

ME 4309 - Engineering Control and Measurements

(3-3-1-0)

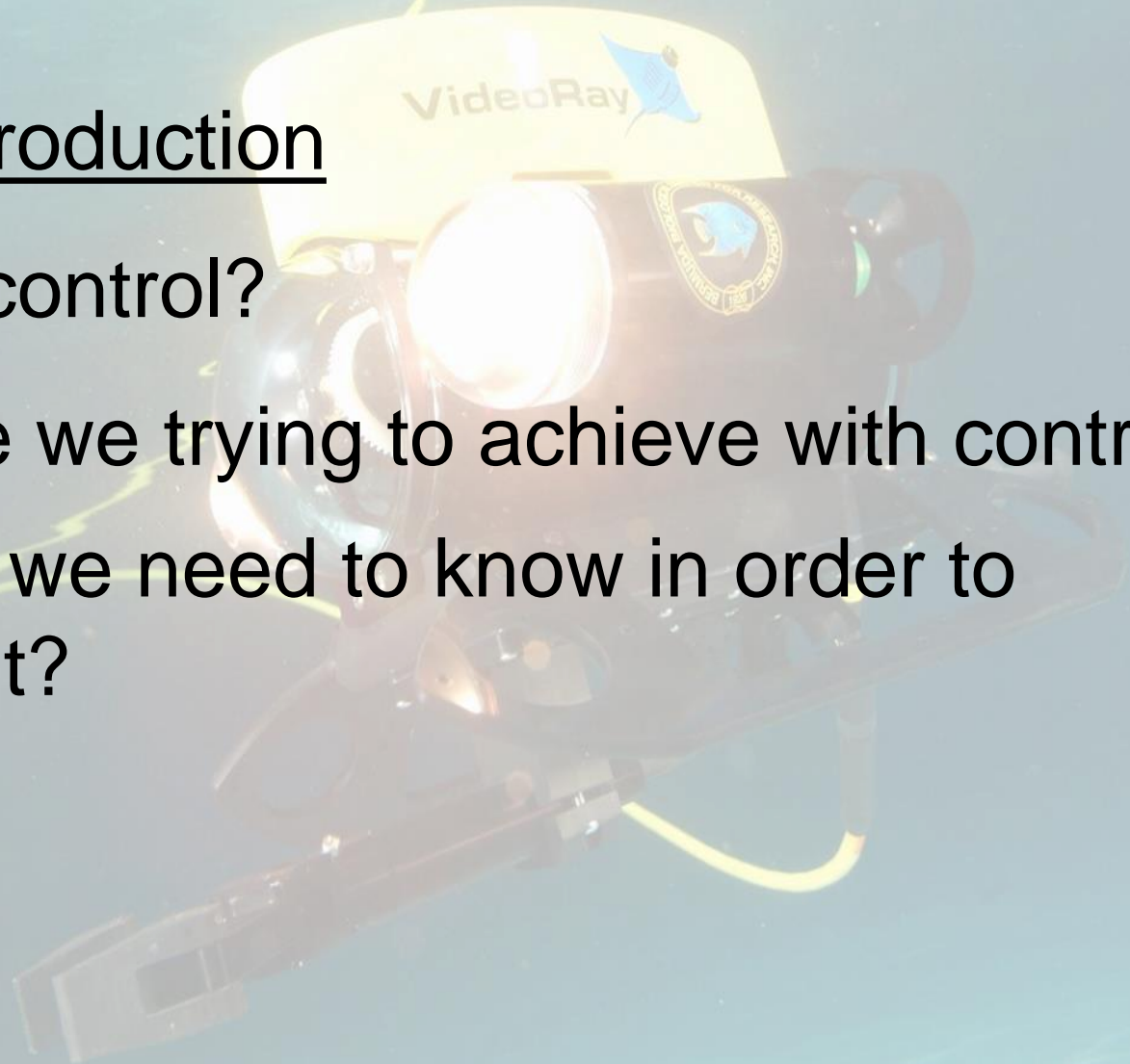
Fourth Stage

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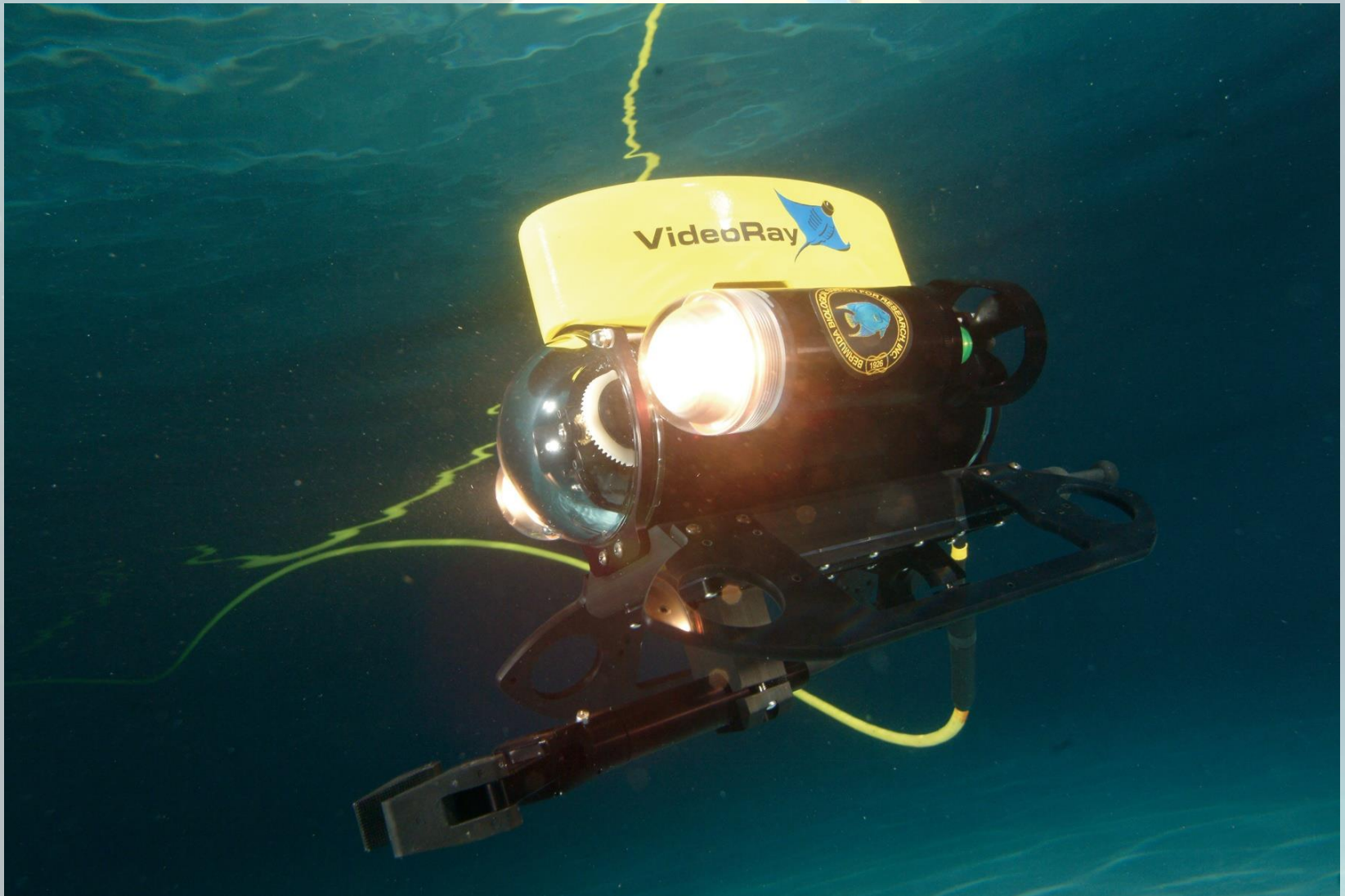
Chapter 1: Control Systems

Course Introduction

- What is control?
- What are we trying to achieve with control?
- What do we need to know in order to achieve it?

