



Conception numérique (DiD)

Introduction

IND

Filière Systèmes industriels

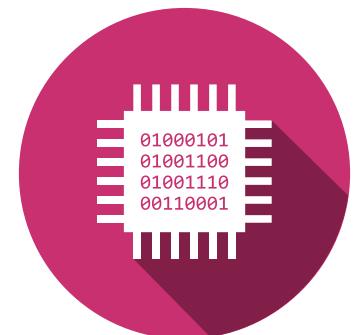
Filière Energie et techniques environnementales

Filière Informatique et systèmes de communications

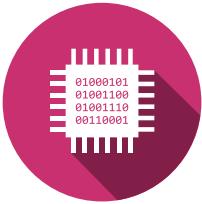
Silvan Zahno silvan.zahno@hevs.ch

Christophe Bianchi christophe.bianchi@hevs.ch

François Corthay francois.corthay@hevs.ch

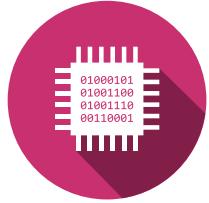


SYND Modules 1^{ère} année



Resp.	No	Abrév.		Cours / Vorlesungen	Credits	Heures par semestre / Stunden pro Semester					
						1	2	3	4	5	6
lal	S1.1	LCG	1re année / 1. Jahr Tronc commun / Kernlehrplan	Langues, communication et gestion / Sprachen, Kommunikation und Management	10	80	80				
	S1.11	All1/Fra1		Deutsch für Ingénieurs / Français pour ingénieur.e.s		30	30				
	S1.12	Eng1		English for Engineers		30	30				
	S1.13	Com		Communication / Kommunikation		20					
	S1.14	GeP		Gestion de projet / Projektmanagement			20				
	S1.2	BaS1		Bases scientifiques 1 / Wissenschaftliche Grundlagen 1	20	210	180				
	S1.21	An1-2		Analyse 1-2 / Analyse 1-2		90	60				
	S1.22	ALin		Algèbre linéaire / Lineare Algebra		60					
	S1.23	MthA1		Mathématiques appliquées 1 / Angewandte Mathematik 1			60				
	S1.24	SMx		Science des matériaux / Werkstoffkunde		60					
bco	S1.25	Phy1		Physique 1 / Physik 1			60				
	S1.3	BaM		Bases métier / Fachspezifische Grundlagen	14	105	180				
	S1.31	Inf		Informatique / Informatik		60	60				
	S1.32	Ele		Electrotechnique / Elektrotechnik			75				
	S1.33	Mec		Mécanique / Mechanik		45	45				
	S1.4	Sys1		Ingénierie des systèmes 1 / Systemtechnik 1	12	120	75				
	S1.41	CNum		Conception numérique / Digitales Design		75					
	S1.42	CMec		Conception mécanique / Mechanisches Design			30				
	S1.43	PES		Projet éléments système / Systemelemente		45	45				
pag	S1.5	SS1		Summer school 1	4						

But du cours



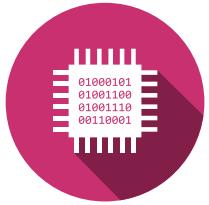
Savoir interpréter le cahier des charges fonctionnel d'un système simple (C) et le représenter sous forme numérique (A)

Appliquer les principes de base de la conception numérique selon les méthodologies proposées (A)

Réaliser la fonction logique qui en découle (A)

Valider la conception numérique réalisée selon les méthodologiques de simulation et de test (J)

Contenu du cours

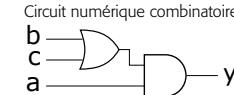
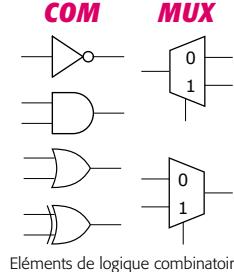
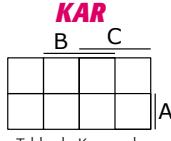


