
Presentation to begin
0 0 : 0 0 am

Wydział Elektryczny

POLITECHNIKA WARSZAWSKA

www.ee.pw.edu.pl

Inżynier: najciekawszy zawód przyszłości

Część 2 z 2: Czy mówisz w języku sztucznej inteligencji?

dr hab. inż. Bartłomiej Ufnalski, prof. uczelni

Instytut Sterowania i Elektroniki Przemysłowej (ISEP)

www.isep.pw.edu.pl

Politechnika Warszawska

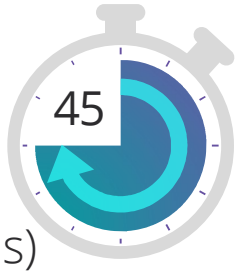
www.pw.edu.pl

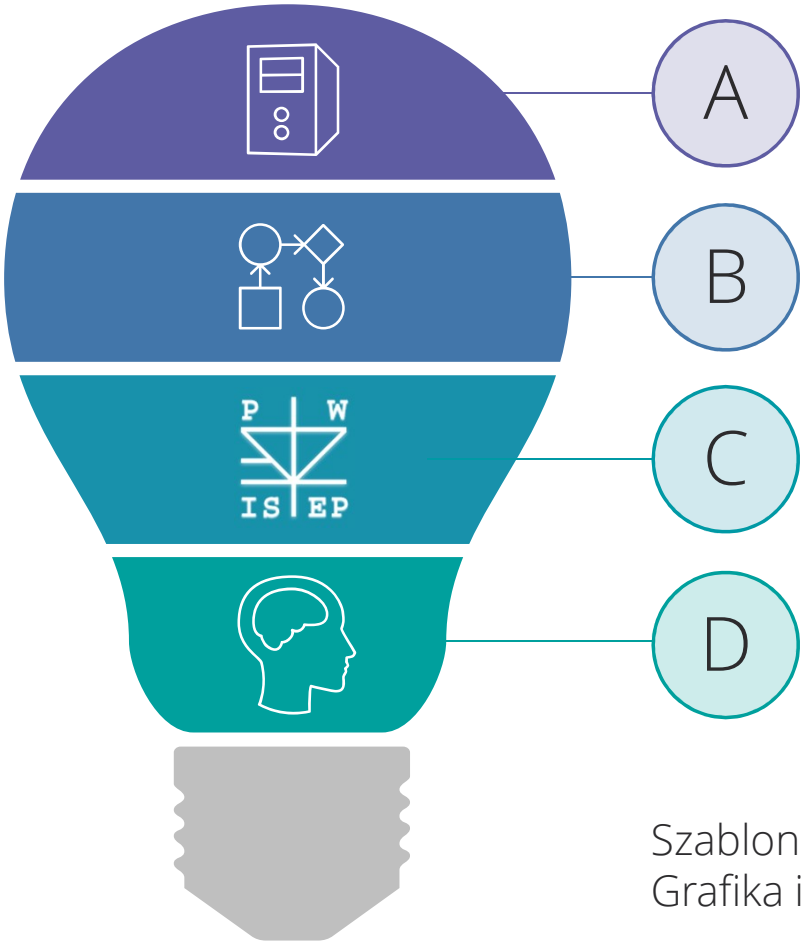
Twoja Szkoła

www.Twoja_Szkola.pl

data

Ogólny zarys tematyki (część 2)





A

Cyfrowe układy sterowania (digital control systems)

Ich wszechobecność wokół nas, oraz coraz częściej na nas (wearables) i w nas (bionics)

B

Numeracy is the modern literacy

A ja chcę być artystą - czy potrzebna mi do tego umiejętność programowania?

C

Instytut Sterowania i Elektroniki Przemysłowej

Dlaczego warto studiować na Wydziale Elektrycznym Politechniki Warszawskiej

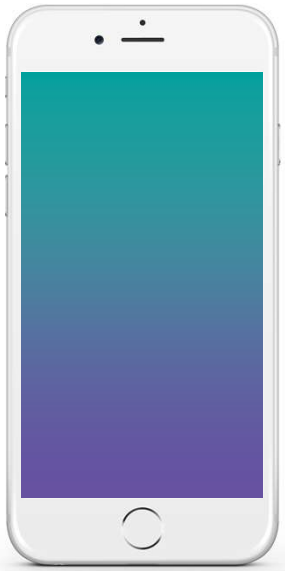
D

Ocean informacji

Myślenie krytyczne jako kapitan naszego statku, uczenie maszynowe i sztuczna inteligencja jako jego oficerowie

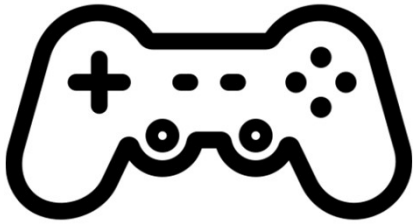
Szablon prezentacji: graphicriver.net/item/i9-template-system/10955645.
Grafika i fotografia: pixabay.com, unsplash.com, flaticon.com, wikipedia.org.