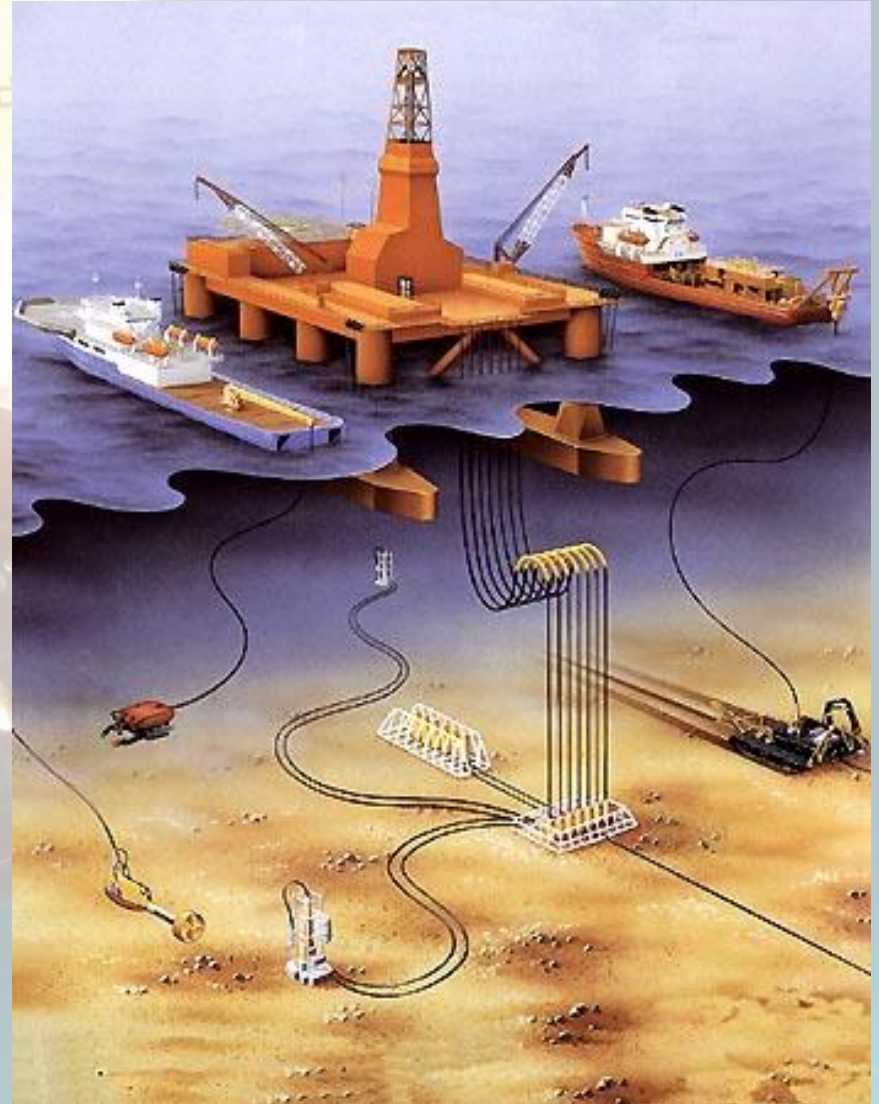


Consider a Submarine Remotely Operate Vehicle (ROV)