Cahier des charges

NUM
11110101
Binary digIT
MSb LSB

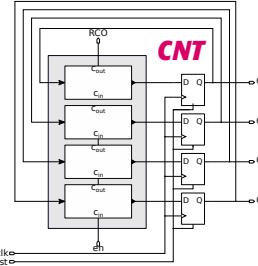
a	b	y
0	0	0
0	1	1
1	0	1
1	1	0

Table de vérité

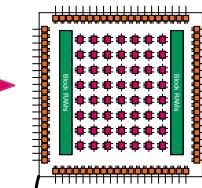


LST

Compteur

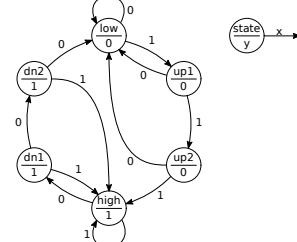


FPGA



Q_A	Q_B	Q_A^+	Q_B^+
0	0	1	0
0	1	0	0
1	0	1	1
1	1	0	1

Table d'état



Equation polynomiale

$$Q_0^+ = \overline{Q}_0$$

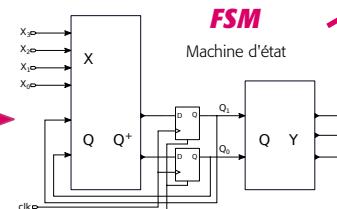
$$Q_1^+ = Q_0 \oplus Q_1$$



Eléments de logique séquentielles

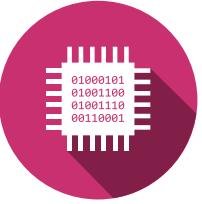
clk
rst

DiD IND



MET

Blague



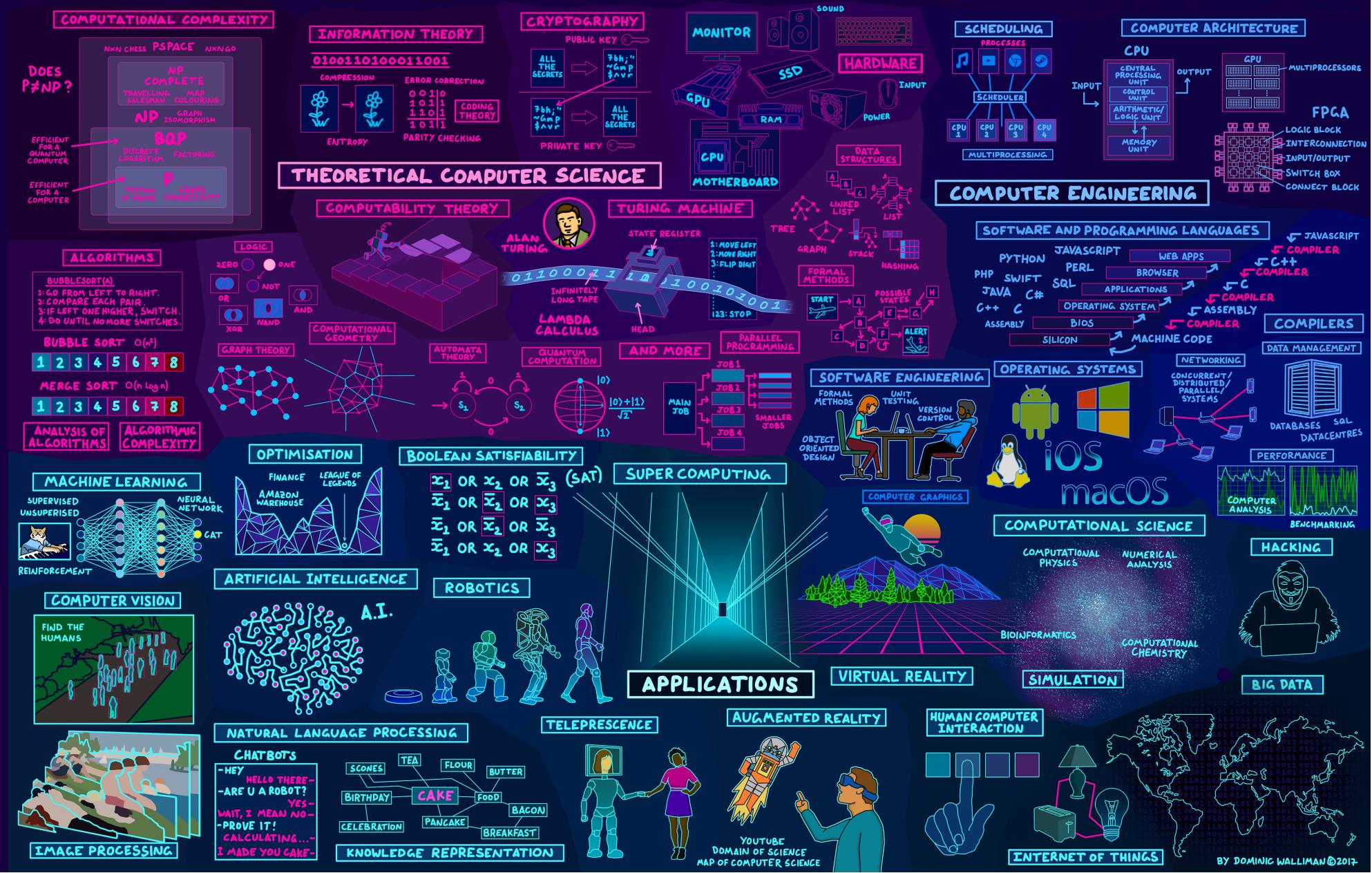
The image displays a binary matrix pattern consisting of a grid of black and white dots. The dots are arranged in vertical columns, with each column containing either all black dots or all white dots. Interspersed among these monochromatic columns are several columns that contain both black and red dots. These colored columns are positioned at regular intervals across the entire grid. The red dots are scattered throughout these mixed columns, appearing in various vertical positions. The overall effect is a digital or abstract representation of data storage or transmission.

