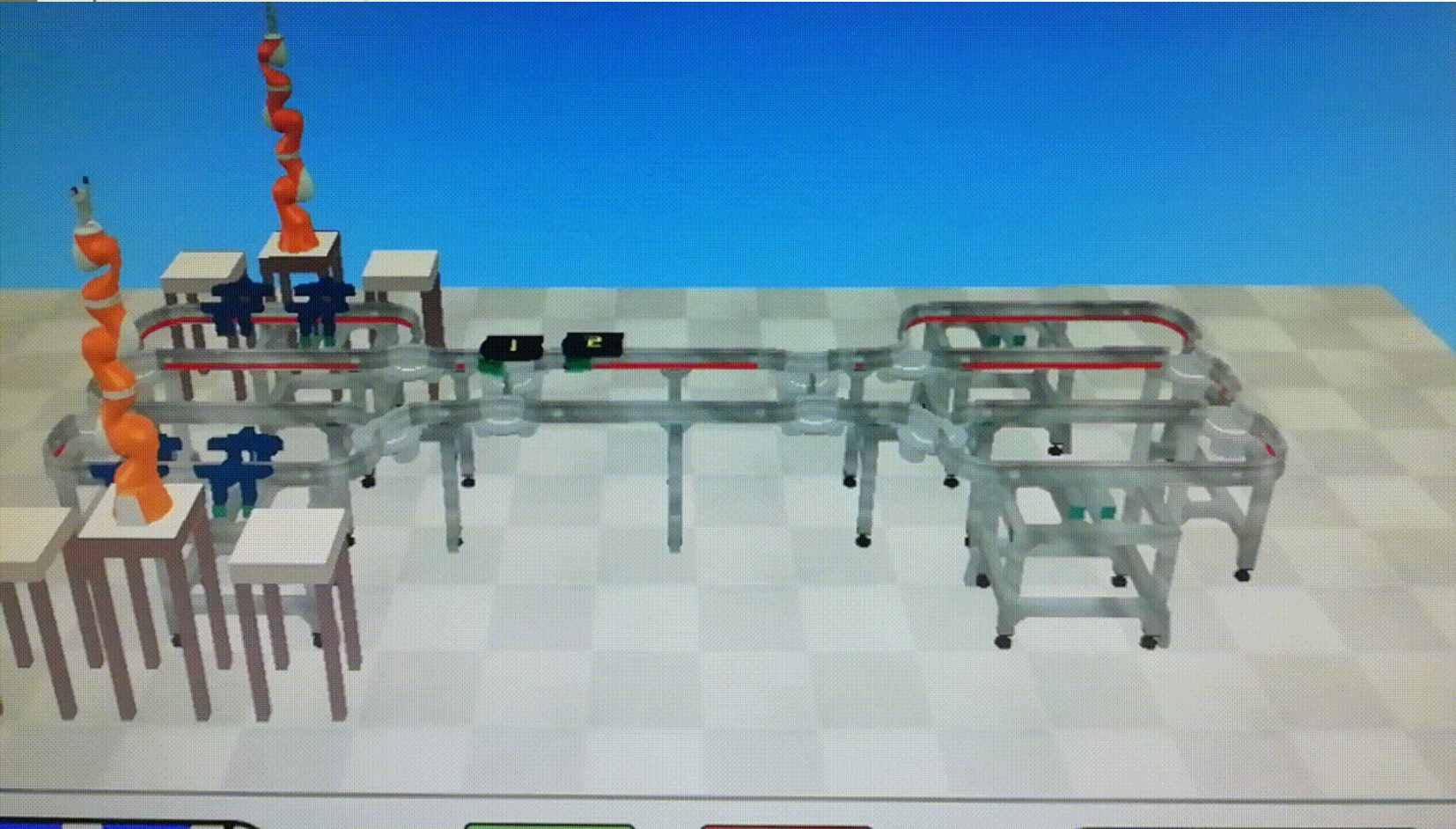
Hypothesis:

