

***EDS*** (*Enseignement de Spécialité*)

***Sciences de l'Ingénieur***



Notre société devra relever **des défis** dans les prochaines décennies.

Avec une forte croissance de la population mondiale, il faudra donc **proposer des réponses aux besoins fondamentaux des hommes**, dans les domaines :

- De **l'énergie**,
- du **transport**,
- de **l'habitat**,
- de la **santé**,
- du **numérique**, de la **mobilité**, du **sport**, de la **communication** etc...

La réponse à ces défis passe  
inévitablement **par la formation  
d'ingénieurs et de chercheurs** aux  
compétences scientifiques et  
technologiques pluridisciplinaires de  
haut niveau, **capables d'innover, de  
prévoir et maîtriser les performances  
des systèmes complexes.**

La France a besoin de **50 000** nouveaux ingénieurs diplômés chaque année...

...et elle en « fabrique » **38 000** par an

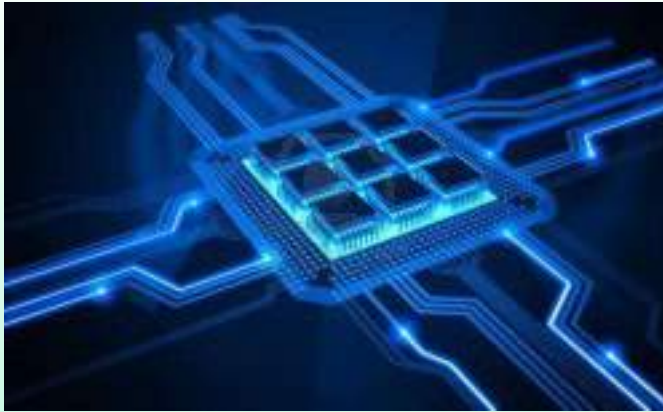
...

Le salaire brut médian annuel de l'ensemble de la population des ingénieurs est de **56 400 euros**.



# Les Sciences de l'Ingénieur pour ...AMELIORER LE PRESENT...



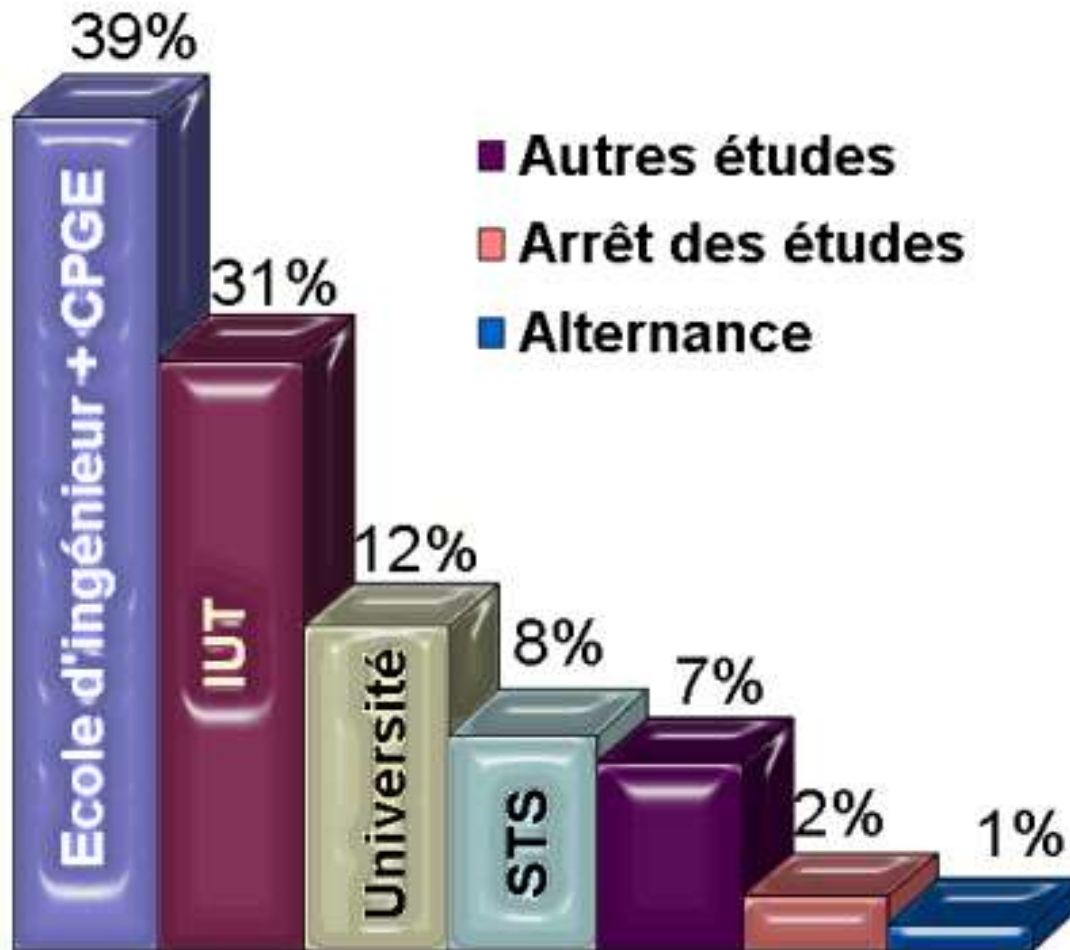


# Les Sciences de l'Ingénieur pour ... IMAGINER LE FUTUR...



# *Les poursuites d'étude*

Niveau de formation visé : **BAC + 5**



# *Les horaires*

4h en classe de première

6h en classe de terminale  
(complété par 2h de sciences physiques)

**2h TP + challenge (12h)**

→ en groupe

**2h cours/TD** → en classe  
entière

**4h TP + projet (48h)** →

en groupe

**2h cours/TD** → classe  
entière

# Thèmes abordés en Sciences de l'ingénieur

Domaine de l'électronique ...



Domaine de l'énergie ...

## Mécanique pour modéliser et décrire les systèmes...

## Conception des systèmes mécaniques ...



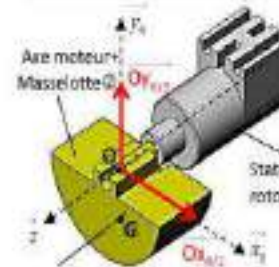
Numérique et informatique ...

## Les réseaux informatiques ...

## La résistance des matériaux ...

## La modélisation des système et leur commande ...

## L'intelligence artificielle ...



|        |                        |
|--------|------------------------|
| 机种名    | A2B                    |
| 额定电压   | 3.0V DC                |
| 使用电压范围 | 2.0 ~ 3.6 V DC         |
| 额定频率数  | 9,000 ± 1,800 tr / min |
| 额定电流   | 63mA 以下                |
| 质量     | 1.48 g ± 10%           |



```

1 // Source of example code from http://cglab.ca/
2 // Copyright 2007, University of Guelph, Guelph, Ontario, Canada
3 // License: LGPL
4 // Last Modified: 2007-01-01
5 // Author: John D. Smith
6 // Version: 1.0
7 // Description: A simple program to demonstrate the use of the
8 //           std::vector and std::string containers.
9 //
10 // The program reads a line of text from the user and stores it in a
11 // std::string variable. It then prints the string and the length of the
12 // string.
13 //
14 // The program also demonstrates the use of the std::vector container.
15 // It creates a vector of integers and stores the values 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
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169 //
170 // The program also demonstrates the use of the std::set
```



# *La démarche de l'ingénieur*

## Compétences

Innover

Analyser

Modéliser  
& Résoudre

Expérimenter  
&  
Simuler

Communiquer

## Objectifs de formation

- Créer des produits innovants

- Analyser les produits existants pour appréhender leur complexité.

- Modéliser les produits pour prévoir leurs performances

- Valider les performances d'un produit par les expérimentations et les simulations numériques

- S'informer, choisir, produire de l'information pour communiquer au sein d'une équipe ou avec des intervenants extérieurs

# 3 domaines d'études :



# *Les activités proposées :*

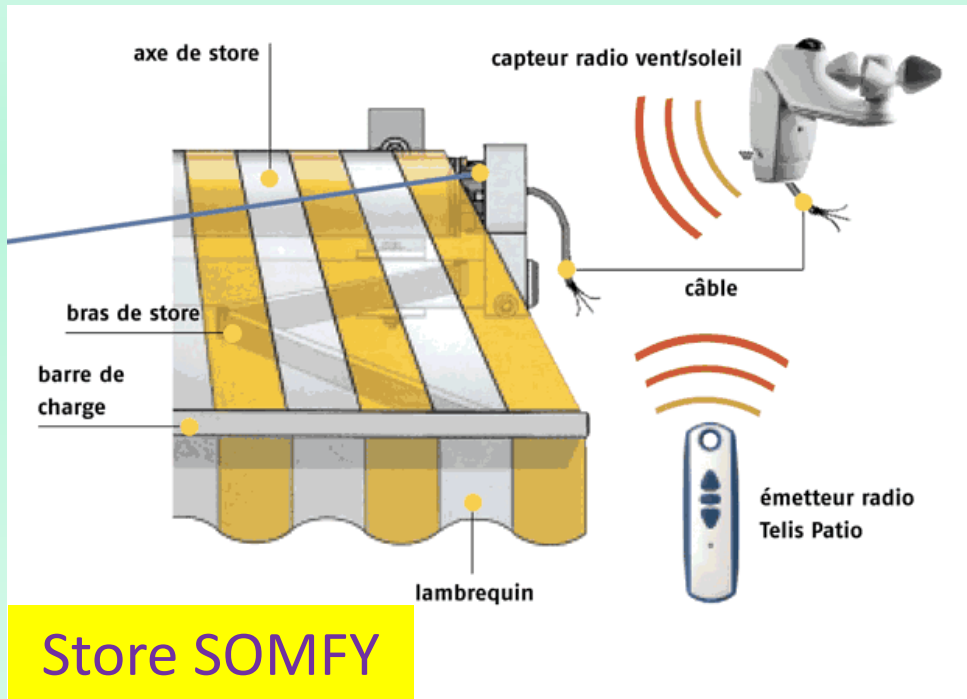
**Des TP (Travaux Pratiques) ...**

**...Sur des systèmes mécatroniques ...  
présents dans le labo de SI**



# Domaine de l'INFORMATION

- Connaitre les moyens d'acquisition des données
- Réaliser l'étude des capteurs qui « nous entourent »