There are 10 types of people in this world. Those who understand binary and those who don't.

Il y a 10 types de personnes dans ce monde. Ceux qui comprennent le binaire et ceux qui ne le comprennent pas.

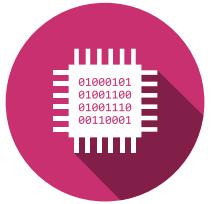
Map of

Computer Science



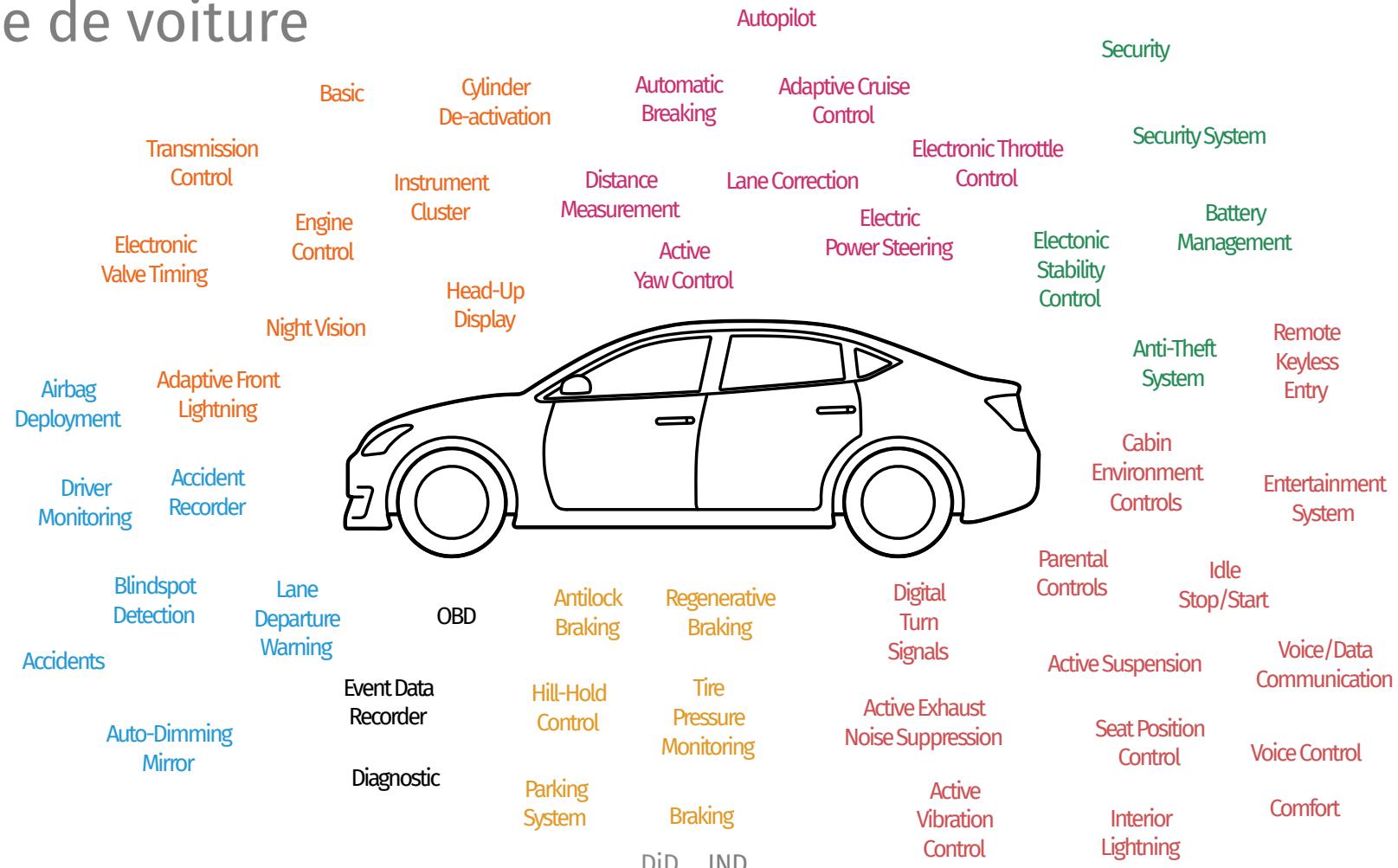
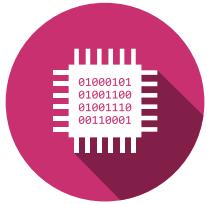
Electronique numérique