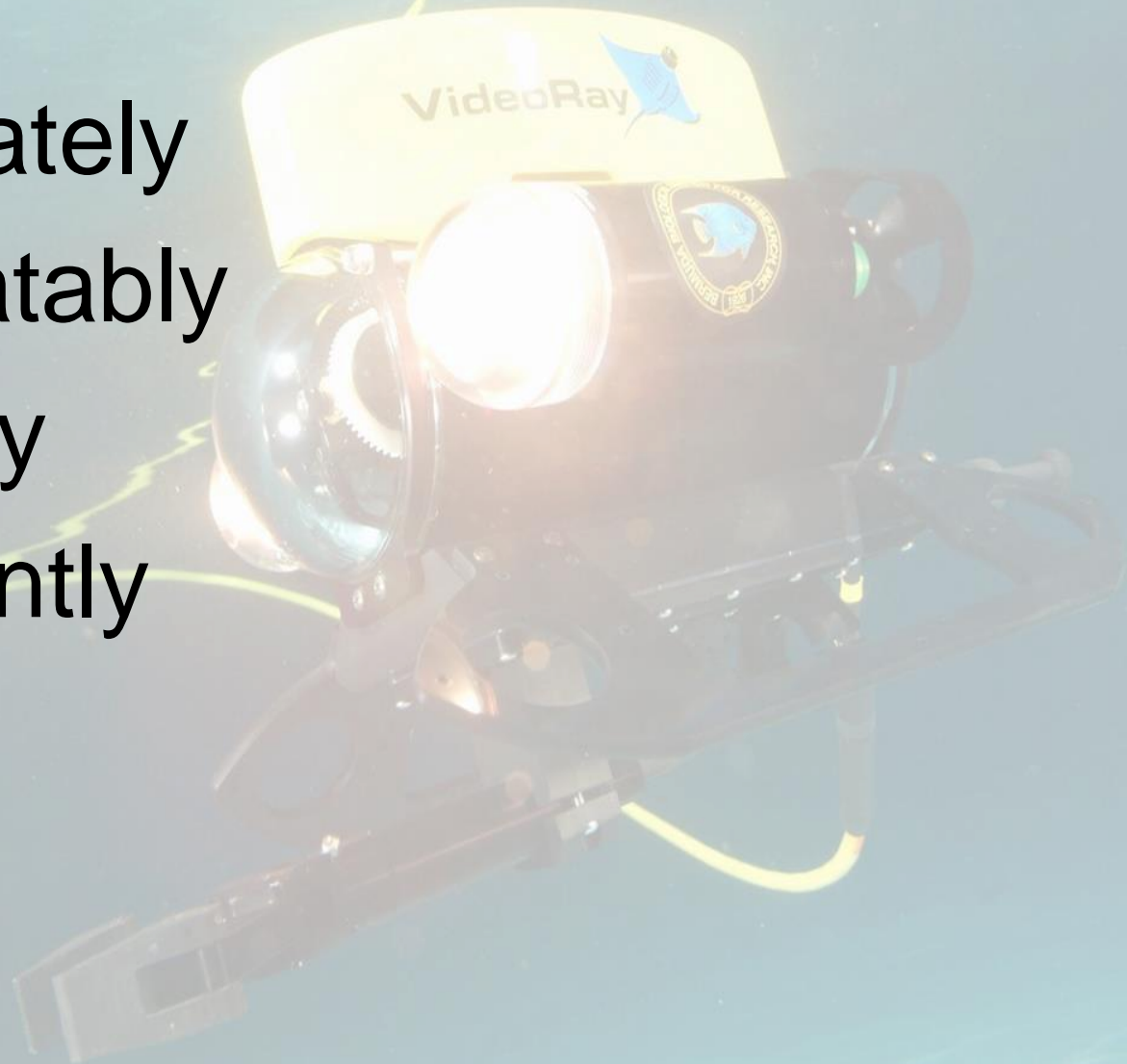
What does it do?

- Moves to defined positions
 - Well head, control valve etc
- Maintain position
- Follows defined path
 - Pipeline etc