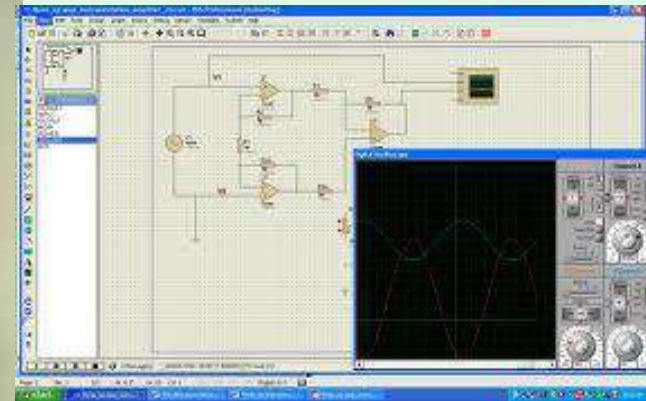
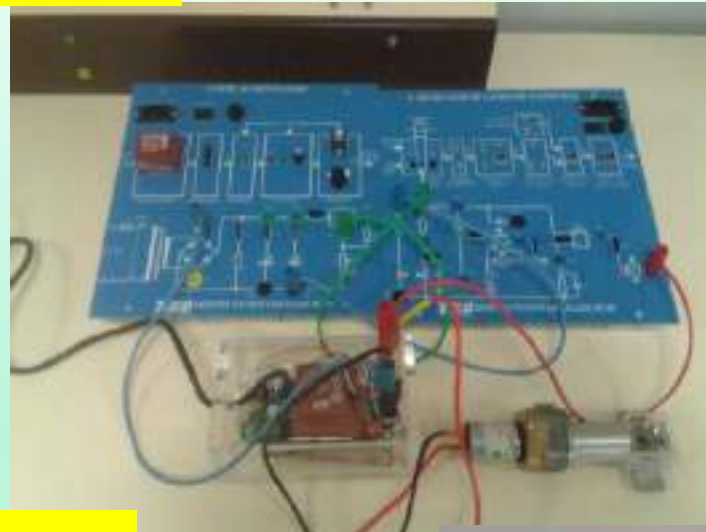


Chariot de golf

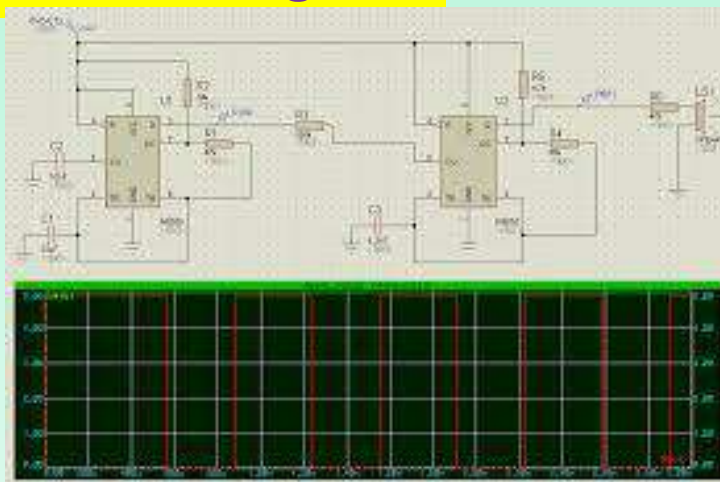


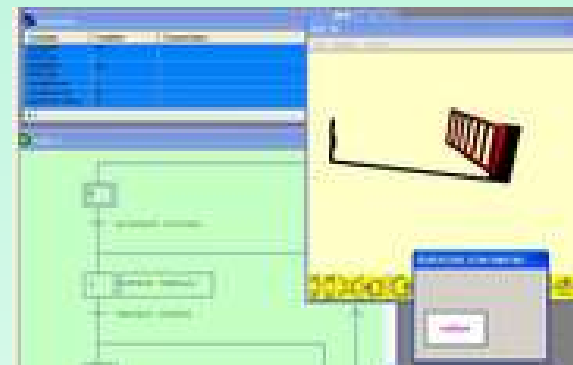
# Domaine de l'INFORMATION : CAPTER les données

## Destructeur d'aiguilles



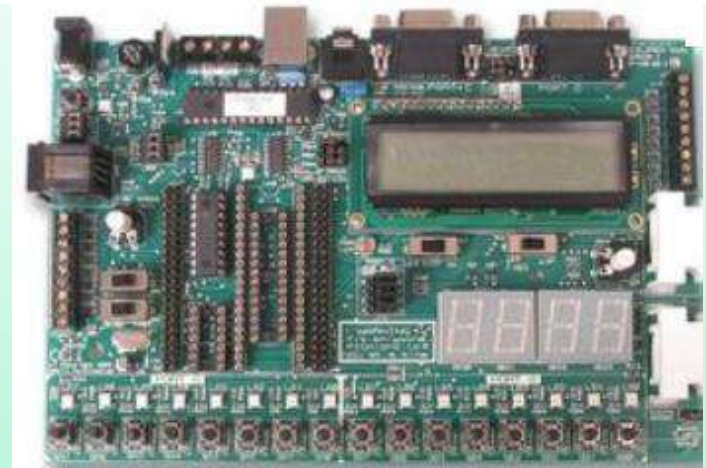
## Attacheur de vigne





## Programmation en langage algorithmique (code Arduino ou FLOWCODE)



```

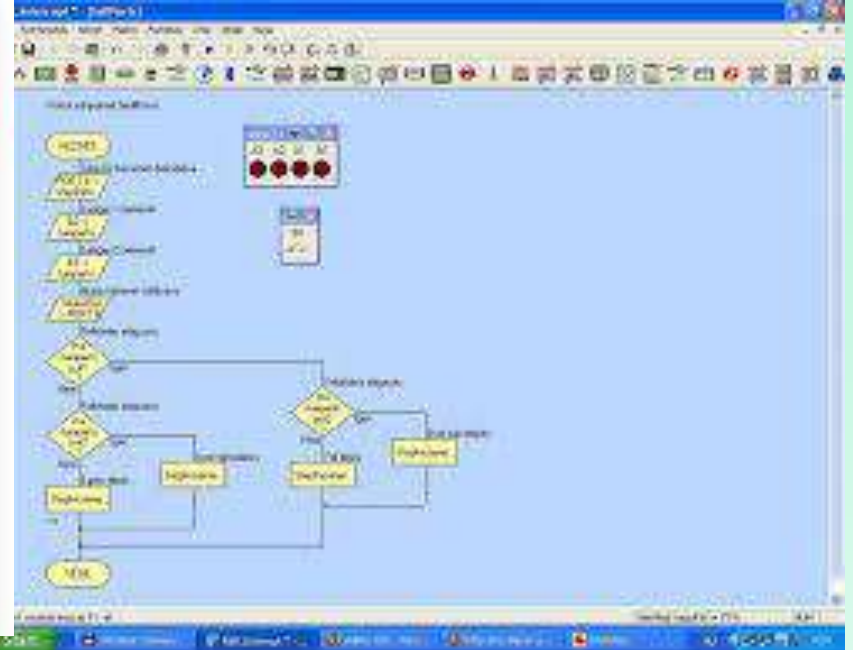
// Affiche la valeur lue par la LDR sur l'entrée analogique A0

int mesureLDR; // déclare la variable "mesureLDR" comme un entier entier
                //compris entre -32768 et +32767

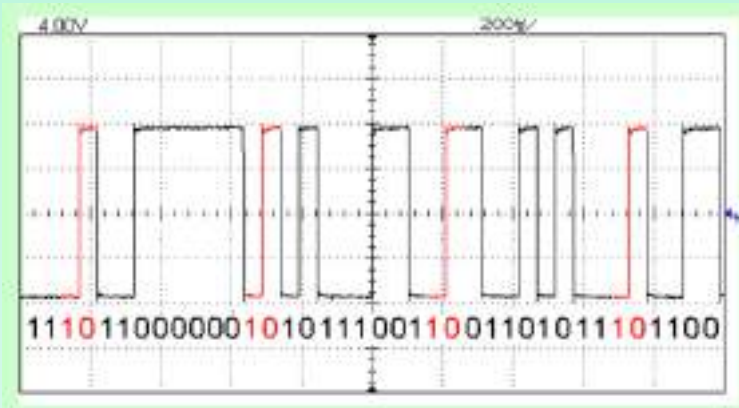
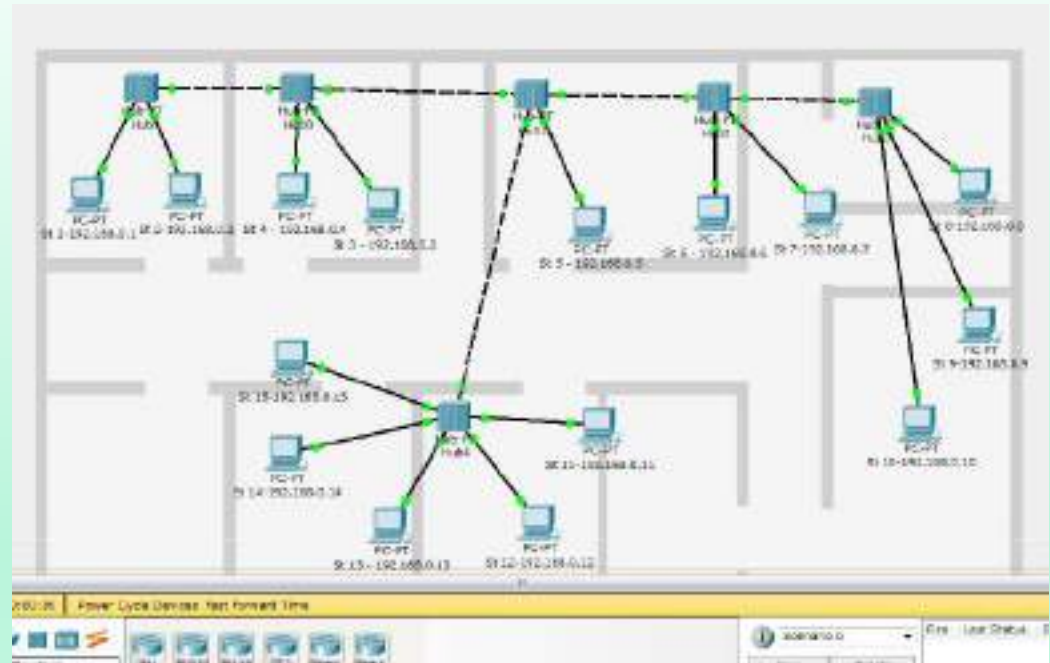
void setup()
{
  Serial.begin(9600);
}

void loop()
{
  mesureLDR = analogRead(A0); //lit la valeur sur la broche A0 et la stocke dans "mesureLDR"
  Serial.println("valeur lue"); //affiche le texte entre guillemets sur le moniteur série
  Serial.println(mesureLDR);    // affiche la valeur lue en temps réel par la LDR
  delay(500);                  // attends 500ms
}