Domaines d'application



Electronique numérique

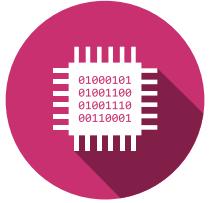
Exemple de voiture



Electronique numérique

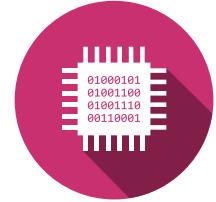
Ariane 5

https://youtu.be/PK_yguLapgA

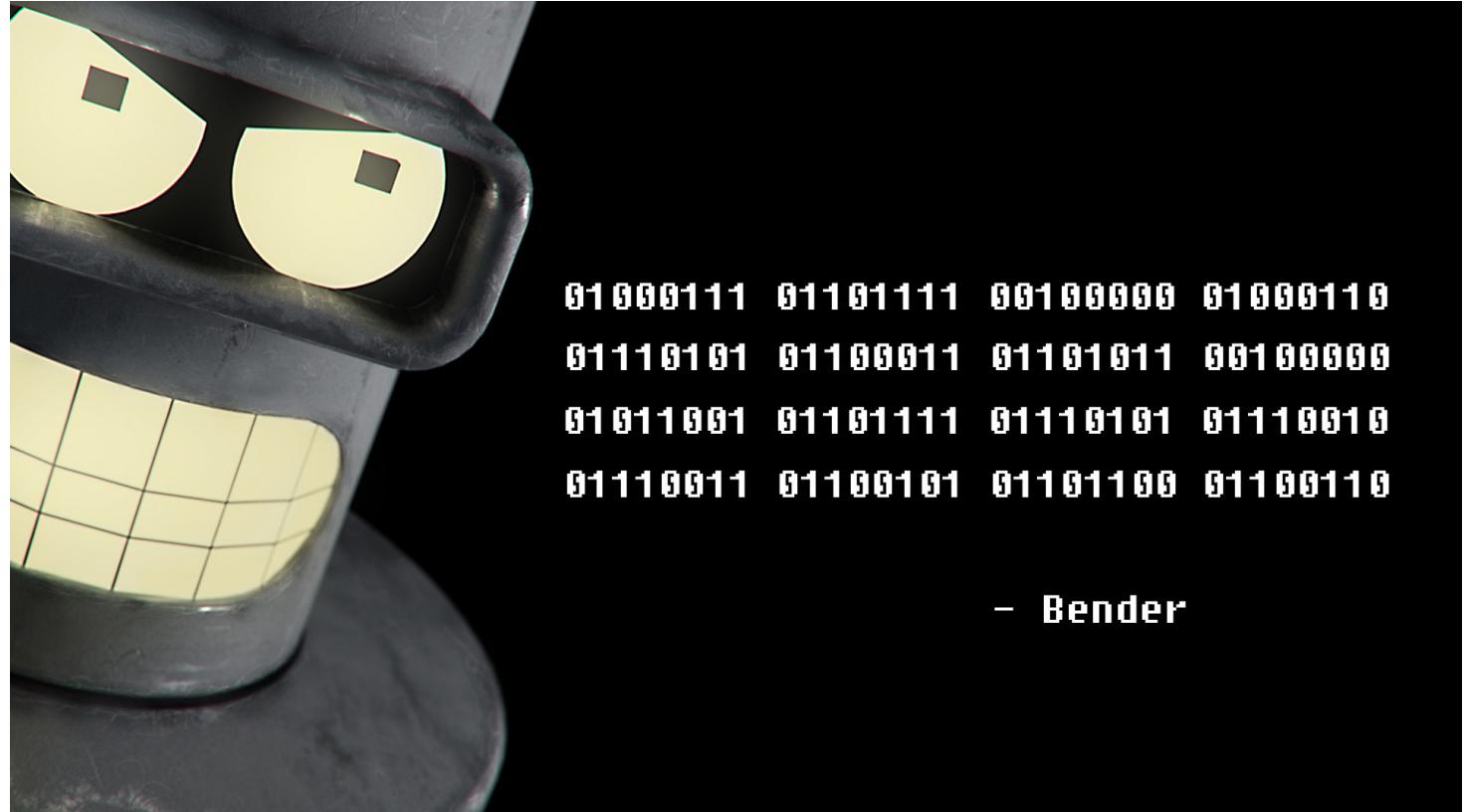
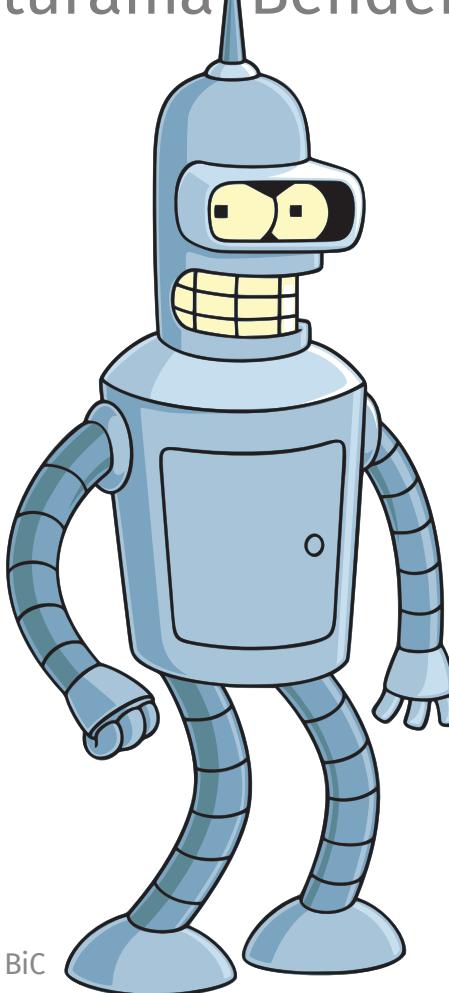