- 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

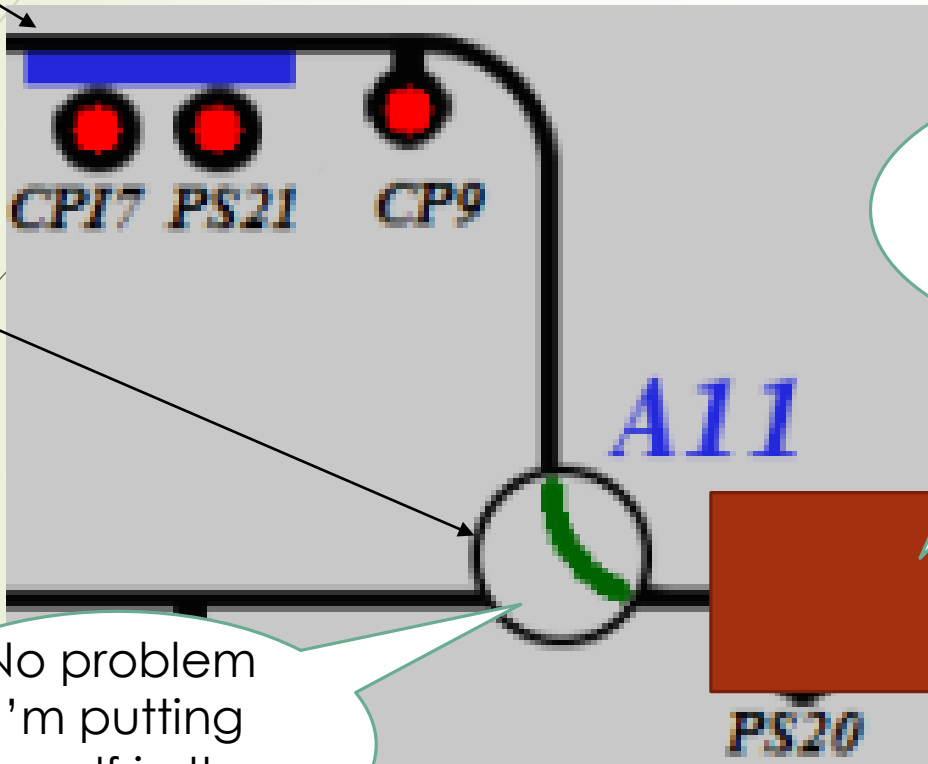
We can keep the robots !!!



Unrealistic shuttle control

Workstation 1

Rail switch



I need to go to
workstation 1

No problem
I'm putting
myself in the
right position

Shuttle

**Not possible for
the real system !**

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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

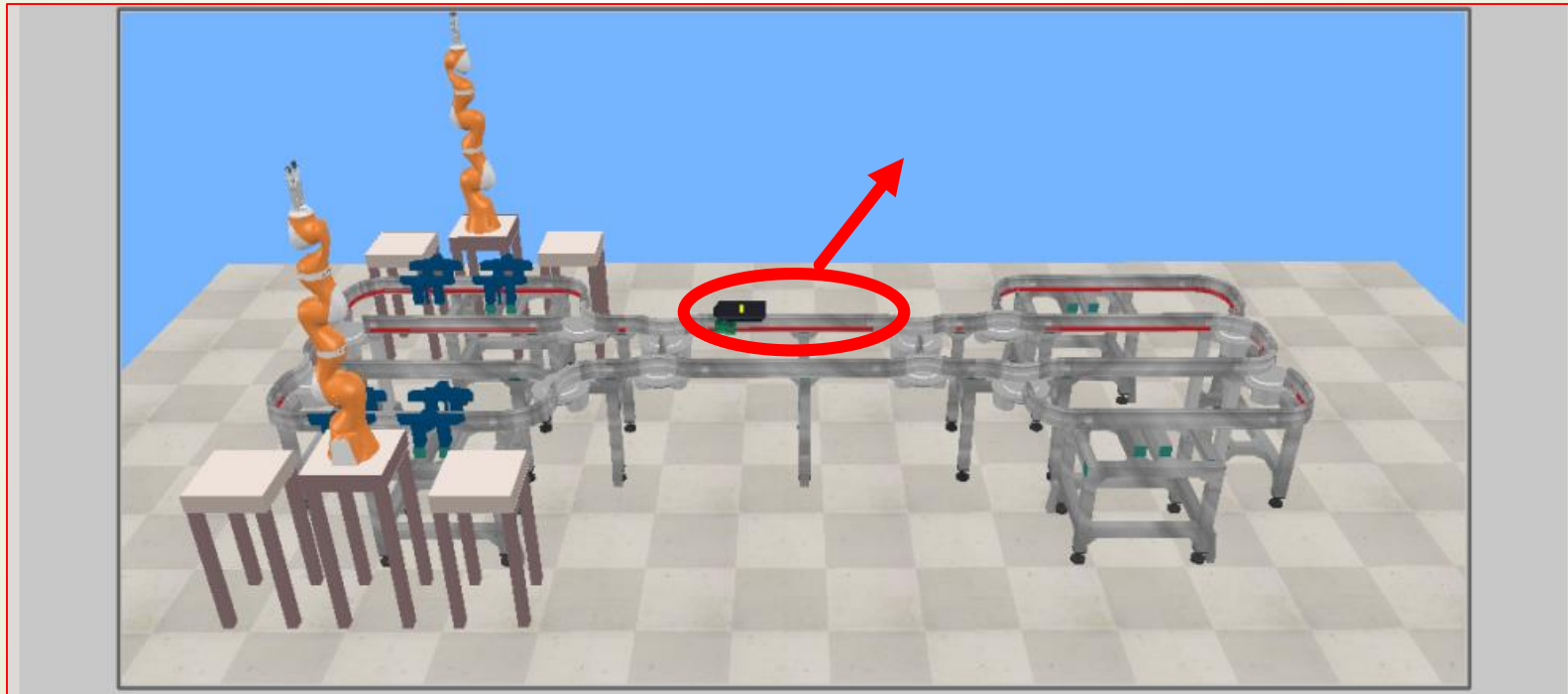
- Challenge : Where should the products appear ?



