

# AUTONOMOUS CONTROL SYSTEMS

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# INTRODUCTION

AUTOMATIC VERSUS AUTONOMOUS

EVOLUTION OF AIR

EVOLUTION OF LAND

FUTURE DEVELOPMENTS



# AUTOMATIC VERSUS AUTONOMOUS

## DECISIONS ARE MADE BY A HUMAN..... OR A MACHINE

### **AUTOMATIC:**

DECISION MAKING IS EXTERNAL TO THE VEHICLE  
COMPUTER DRIVES THE VEHICLE BUT IS CONSTRAINED AND A DRIVER IS PRESENT  
THE SIGNALLING SYSTEM IS "IN AUTHORITY"  
SITUATION AWARENESS IS OFF-BOARD

### **AUTONOMOUS:**

DECISION MAKING IS INTERNAL TO THE VEHICLE  
COMPUTER DRIVES THE VEHICLE AND NO DRIVER IS PRESENT  
VEHICLE IS IN AUTHORITY THROUGH DEFINITIONS OF "INTENTIONS" AND CONSTRAINTS  
SITUATION AWARENESS IS ON-BOARD



## EVOLUTION WITHIN AIR

# CERTIFICATION AND FLIGHT CLEARANCE

ROCKETS FLY A PRE-SPECIFIED PLAN

ELECTRO MECHANICAL CONTROL, INERTIAL NAVIGATION

AUTOPILOT HAS AUTOMATION WITH LIMITED AUTHORITY

DRONES ARE REMOTELY PILOTED OVER RADIO LINK

UNMANNED AIR VEHICLES

SOME INBUILT FLIGHT PATTERNS E.G RACETRACK (FLY BY WIRE)

VEHICLE INFORMS AND GETS AUTHORISATION OF ROUTES

VEHICLE MAKES DECISIONS BASED ON SENSING ENVIRONMENT

SENSE AND AVOID



## EVOLUTION WITHIN LAND

# DRIVING LAND AUTONOMY

AUTOMATIC GEARBOX  
ADAPTIVE CRUISE CONTROL  
AUTOMATIC PARKING SYSTEM  
REVERSING SENSORS/CAMERAS  
UNMANNED LAND VEHICLE  
REMOTE DRIVER  
'FOLLOW-ME'





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# FUTURE DEVELOPMENTS

## LOOKING TO THE FUTURE

AGENT BASED SOFTWARE  
SENSORS – DIVERSE, HIGH INTEGRITY  
CO-OPERATIVE BEHAVIOUR  
FUTURE CERTIFICATION



## **SUMMARY**

**MOST TECHNOLOGIES ARE  
AVAILABLE NOW**

**THE DEGREE OF AUTOMATION  
OR AUTONOMY NEEDS TO BE  
BASED ON WHAT IS  
APPROPRIATE**



**AUTOMATIC VERSUS AUTONOMOUS  
EVOLUTION WITHIN AIR  
EVOLUTION WITHIN LAND  
FUTURE DEVELOPMENTS**





**THANK YOU**

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