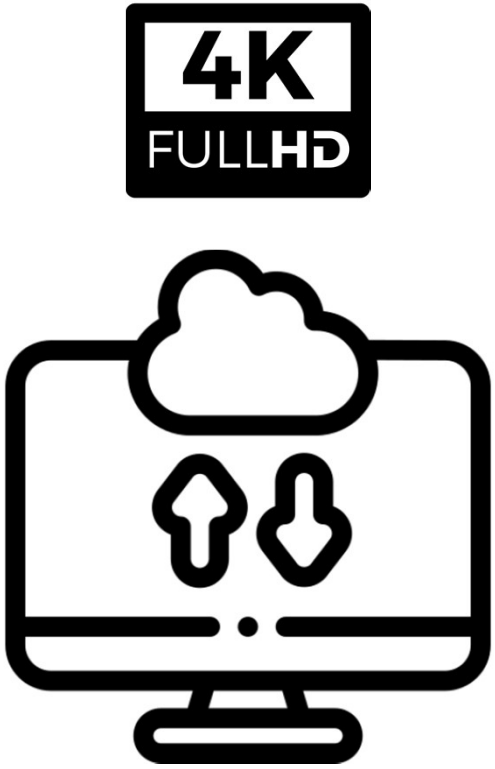
Dwa światy: analogowy i cyfrowy. Odrębne światy?



Chmura to nie tylko przestrzeń na nasze dane

Chmura obecnie to też moc obliczeniowa umożliwiająca użytkownikowi granie nawet w 4K.

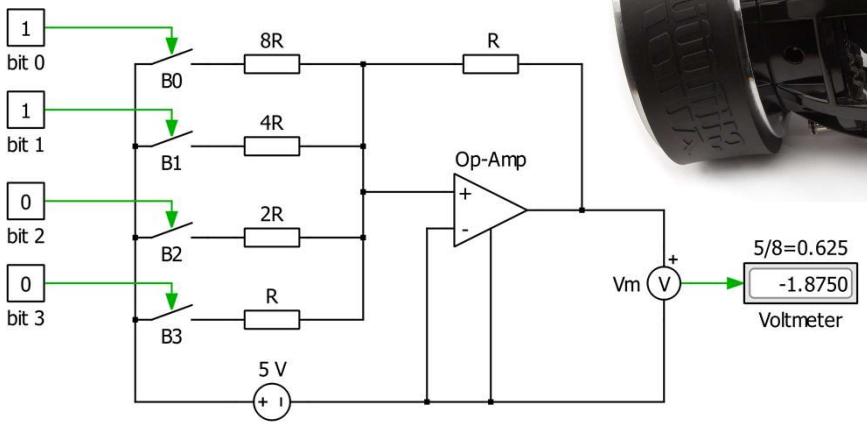




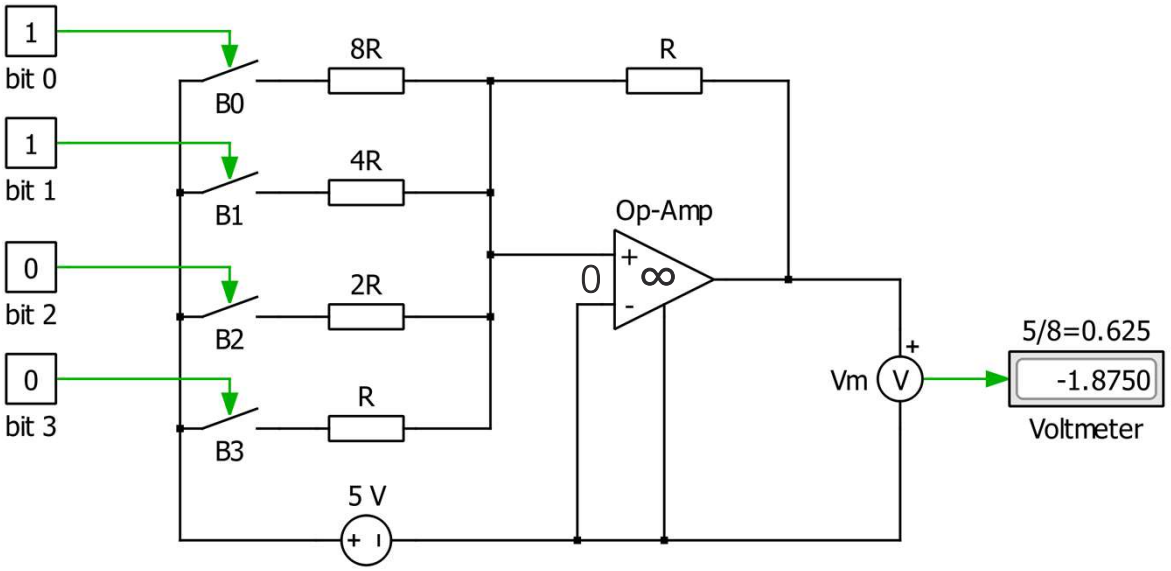
ColdFusion: Stadia – Google's Game Changer?
https://www.youtube.com/watch?v=4SRJO5n5xoQ