```



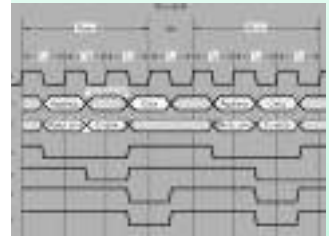
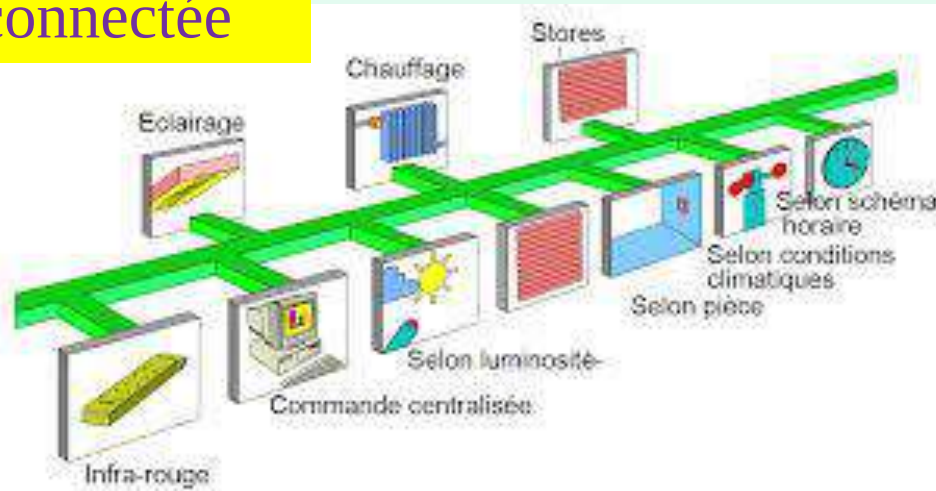
# Domaine de l'information : Etude des réseaux informatiques



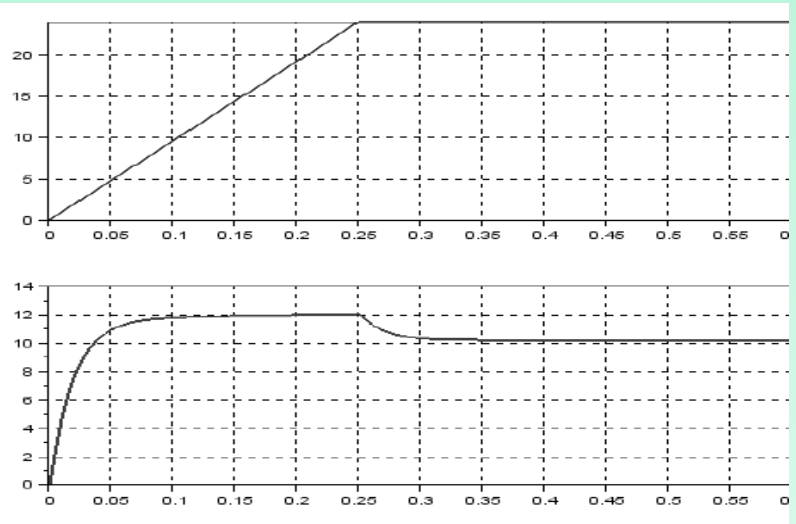
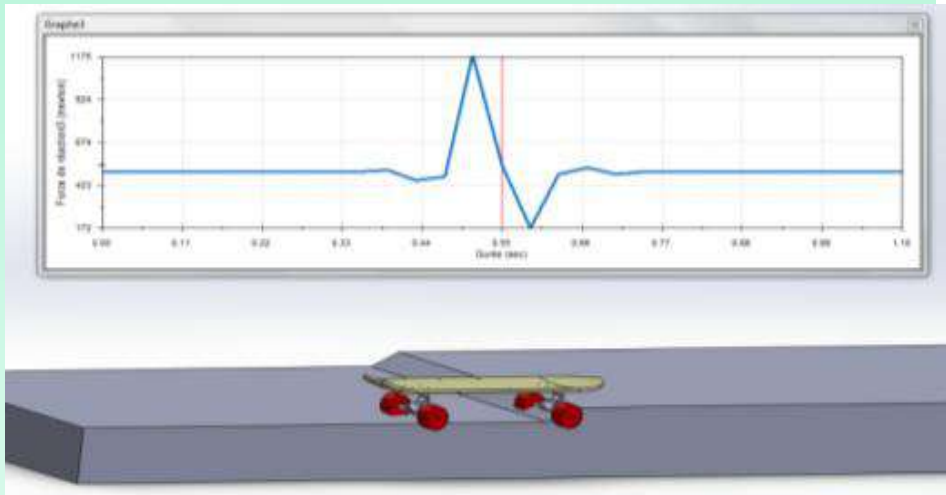
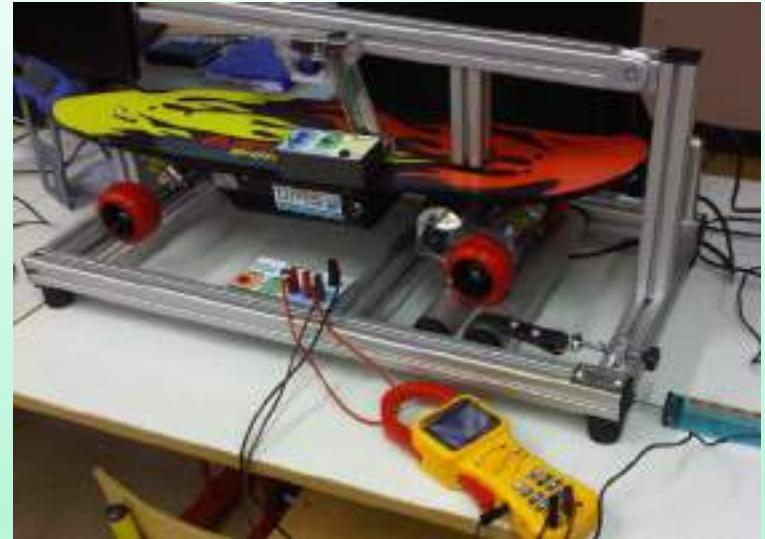
- Comprendre la communication des réseaux informatiques
- Réaliser des réseaux et capturer les trames de communication IP