Electronique numérique

Futurama/Bender

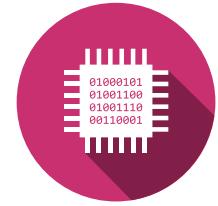


https://youtu.be/_4TPlwwHM8Q

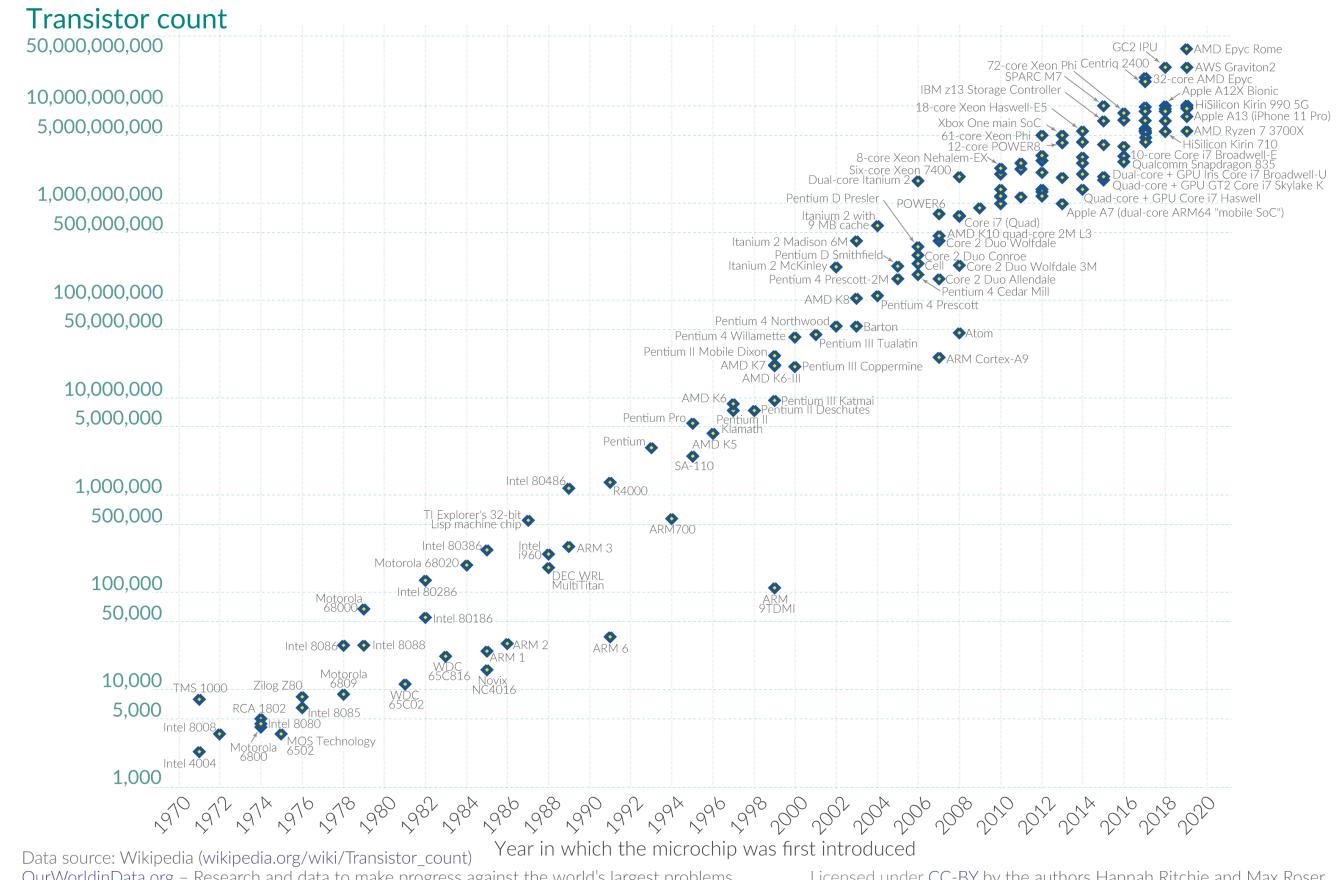


Electronique numérique

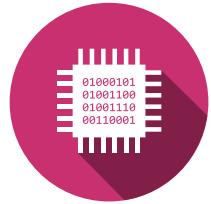
Moore's Law



*Number of transistors double
every two years
- Gordon Moore -*



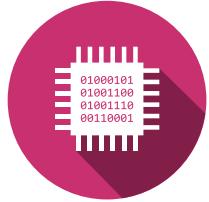
SYND Organisation



- Cours (4 Heures/Semaine)
- Laboratoires (4 Heures/Semaine)
- Appui (2 Heures/Semaine)
- Projet (Cursor $\approx 5 - 6 \text{ Semaine}$)
- Examen
 - Semaine 43 (20.10.2025 – 24.10.2025)
 - Semaine 50 (08.12.2025 – 12.12.2025)

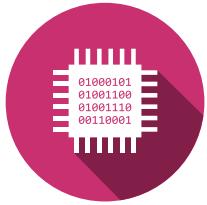
Nbr	Abbr	Cours	Semestre	Pondération			Cours
				Control continue	Examens de semestre		
S1.41	Cnum / DiD	Conception numérique	S1	1	1		2
S1.42	CMec	Conception mécanique	S2	1	1		1
S1.43	PES	Projet éléments système	S1	1	-		3
			S2	1	-		

Bien réussir dans ce cours

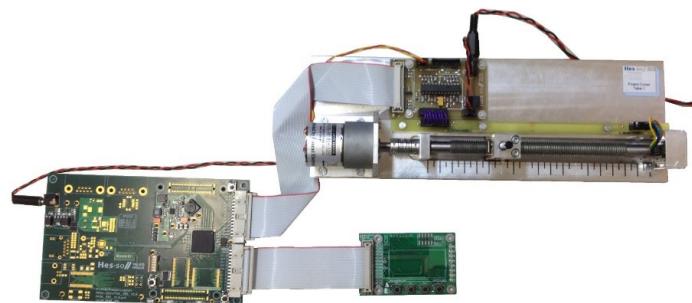
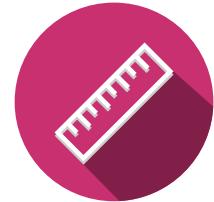


- **Présence obligatoire**
 - La présence à tous les cours est obligatoire. Seuls les professeurs peuvent accorder une **dispense**.