Przeplatające się dwa światy: analogowy i cyfrowy

Budujemy coraz bardziej zaawansowaną cywilizację,
aby coraz lepiej zaspokajać nasze ANLOGOWE potrzeby – świat CYFROWY
też konsumujemy zmysłami ANALOGOWYMI



A na styku tych dwóch światów mamy przetworniki analogowo-cyfrowe (ADC) i cyfrowo-analogowe (DAC)



$$U = 5V$$

$$\frac{5V}{8} = -0{,}625\text{V}$$

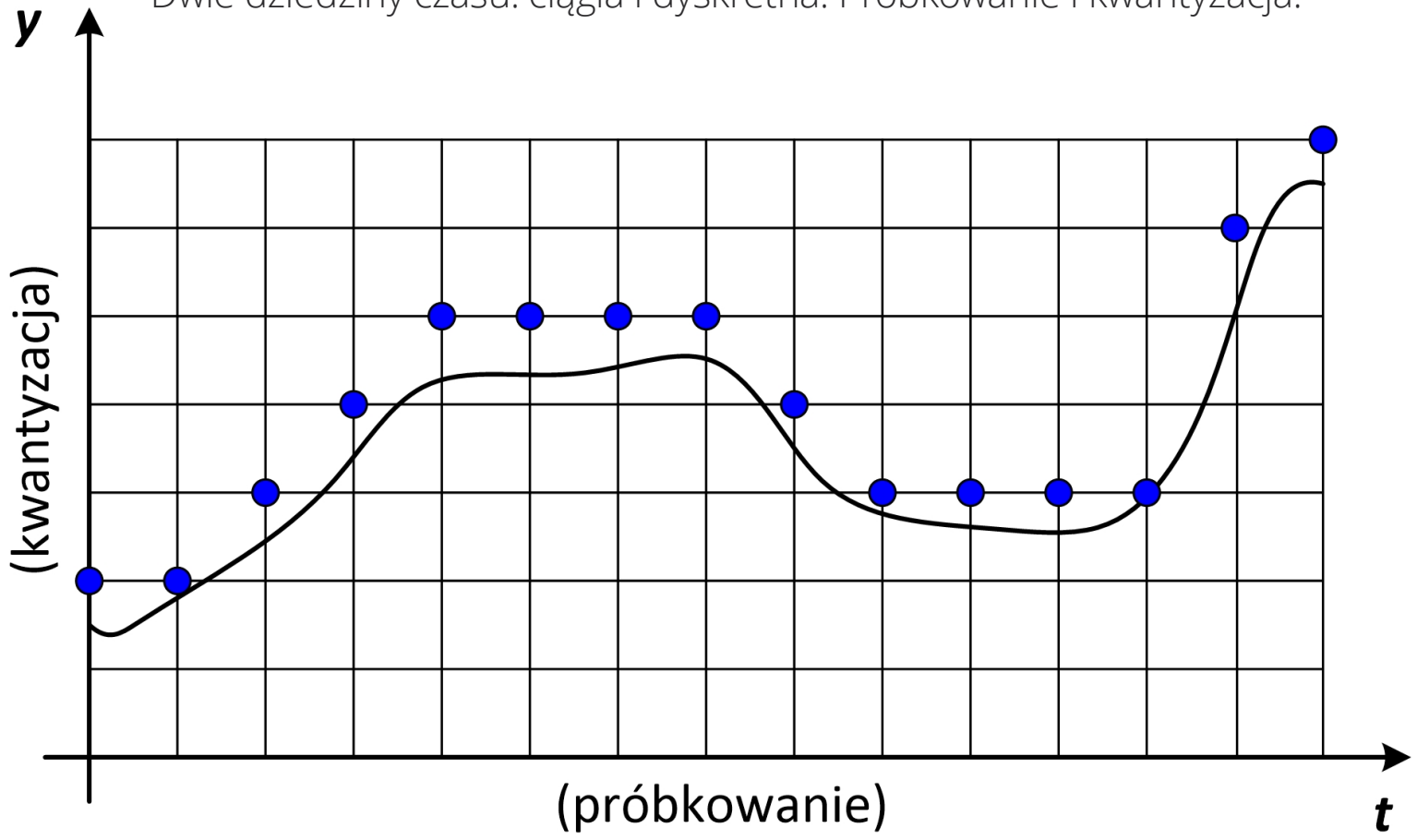
$$I = I_1 + I_2 + I_4 + I_8 = B_0\frac{U}{8R} + B_1\frac{U}{4R} + B_2\frac{U}{2R} + B_3\frac{U}{R}$$