# COMMUNIQUER l'information : programmation bus KNX

## Maison DOMOTIS connectée

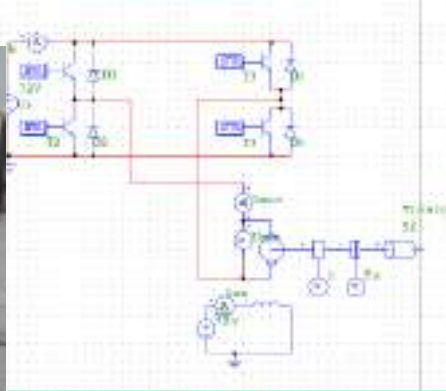


# Domaine de l'ENERGIE : e-skate



# Domaine de l'ENERGIE : Chariot de golf et voiture RC

## Chariot de Golf

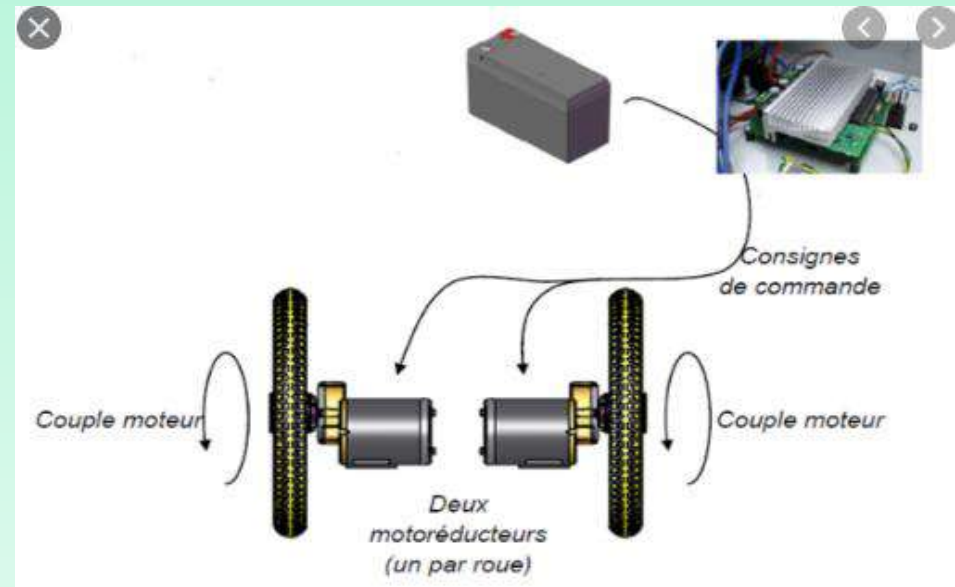
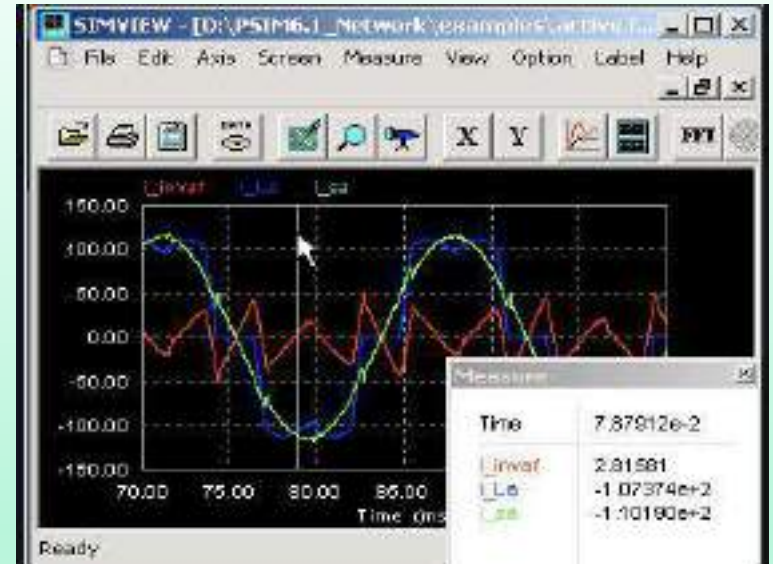


## Voiture RC



# Domaine de l'ENERGIE : Gyropode

## Gyropode

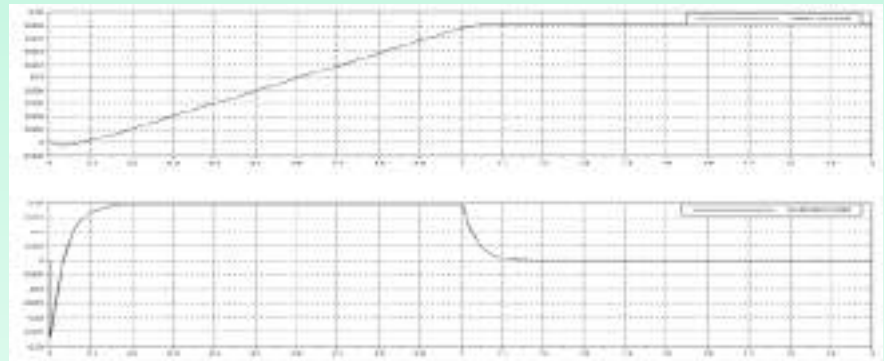
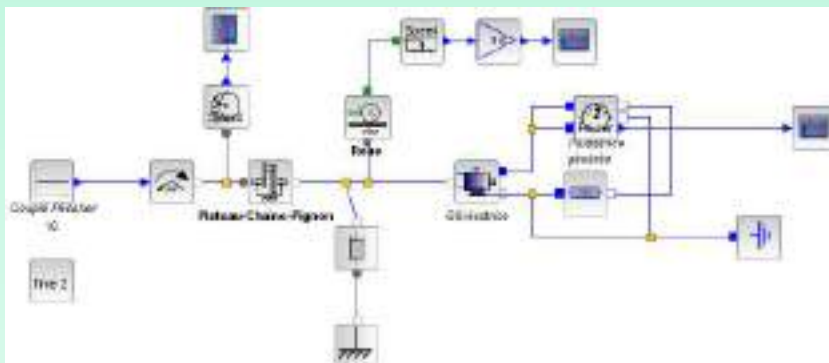