- **Prise de notes**
 - Il est **indispensable de prendre des notes**, en particulier lors des **exemples et exercices** faits en classe.
 - Les **solutions élaborées ensemble au tableau** peuvent être recopiées.
- **Travail personnel**
 - Des **exercices complémentaires** sont à réaliser à la maison.
 - Un **travail personnel régulier** est **indispensable** pour assimiler la matière.
- **Aide et accompagnement**
 - Le **cours de complément** ainsi que le **canal MS Teams** sont à votre disposition pour **poser des questions** sur la **théorie** et les **exercices**.
- **Correction d'exercices**
 - Les **exercices** peuvent être **remis à un professeur** pour **correction**.

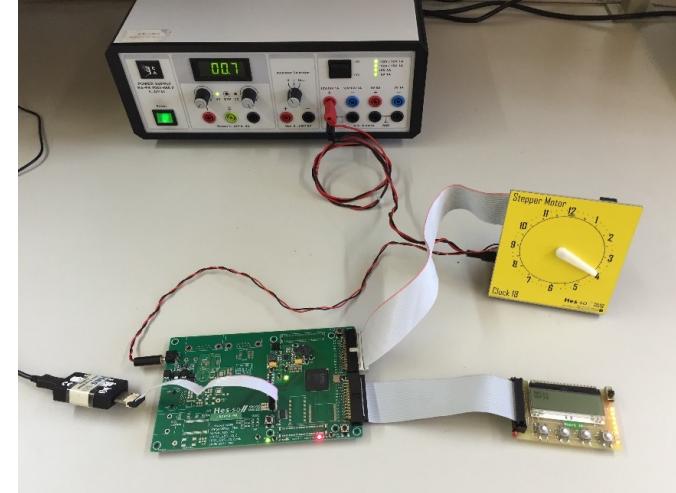
Projet de semestre Systèmes Industriels



Cursor



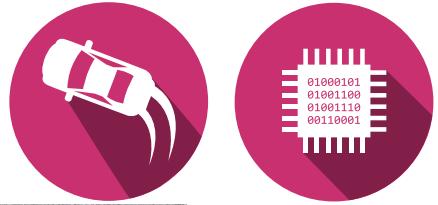
Chrono



Summerschool Kart

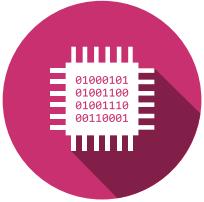
SS1 2017

<https://www.youtube.com/watch?v=g6lU2NDZub8>



Organisation

Professeurs



Bianchi Christophe (BiC)
Bureau: ENP.23.N207
Email: christophe.bianchi@hevs.ch
Tel: +41 58 606 87 60