$$U_{wy} = -RI = -U\left(\frac{B_0}{8} + \frac{B_1}{4} + \frac{B_2}{2} + \frac{B_3}{1}\right) = -\frac{U}{8}(B_0 2^0 + B_1 2^1 + B_2 2^2 + B_3 2^3)$$

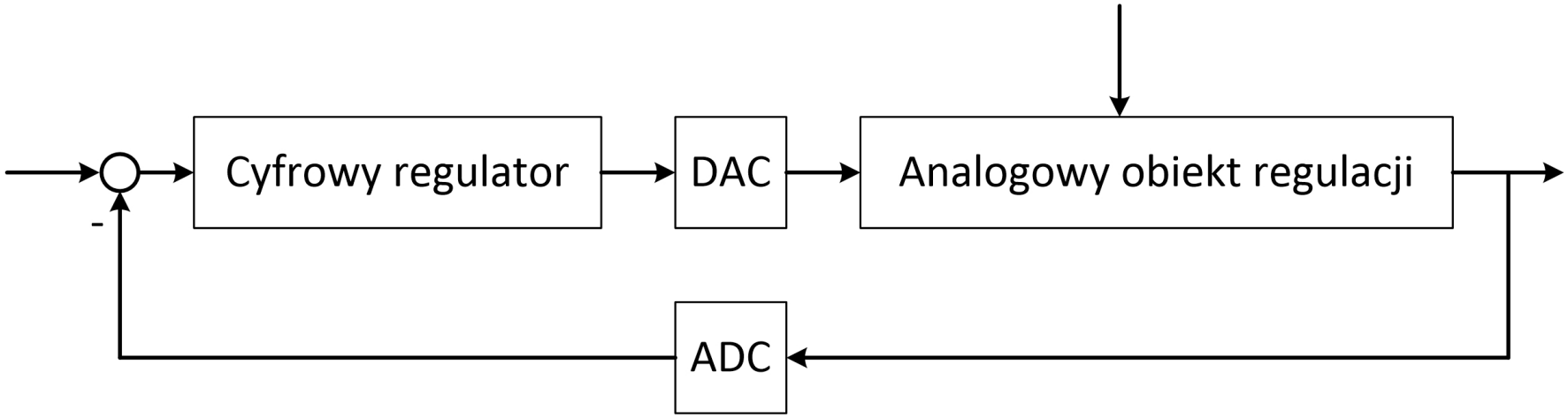
A kto ma pomysł na takie rozbudowanie powyższego układu, aby możliwa była realizacja zadania przetwarzania sygnału analogowego na cyfrowy?

Przeplatające się dwa światy: analogowy i cyfrowy

Dwie dziedziny czasu: ciągła i dyskretna. Próbkowanie i kwantyzacja.