# Domaine de l'ENERGIE : VAE & trottinette électrique

## VAE

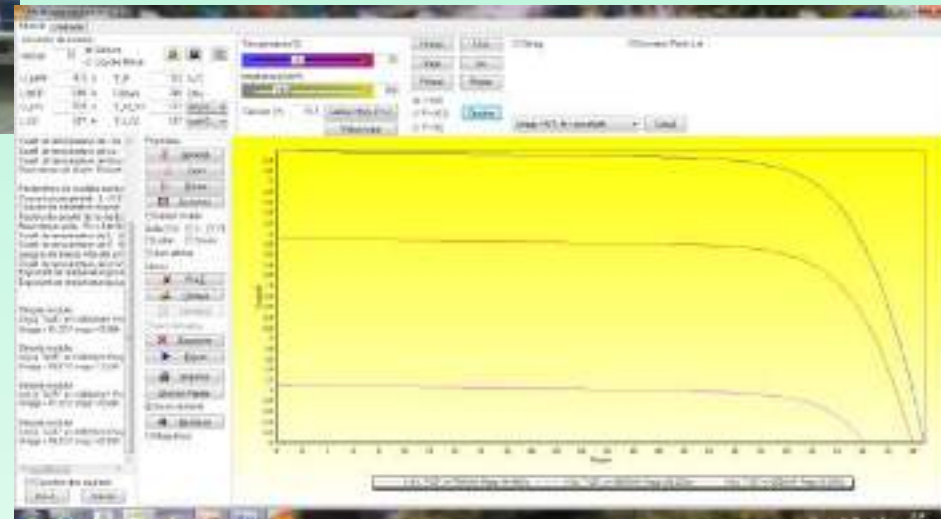


## E-scooter



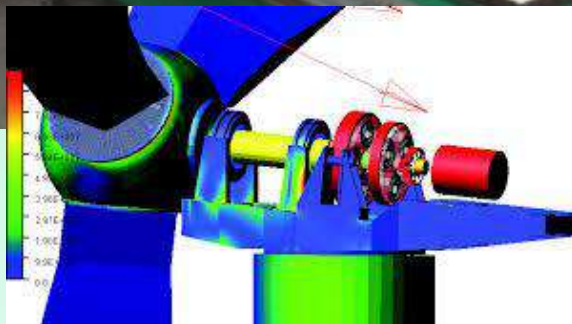
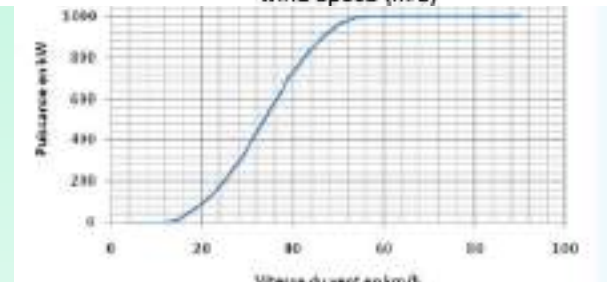
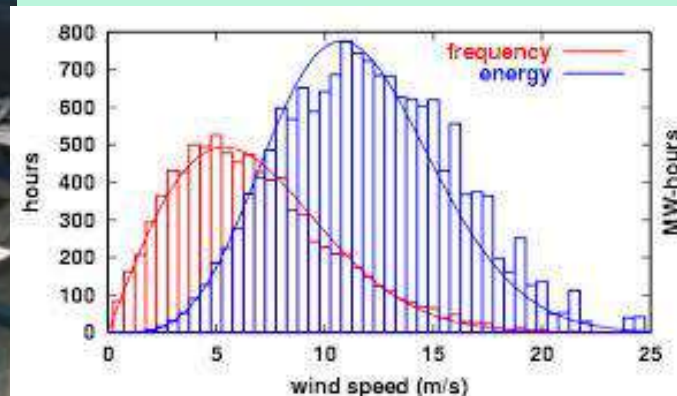
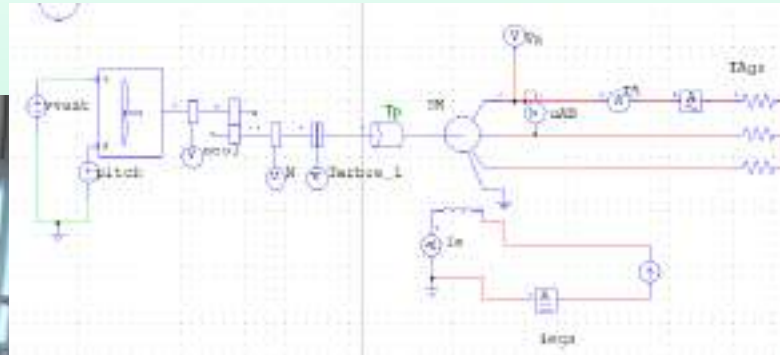
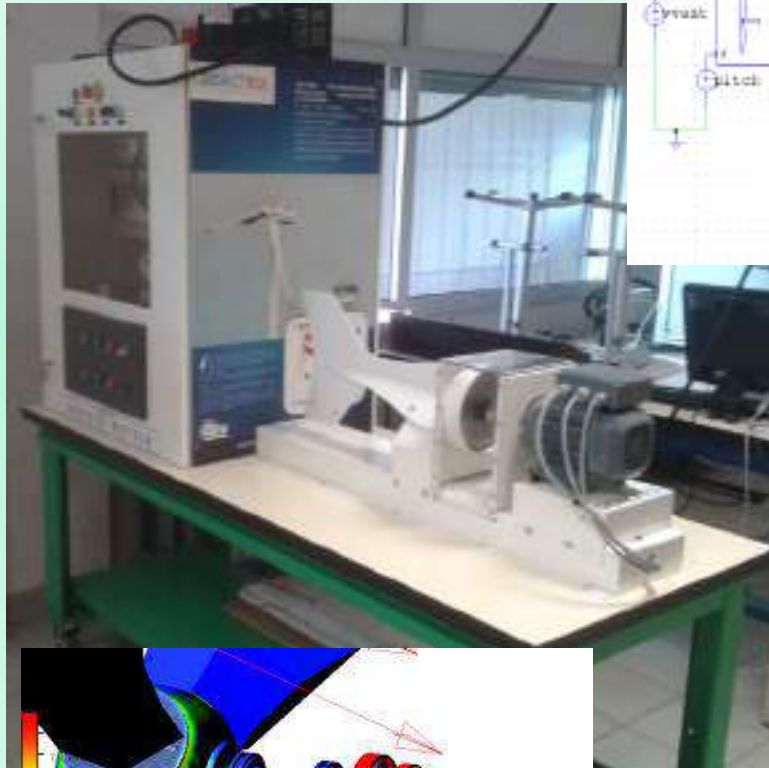
# Domaine de l'ENERGIE renouvelable :

## Le photovoltaïque



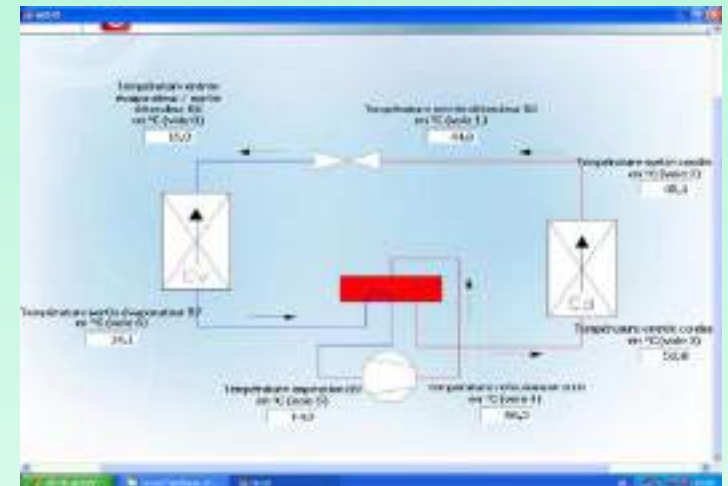
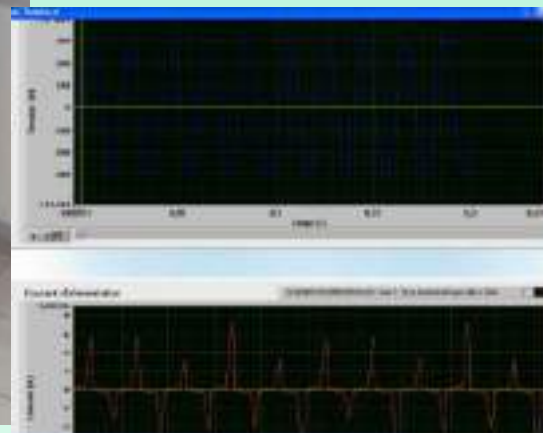
# Domaine de l'ENERGIE renouvelable :

## L'éolienne



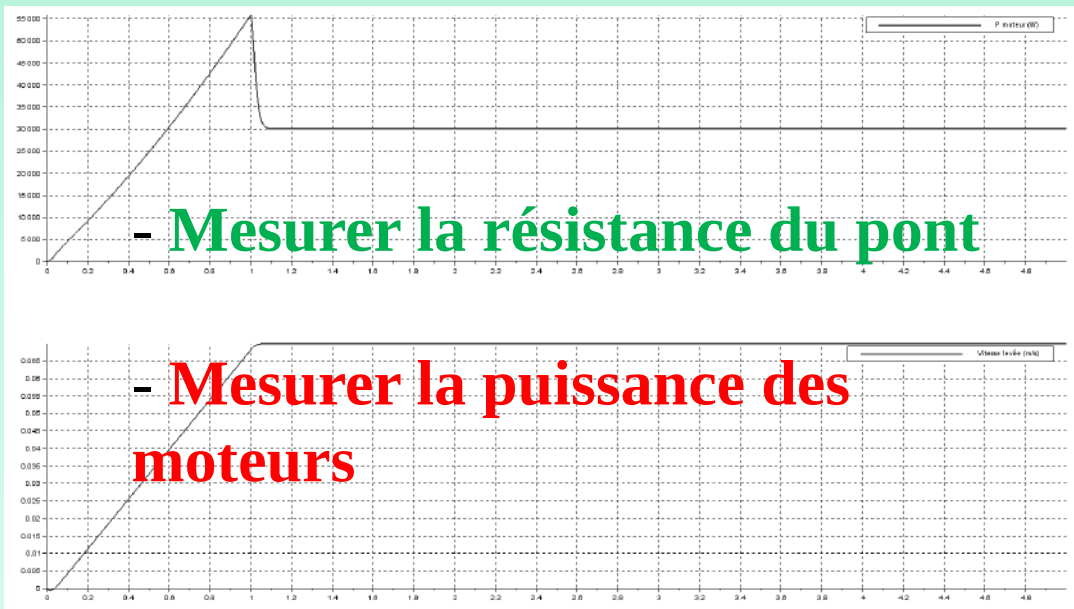
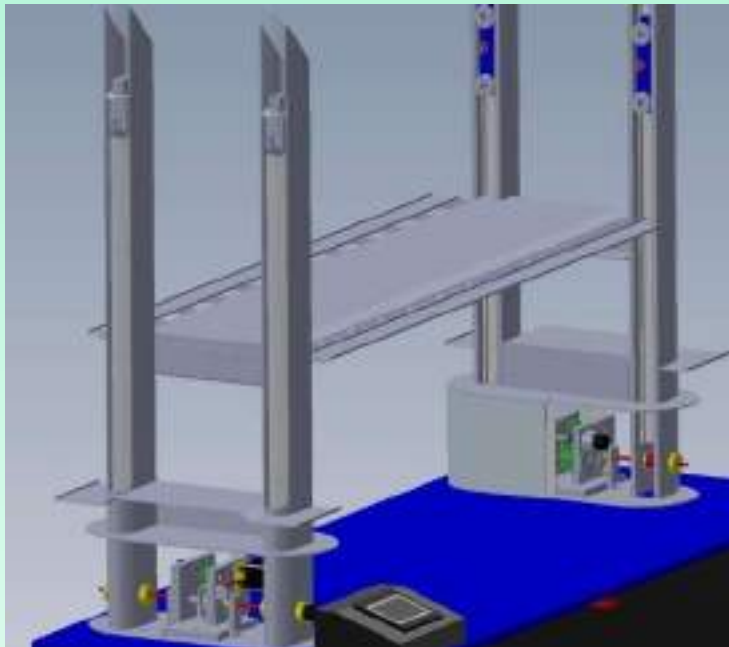
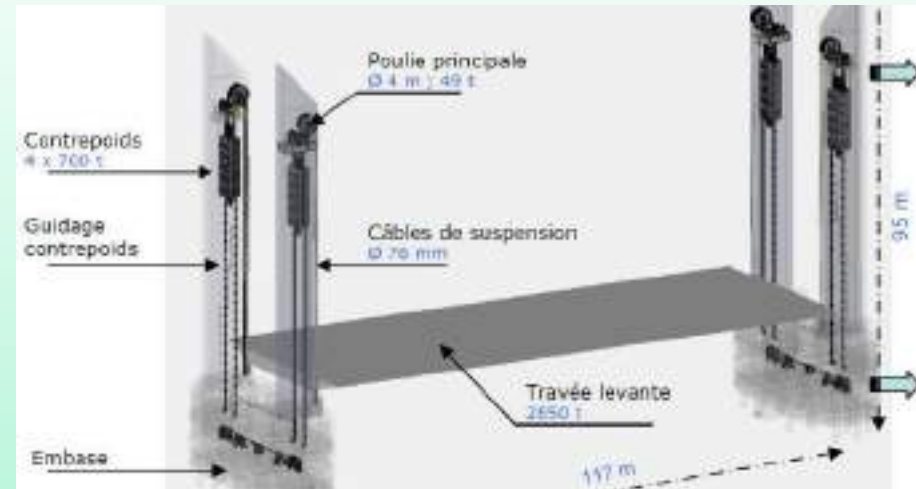
# Domaine de l'ENERGIE renouvelable :