- Solution : On workstation 2

Products outputs

- Challenge : Where should the products disappear ?



- Solution : After a specific sensor

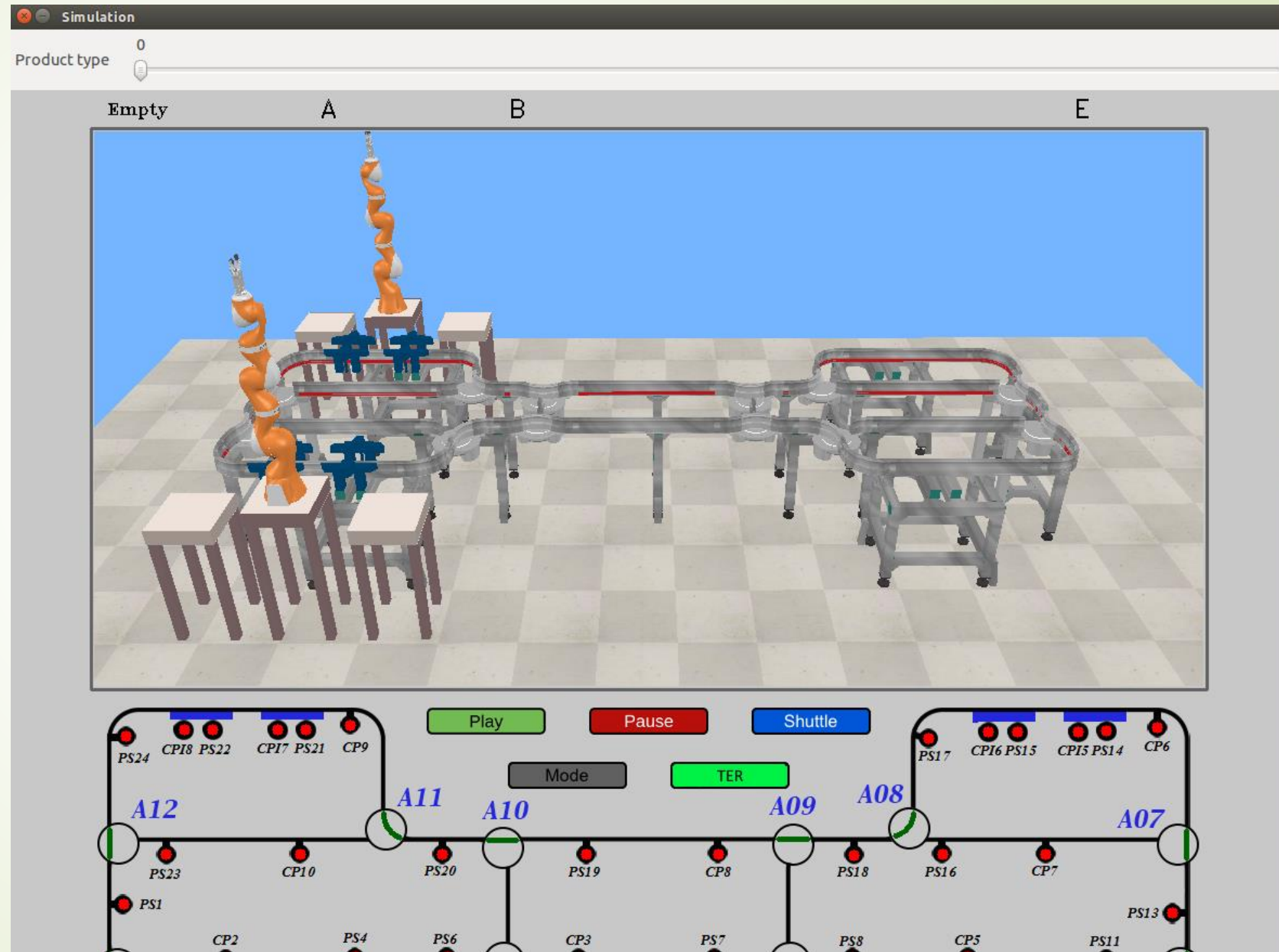
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User Interface

Issues :