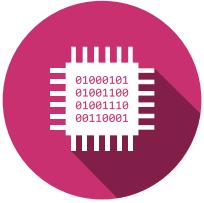
Andrea Guerrieri (GuA)
Bureau: ENG.23.N312
Email:
andrea.guerrieri@hevs.ch
Tel: +41 58 606 93 55



Zahno Silvan (ZaS)
Bureau: ENG.23.N312
Email: silvan.zahno@hevs.ch
Tel: +41 58 606 88 07

Organisation

Collaborateurs



Alban Theytaz (ThA)
Bureau: ENG.23.N219
Email: alban.theytaz@hevs.ch
Tel: +41 58 606 85 85



David Tagan (TaD)
Bureau: ENG.23.N219
Email: david.tagan@hevs.ch
Tel: +41 58 606 92 96



Rémy Borgeat (BoR)
Bureau: ENG.23.N313
Email: remy.borgeat@hevs.ch
Tel: +41 58 606 92 20

Serveurs et fichiers

Systèmes industriels

Moodle Cyberlearn

- 25_HES-SO-VS_S1.41_CONCEPTION NUMÉRIQUE / DIGITALES DESIGN
- Password: *welcome*

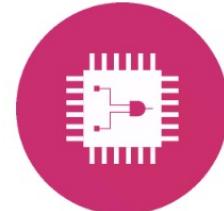
Microsoft Teams

- 25_SYND_CNum
- Access Code: **v3tkguu**

INFO

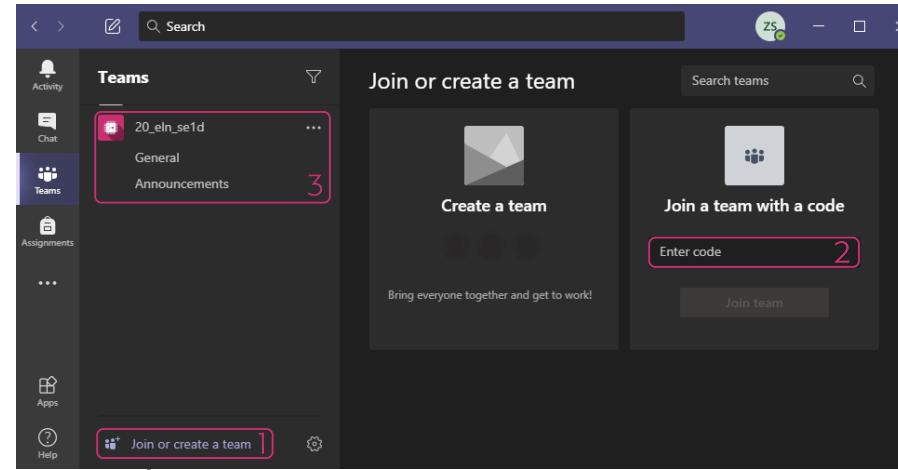
Tout replier

INFORMATIONS DU MODULE -MODULINFORMATIONEN MODULE DID - KURS DID



Le module Sys est une introduction à l'ingénierie des Systèmes et à la démarche pluridisciplinaire et structurée qui en découle. L'approche pédagogique vise à développer les compétences de conception et de réalisation d'éléments de système. Le module se compose des unités d'enseignement: conception numérique (CNum), conception mécanique (CMec) et projet éléments systèmes (PES).

Das Sys-Modul ist eine Einführung in das Systems Engineering und den daraus resultierenden multidisziplinären und strukturierten Ansatz. Der pädagogische Ansatz zielt darauf ab, die Fähigkeiten des Designs und der Realisierung von Systemelementen zu entwickeln. Das Modul besteht aus den Unterrichtseinheiten: Digital Design (DiD), Mechanical Design (CMec) und System Elements Project (PES).



WHY ARE THERE MIRRORS ABOVE BEDS
WHY DO I SAY UH
WHY IS SEA SALT BETTER
WHY ARE THERE TREES IN THE MIDDLE OF FIELDS
WHY IS THERE NOT A POKEMON MMO
WHY IS THERE LAUGHING IN TV SHOWS
WHY ARE THERE DOORS ON THE FREEWAY
WHY ARE THERE SO MANY SVHOST-EXE RUNNING
WHY AREN'T ANY COUNTRIES IN ANTARCTICA
WHY ARE THERE SCARY SOUNDS IN MINECRAFT
WHY IS THERE KICKING IN MY STOMACH
WHY ARE THERE TWO SLASHES AFTER HTTP
WHY ARE THERE CELEBRITIES
WHY DO SNAKES EXIST
WHY DO OYSTERS HAVE PEARLS
WHY ARE DUCKS CALLED DUCKS
WHY DO THEY CALL IT THE CLAP
WHY ARE KYLE AND CARTMAN FRIENDS
WHY IS THERE AN ARROW ON AANG'S HEAD
WHY ARE TEXT MESSAGES BLUE
WHY ARE THERE MUSTACHES ON CLOTHES
WHY WUBA LUBBA DUB DUB MEANING
WHY IS THERE A WHALE AND A POT FALLING
WHY ARE THERE SO MANY BIRDS IN SWISS
WHY IS THERE SO LITTLE RAIN IN WALLIS
WHY IS WALLIS WEATHER FORECAST ALWAYS WRONG