## La pompe à chaleur



# Domaine de la MATIERE : le pont Bacalan

## Le pont Bacalan



# Domaine de la MATIERE : Les bancs d'essais

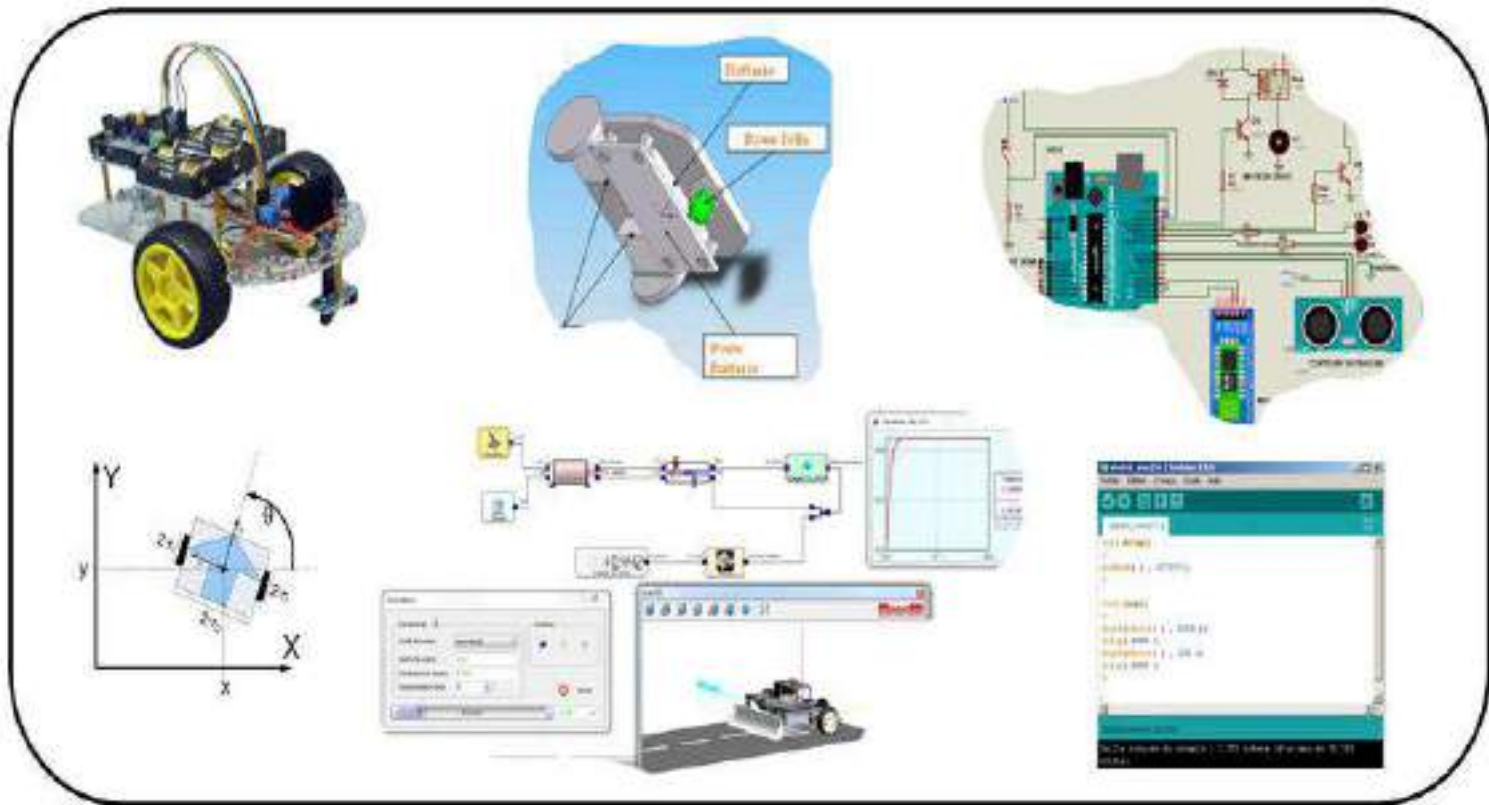


**Mesurer et Calculer les caractéristiques des matériaux**

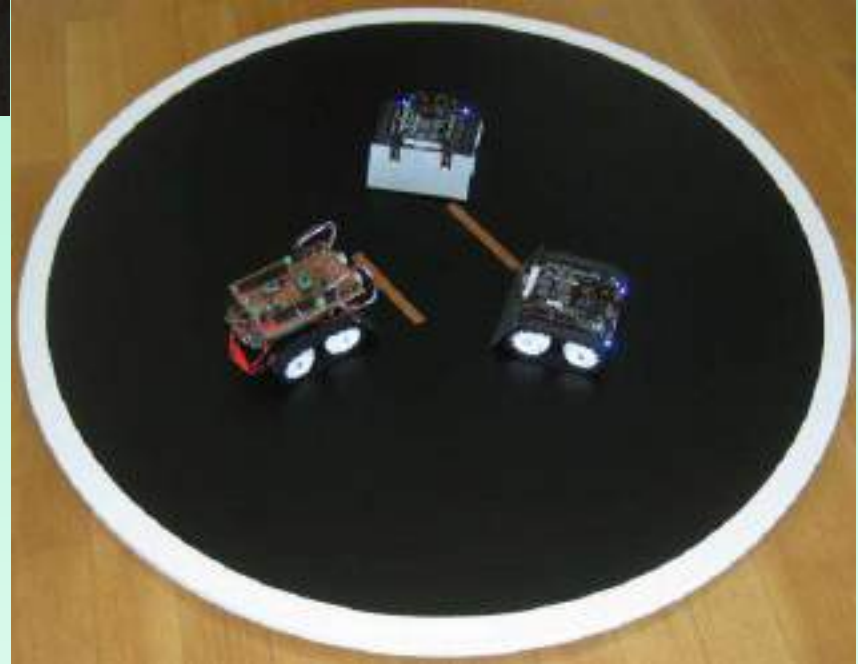
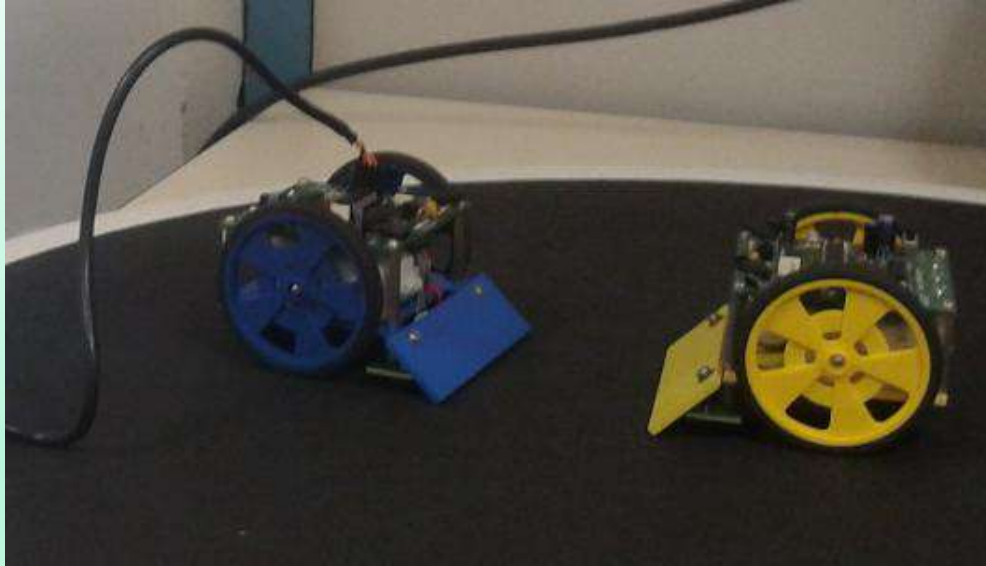