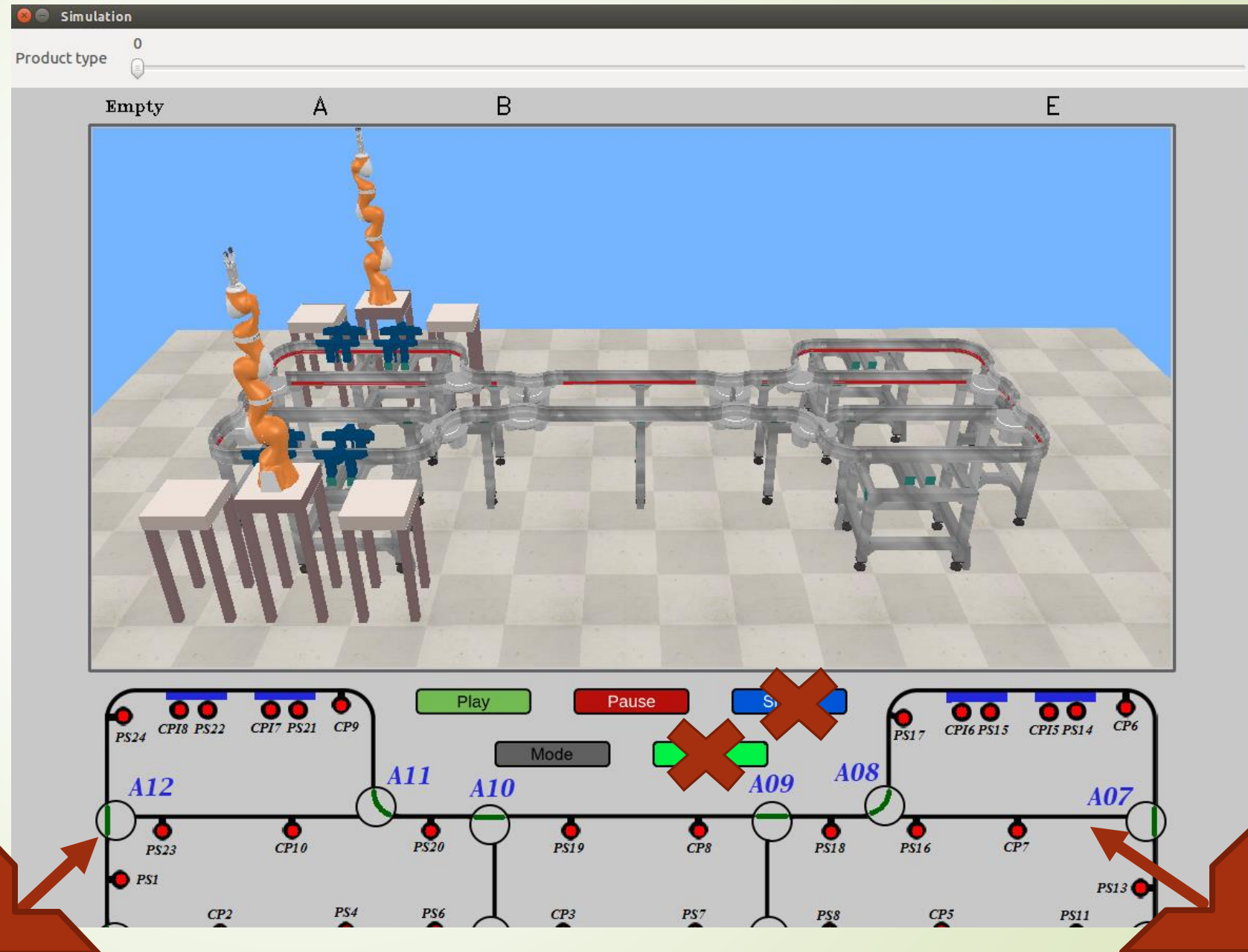
- We don't see all the rail switches
- Useless buttons

➤ Before :