WHY ARE THERE MALE AND FEMALE BIKES
WHY ARE THERE SQUIRRELS
WHY ARE THERE BRIDESMAIDS
WHY DO DYING PEOPLE REACH UP
HOW FAST IS LIGHTSPEED
WHY ARE OLD KLINGONS DIFFERENT

WHY ARE THERE TINY SPIDERS IN MY HOUSE
WHY DO SPIDERS COME INSIDE
WHY ARE THERE HUGE SPIDERS IN MY HOUSE
WHY ARE THERE LOTS OF SPIDERS IN MY HOUSE
WHY ARE THERE SPIDERS IN MY ROOM
WHY ARE THERE SO MANY SPIDERS IN MY ROOM

WHY DO SPYDER BITES ITCH

WHY IS DYING SO SCARY

WHY IS THERE NO GPS IN LAPTOPS
WHY DO KNEES CLICK
WHY AREN'T THERE E GRADES

WHY 2*B / 2*B

ILUV IS PROGRAMMING SO HARD

QUESTIONS

CAN BE ASKED BY ANYONE ANYTIME

WHY AREN'T ECONOMISTS RICH
WHY DO AMERICANS CALL IT SOCCER
WHY ARE MY EARS RINGING
WHY IS 42 THE ANSWER TO EVERYTHING
WHY CAN'T NOBODY ELSE LIFT THORS HAMMER
WHY IS MARVIN ALWAYS SO SAD

WHY IS THERE A SWARM OF ANTS
WHY IS THERE PILGRIM
WHY ARE THERE SO MANY CROWS IN ROCHESTER
WHY IS TO BE OR NOT TO BE FUNNY
WHY DO CHILDREN GET CANCER
WHY IS POSEIDON ANGRY WITH ODYSSEUS
WHY IS THERE ICE IN SPACE

WHY ARE THERE ANTS IN MY LAPTOP

WHY IS EARTH TILTED
WHY IS SPACE BLACK
WHY IS OUTER SPACE SO COLD
WHY ARE THERE PYRAMIDS ON THE MOON
WHY IS NASA SHUTTING DOWN

WHY ARE THERE GHOSTS

WHY IS THERE AN OWL IN MY BACKYARD
WHY IS THERE AN OWL OUTSIDE MY WINDOW
WHY IS THERE AN OWL ON THE DOLLAR BILL

WHY DO OWLS ATTACK PEOPLE
WHY ARE FPGA's EVERYWHERE

WHY ARE THERE HELICOPTERS CIRCLING MY HOUSE
WHY ARE THERE GODS

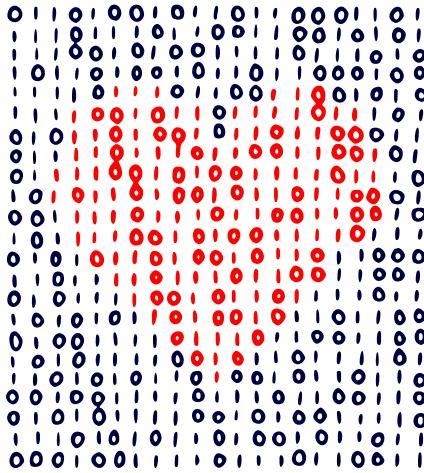
WHY ARE THERE TWO SPOCKS

WHY ARE MY BOOBS ITCHY
WHY ARE CIGARETTES LEGAL
WHY ARE THERE DUCKS IN MY POOL
WHY IS JESUS WHITE
WHY IS THERE LIQUID IN MY EAR
WHY DO Q TIPS FEEL GOOD

WHY DO PEOPLE DIE

WHY AREN'T THERE GUNS IN HARRY POTTER

WHY IS THERE A LINE THROUGH HTTPS
WHY IS THERE A RED LINE THROUGH HTTPS ON TWITTER
WHY IS HTTPS IMPORTANT
WHY ARE THERE WEEKS
WHY DO I FEEL DIZZY



Hes·so // VALAIS
WALLIS



Haute Ecole d'Ingénierie
Hochschule für Ingenieurwissenschaften

Silvan Zahno silvan.zahno@hevs.ch
Christophe Bianchi christophe.bianchi@hevs.ch
François Corthay francois.corthay@hevs.ch