# *Autres activités proposées :*

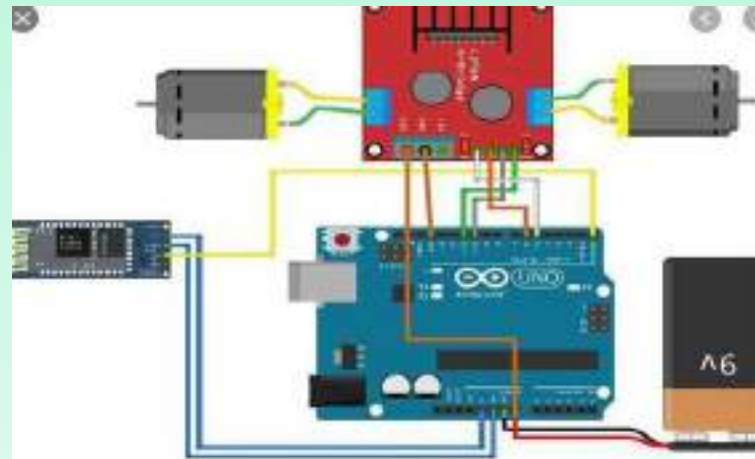
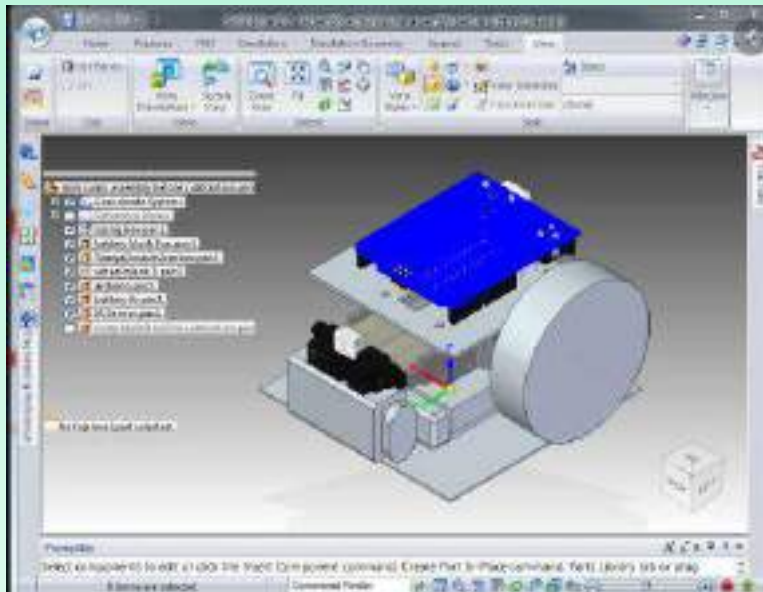
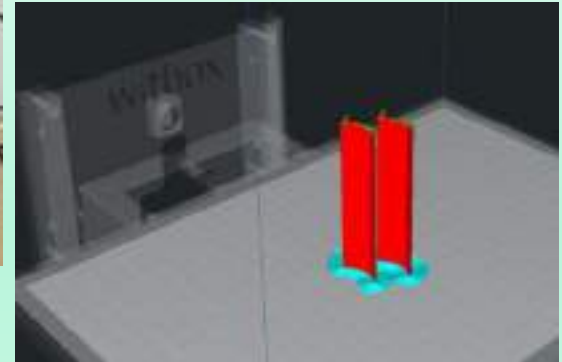
## Le Challenge en 1<sup>ère</sup> : les robots de combat



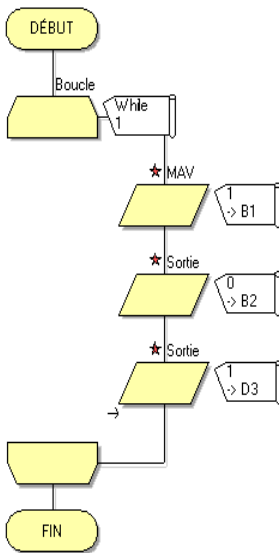
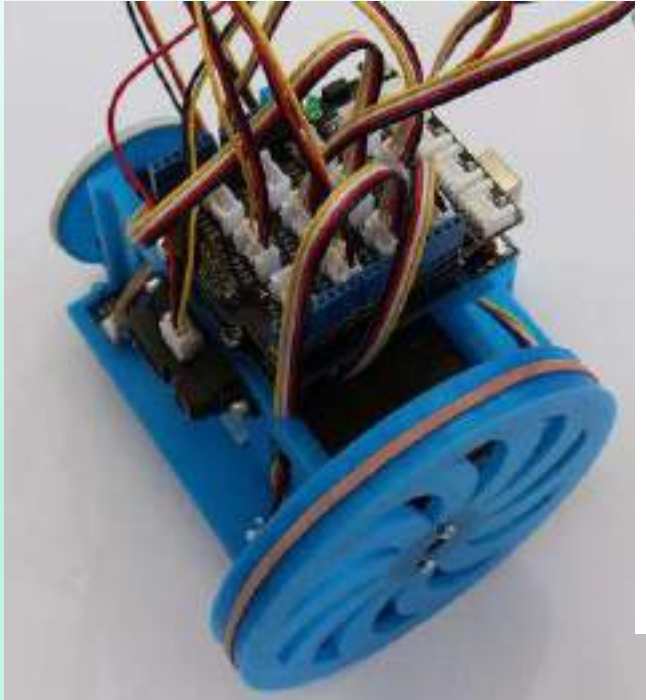
# Le Challenge en 1<sup>ère</sup> : les robots de combat



# Le Challenge en 1<sup>ère</sup> : les robots de combat

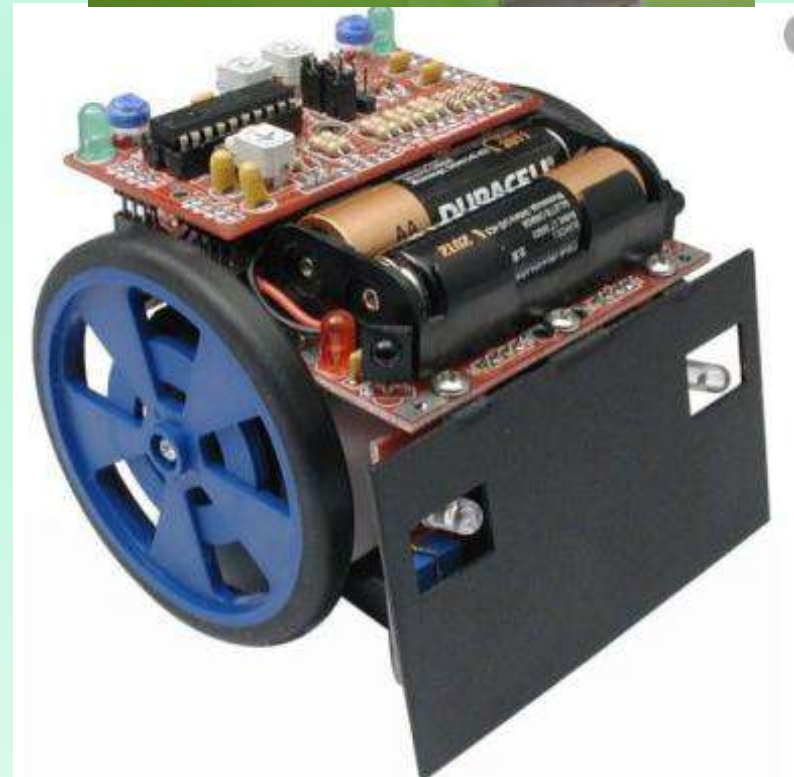


# Le Challenge en 1<sup>ère</sup> : les robots de combat



```
void setup()
{
  pinMode(9, OUTPUT); //La borne 9 est définie comme une sortie
  pinMode(10, OUTPUT); //La borne 10 est définie comme une sortie
  pinMode(3, OUTPUT); //La borne 3 est définie comme une sortie
}

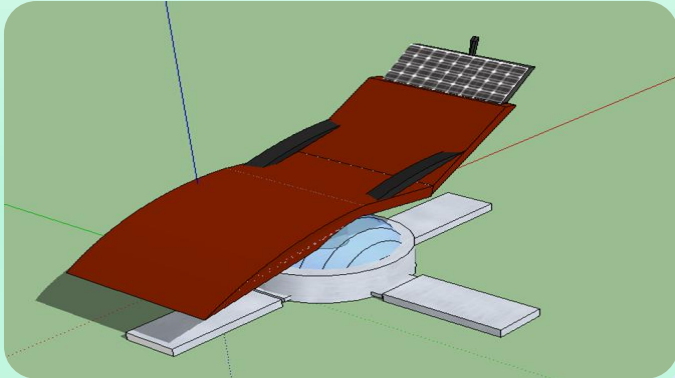
void loop()
{
  digitalWrite(9,1); // rotation sens anti horaire (MAV) du moteur M2: 9=1 et 10=0;
  digitalWrite(10,0); // rotation sens horaire (MAR) du moteur M1: 9=0 et 10=1;
  // Arrêt : 9=0 et 10=0;
  digitalWrite(3,1); // réglage vitesse moteur M1 à fond
}
```



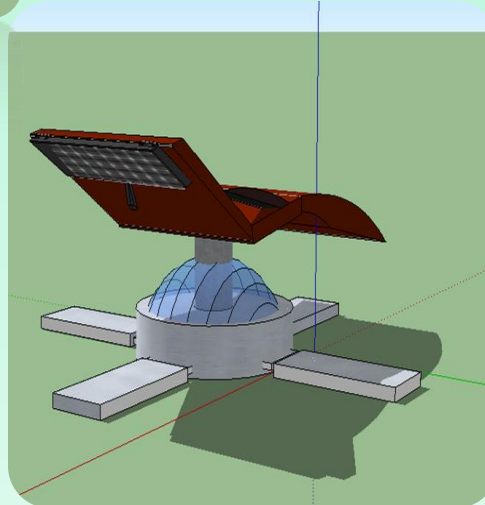
# *Autres activités proposées :*

## Le PROJET en Terminale

Des projets d'élèves...