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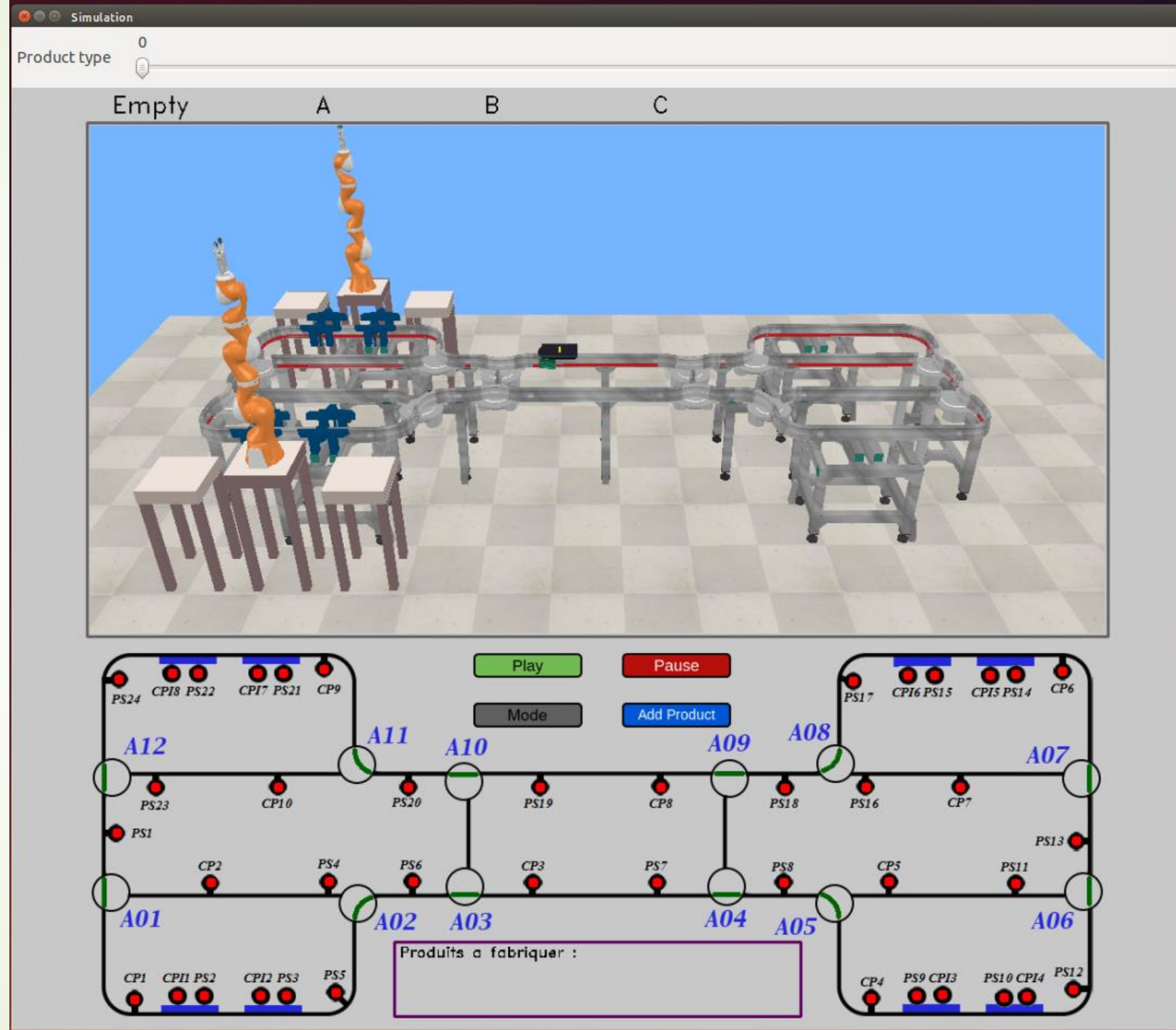
User Interface



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User Interface

➡ New UI :



What
needed to
be done ?



