Title of my report of in robotics

Votre Prénom et votre Nom

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Chapter 1

Introduction

Ce document peut vous servir de modèle pour rédiger votre rapport de stage ou de PFE. Je vous conseille d'utiliser Lyx (ou bien Latex). Je pense que Lyx est plus convivial, surtout quand on aime réfléchir devant son document, sans avoir à l'imprimer. Par exemple, je préfère voir $\alpha \Longrightarrow \beta$ que \alpha \Longrightarrow \beta qui correspond à du Latex.

Lyx peut être téléchargé sur https://www.lyx.org/

Pour plus d'explications, voir sur https://www.ensta-bretagne.fr/jaulin/rapports.html

Bien sûr, si vous avez un style plus chouette n'hésitez pas à le prendre. D'ailleurs, je le reprendrai peut être pour les années suivantes.

Ci dessous voici un peu de texte repris de la référence [JAU15].

A *mobile robot* can be defined as a mechanical system capable of moving in its environment in an autonomous manner [JAU 05]. For that purpose, it must be equipped with:

- *sensors* that will help it gain knowledge of its surroundings (which it is more or less aware of) and determine its location ;
- *actuators* which will allow it to move ;
- an *intelligence* (or algorithm, regulator), which will allow it to compute, based on the data gathered by the sensors, the commands to send to the actuators in order to perform a given task.

The MATLAB code related to the exercises of this book together with explanatory videos can be found at the following address:

`www.ensta-bretagne.fr/jaulin/isterob.html`

Il faut éviter dans votre rapport de citer des liens WEB, comme ci-dessus, ou des polycopiés, sauf si c'est indispensable. Il est préférable de citer des articles (comme [BAZ 12]) des livres [KHA 02] ou même des thèses [LEBARS 11].

Chapter 2

Three-dimensional modeling

The robots [JAU15], whether mobile, manipulator or articulated, can generally be put into a state representation form:

$$\begin{cases} \dot{\mathbf{x}}(t) & = & \mathbf{f}(\mathbf{x}(t), \mathbf{u}(t)) \\ \mathbf{y}(t) & = & \mathbf{g}(\mathbf{x}(t), \mathbf{u}(t)) \end{cases}$$

where $\mathbf{x}$ is the state vector, $\mathbf{u}$ the input vector and $\mathbf{y}$ the vector of measurements [JAU 05].

The robot we will be modeling is the Redermor (*greyhound of the sea* in the Breton language). It is represented on Figure 2. It is an entirely autonomous underwater robot. This robot, developed by GESMA (Groupe d'Etude Sous-Marine de l'Atlantique - *Atlantic underwater research group*), has a length of 6 m, a diameter of 1 m and a weight of 3 800 kg. It has a very efficient propulsion and control system with the aim of finding mines on the seabed.

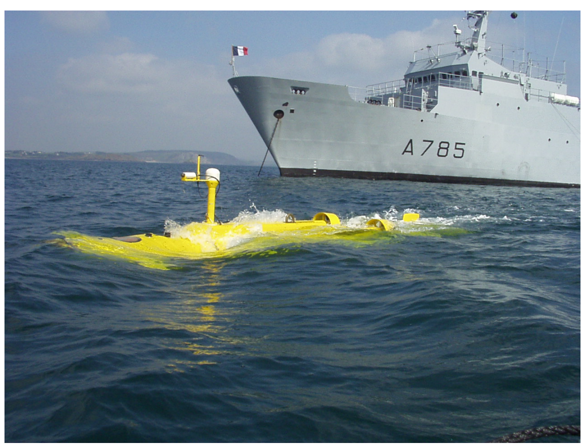

Figure 2.1: *Redermor* built by GESMA

The simulation could be done by using Euler's method as follows:

```
dt=0.1;
x=[0;0;10;0.1;0;0;0];
for t=0:dt:10,
```

```
u=...;
x=x+dt*f(x,u);
draw(x);
end
```

Chapter 3

Feedback linearization

For more on Feedback linearization, see [JAU 05]. Consider the underwater robot represented on Figure 3.

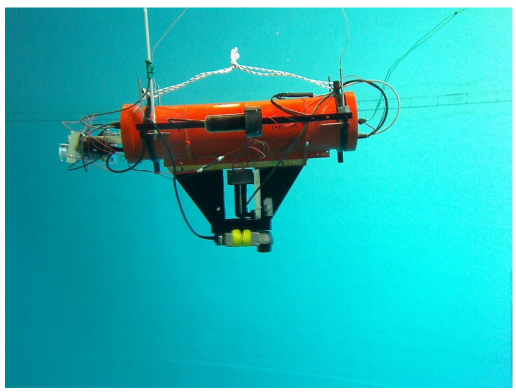

Figure 3.1: The SAUCISSE robot in a pool

This is the SAUCISSE robot, built by students of the ENSTA Bretagne for the SAUC'E competition (*Student Autonomous Underwater Challenge Europe*). It includes three propellers. Propellers 1 and 2 on the left and the right are able to act on the speed of the robot and its angular speed. Propeller 3 acts on the depth of the robot. This robot is stable in roll and pitch and we will assume that its angles of bank φ and elevation θ are always zero.

Bibliography

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