Transat solaire  
suiveur



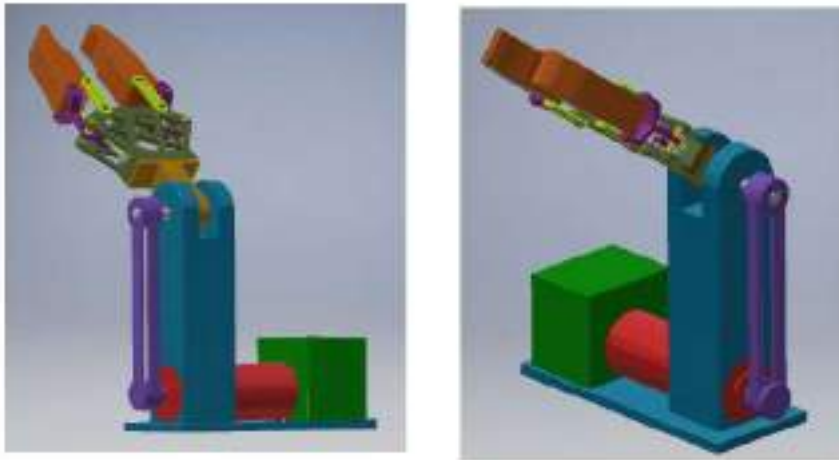
Pilulier intelligent



# Le PROJET en Terminale

## Des projets d'élèves...

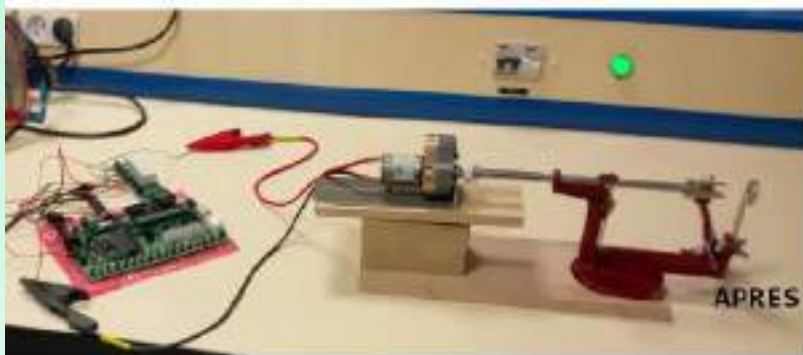
Bras médicalisé pour  
assistance à la personne



Enrouleur de sac de couchage



Epluche pomme motorisé



# Le PROJET en Terminale

## Des projets d'élèves...

Valise suiveuse



Robot-chariot distribution  
plateaux chez McDo



Robot nettoyeur lignes terrain  
de tennis



Ecran suiveur de tête

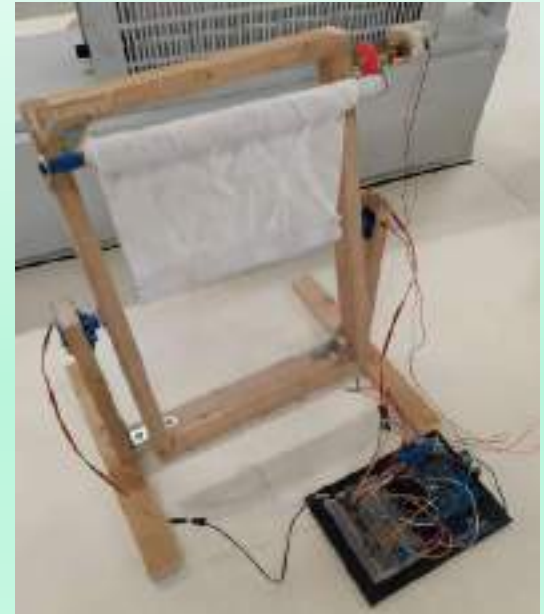


# Le PROJET en Terminale

## Des projets d'élèves...

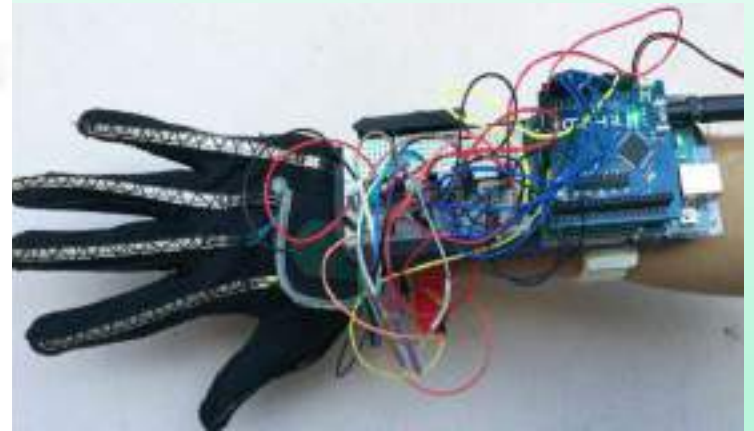


Parasol + glacière à suivi solaire pour la plage

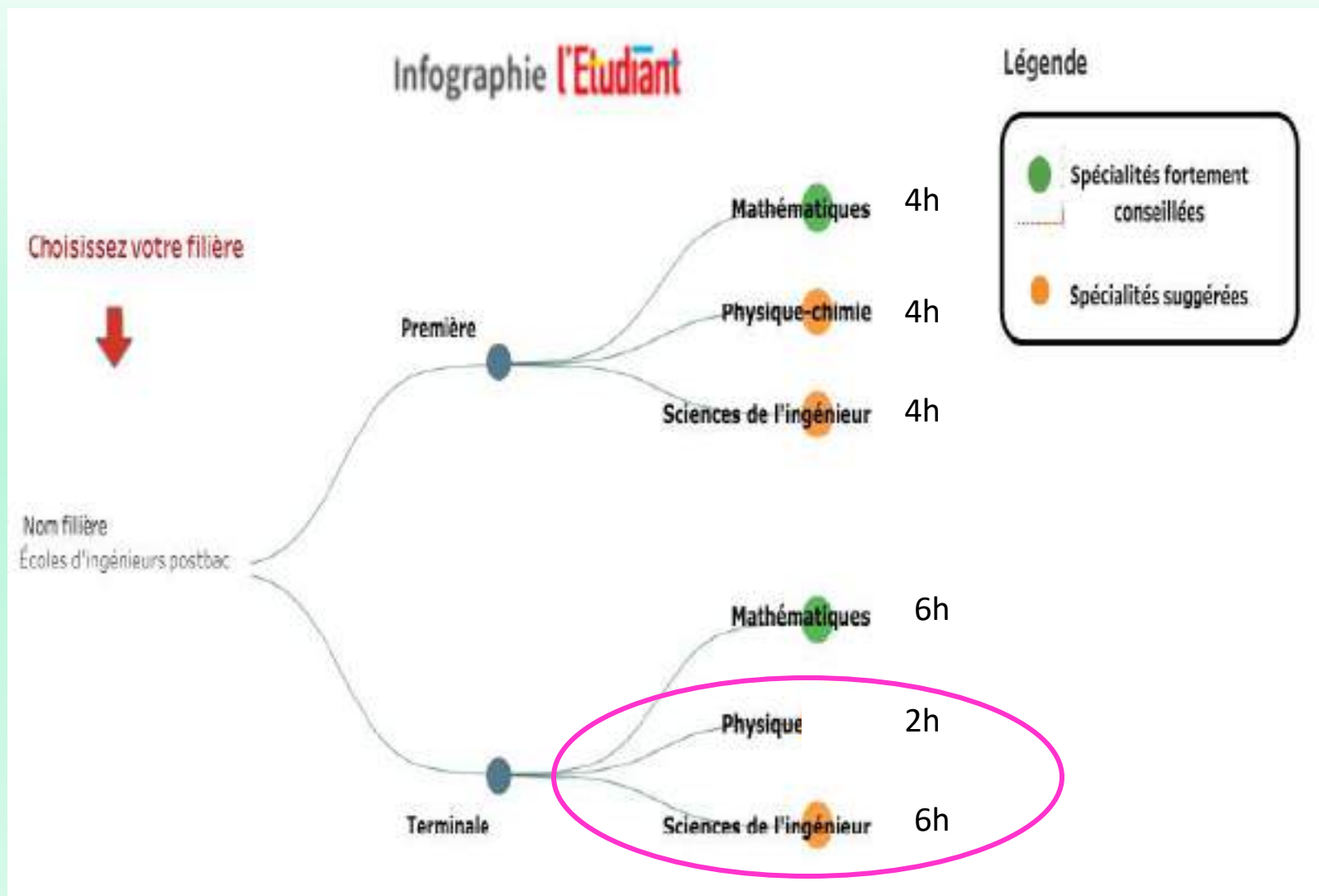


Smart windows

# Les olympiades des SI



# Le parcours idéal pour intégrer une école d'ingénieur ou une Classe Préparatoire aux Grandes Ecoles (CPGE)



Merci de votre  
attention !