Correction of the past version



Adding new functionalities

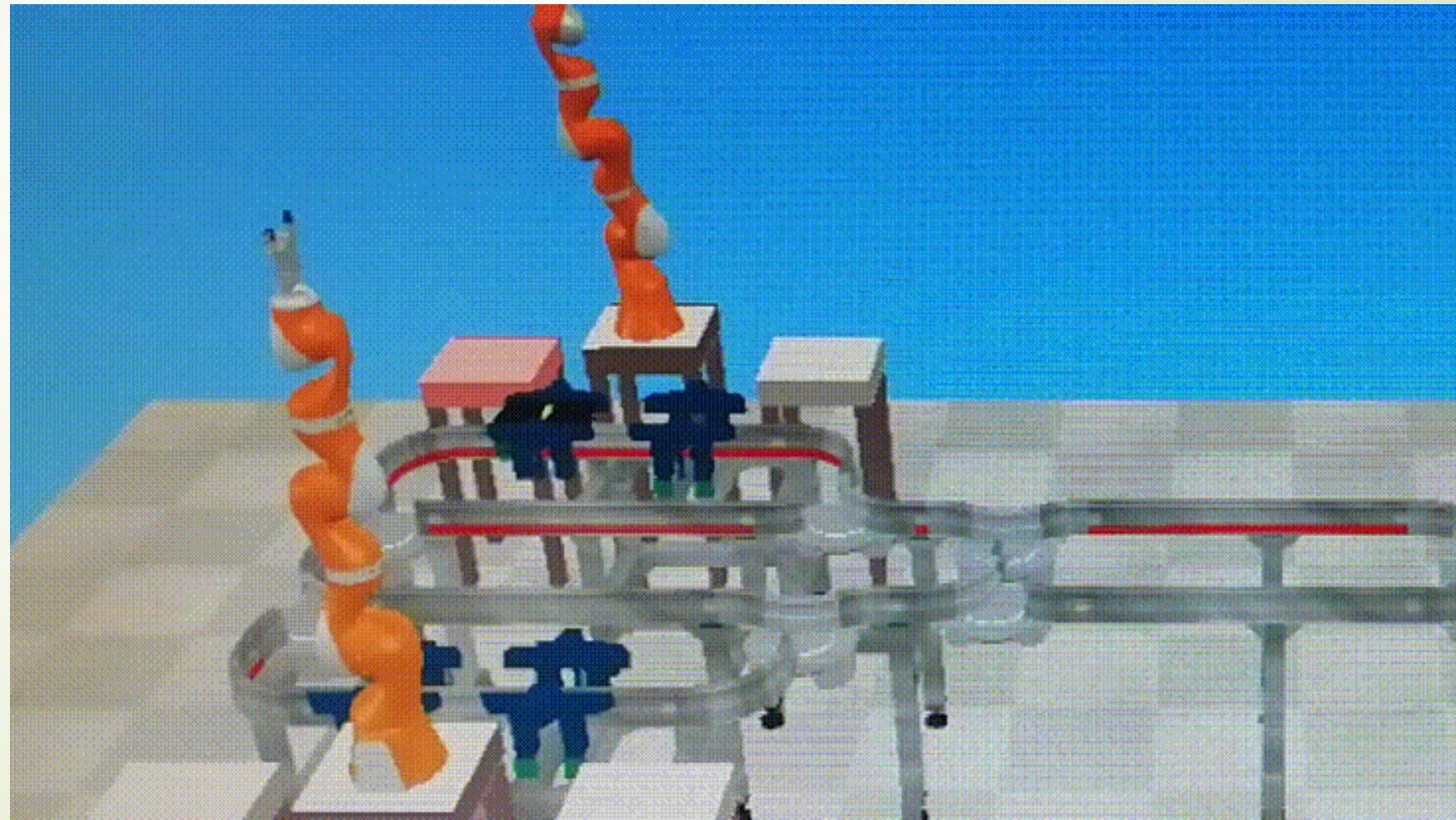


Development for the future

Improving 3D model

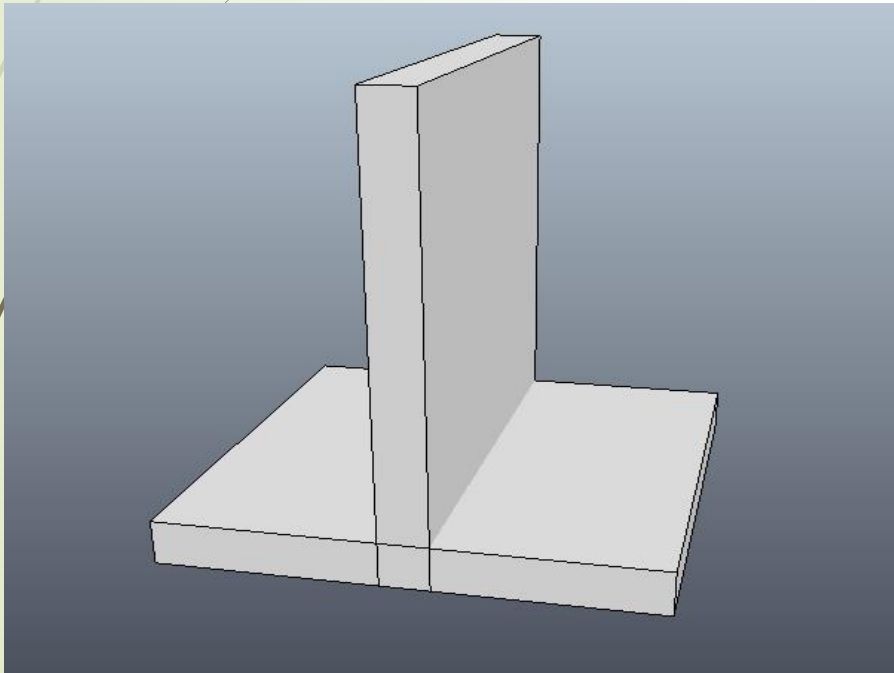
- Challenge : using 3D models instead

- System using colors

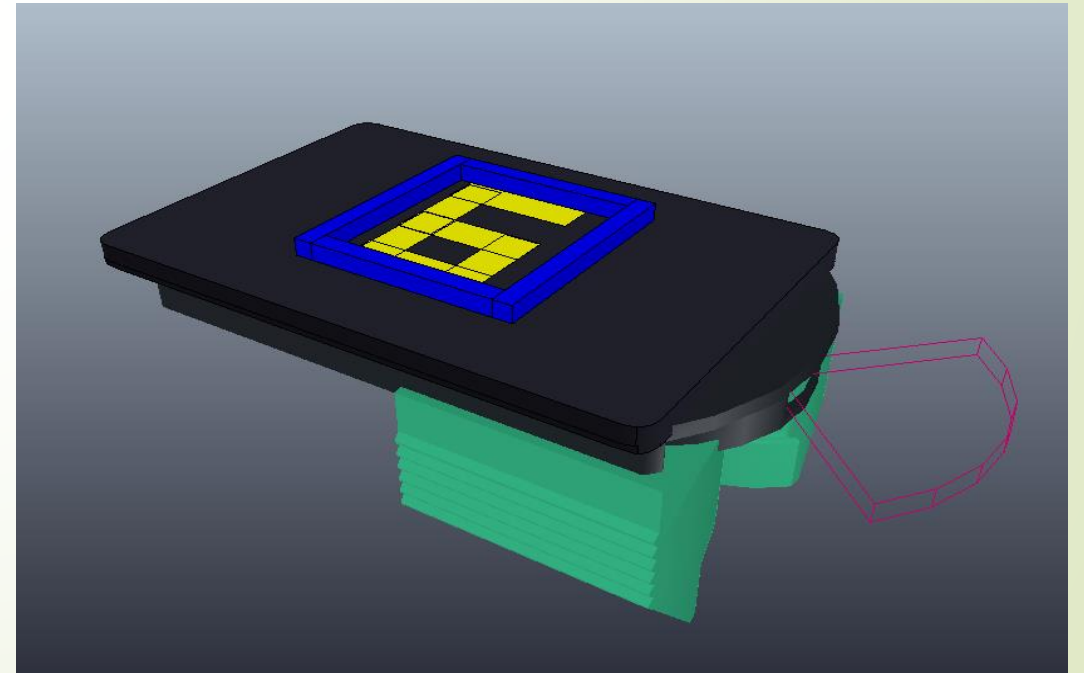


Improving 3D model

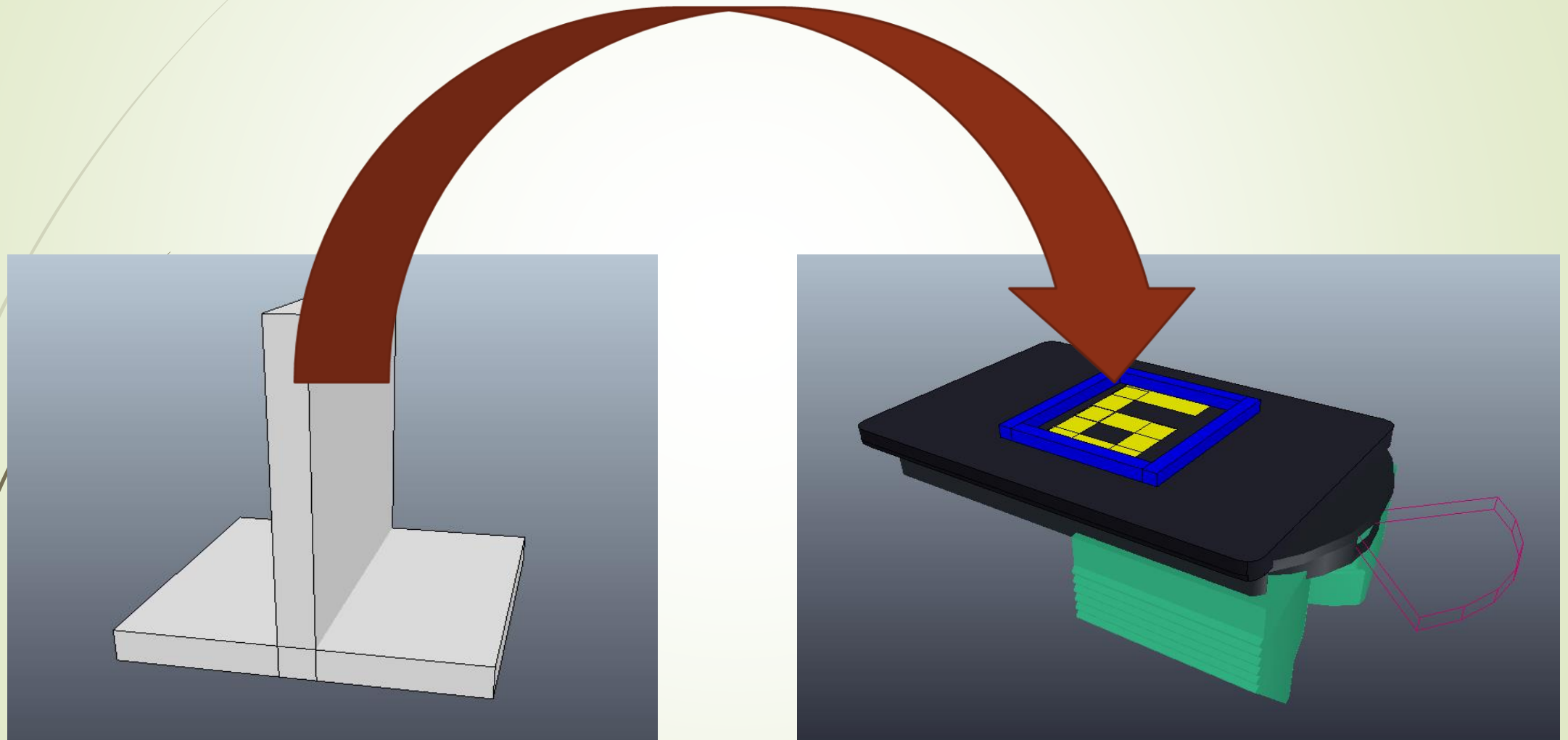
New 3D product shape



New shuttle shape

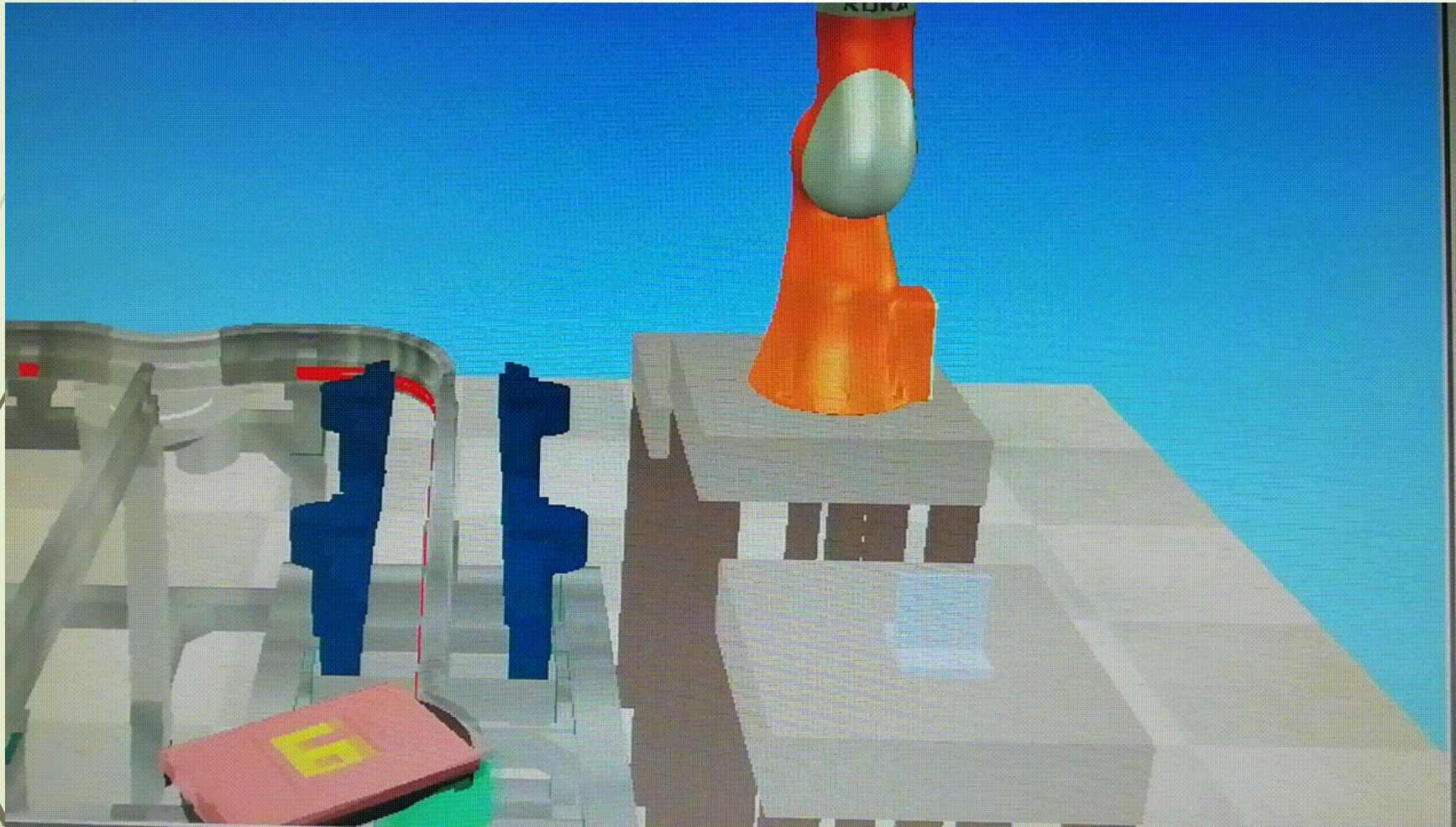


Improving 3D model



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 acquired:
 - Work organization
 - Project Management

Communication with client



Using trello



Weekly meetings

The screenshot displays a Trello board with two columns, 'Semaine 1' and 'Semaine 2', each containing a list of tasks. Each task card has a progress bar at the top and a menu icon at the bottom.

Semaine 1

- Réunion vendredi 10H
- Decouvrir Vrep
- Decouvrir ROS : suivre le tutoriel de Stasse : <https://homepages.laas.fr/ostasse/drupal/content/enseignements-ros>
- Lire le rapport et voir soutenance 2016
- Faire Marcher les codes 2016
- Lire le rapport et voir soutenance 2017
- + Ajouter une autre carte

Semaine 2

- Réunion vendredi 10H
- Définir les objectifs du projets et les décliner en termes de livrables
- Faire une feuille de route
- Réaliser une démo simple VREP montant la faisabilité d'une gestion géométrique d'un robot
- Relire Rapport 2018 et valider le sujet du BE (CB, S)
- Définir et réaliser des tests rapides pour valider les hypothèses liées à
- + Ajouter une autre carte

What would be the next step of the project ?

- Giving access to future students of the data to making products (time for each workstation, 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