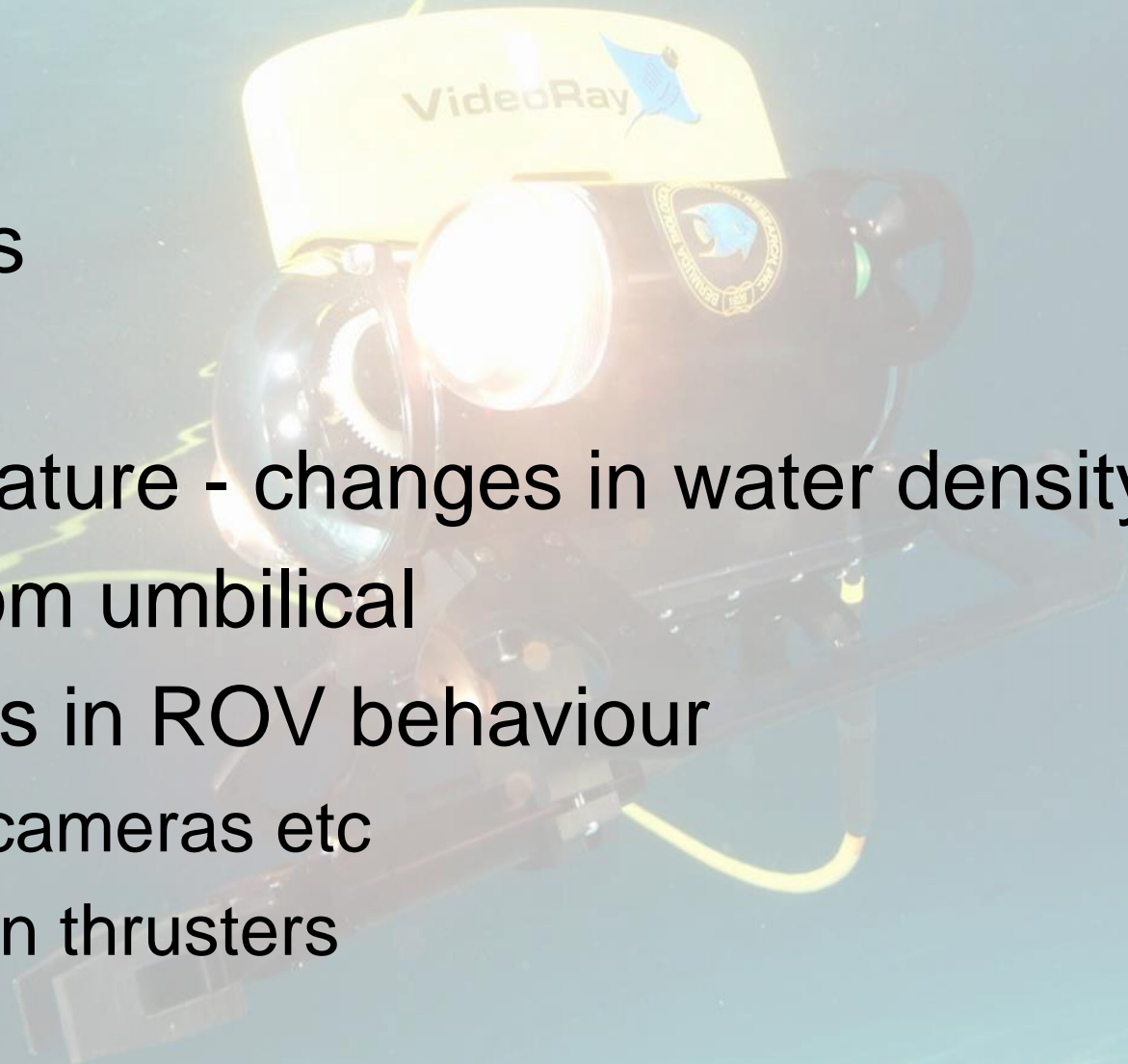
How do we want it to perform?

- Accurately
- Repeatably
- Quickly
- Efficiently



What makes this difficult?

- Waves
- Currents
- Tides
- Temperature - changes in water density
- Drag from umbilical
- Changes in ROV behaviour
 - Extra cameras etc
 - Wear in thrusters



Another Example – Satellite Tracking System



Another Example – Satellite Tracking System



Another Example – Satellite Tracking System



Some other systems in need of control



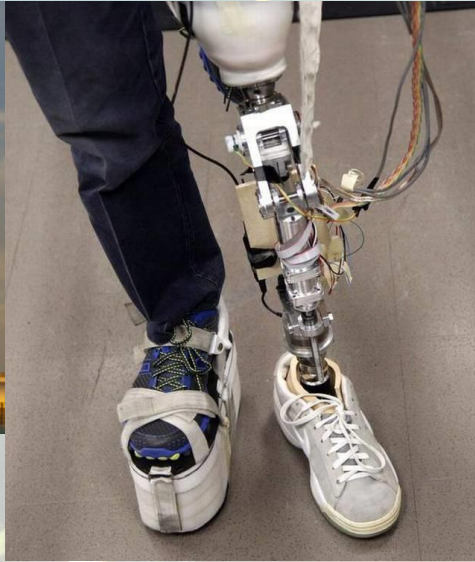
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<http://mediaserver.dwpub.com/press-release/6492/Wind+Turbine+2.jpg>

Some other systems in need of control



What are the outputs?

What are the inputs?

What are the external disturbances?

What do we need to know in order to control the system?

- Understand behaviour of system
- Predict the response of the system to different inputs
- Predict the effect of changes in system and environment
- Simplify the behaviour of the system
- Design control system to give desired performance under different conditions

What do we need to know in order to control the system?

Modelling



- Understand behaviour of system
- Predict the response of the system to different inputs

Control theory



- Predict the effect of changes in system and environment
- Simplify the behaviour of the system
- Design control system to give desired performance under different conditions

Most control systems involve the same elements