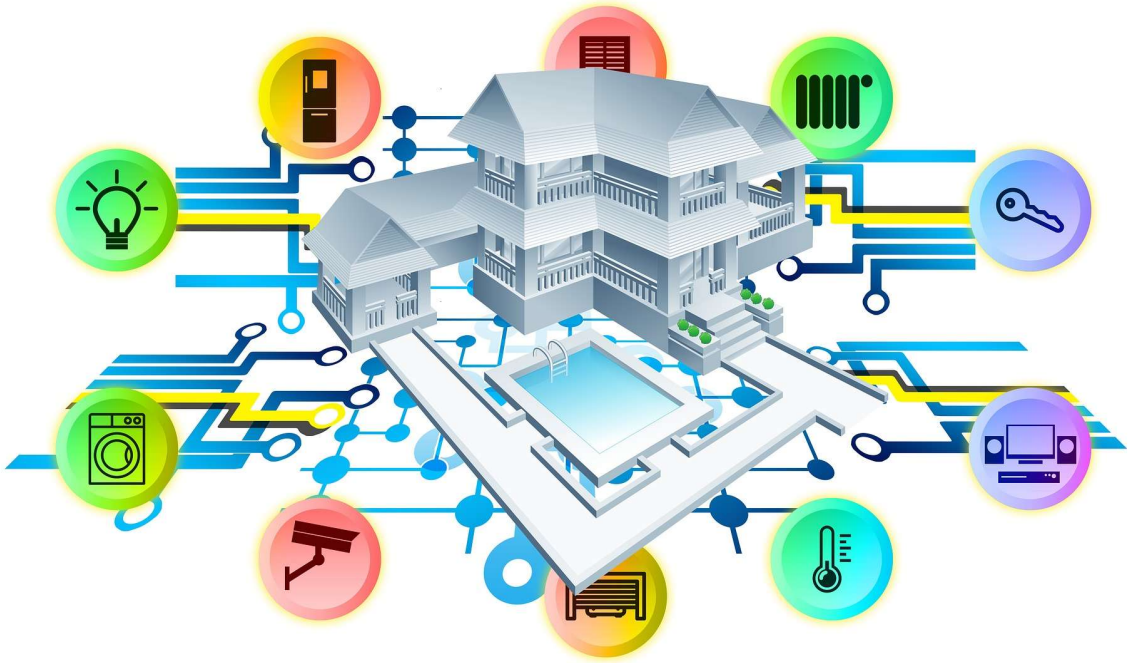


Zamknięty układ regulacji



Understanding Control Systems by Mathworks
https://www.youtube.com/watch?v=FurC2unHeXI
Control lectures by Brian Douglas
https://www.youtube.com/user/ControlLectures

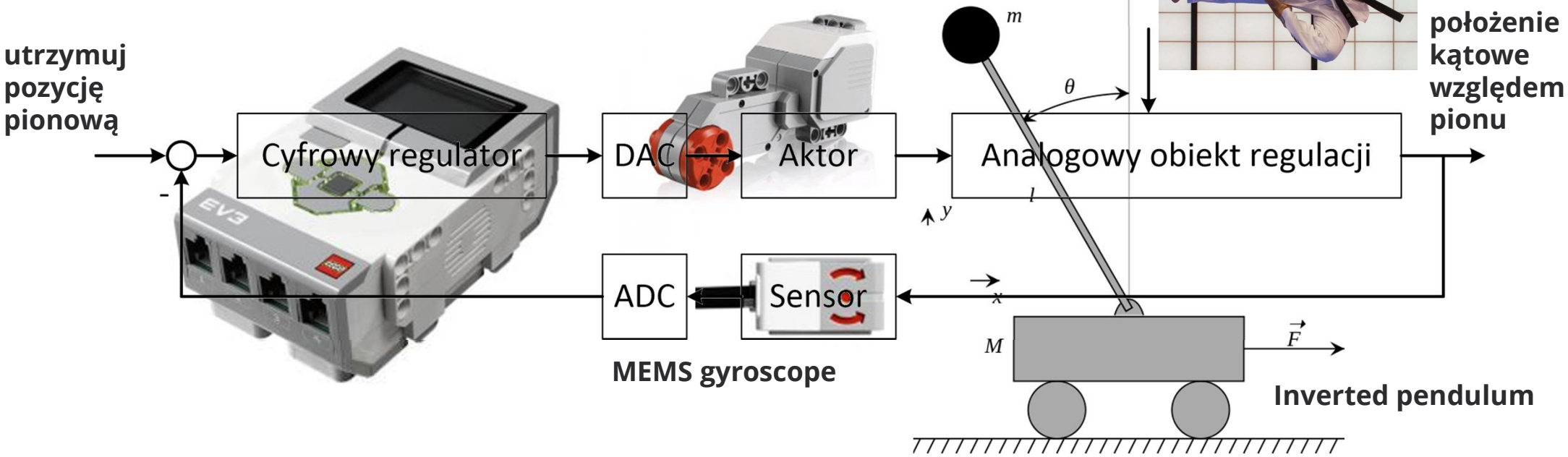
Gdzie stosujemy układy sterowania z cyfrowymi regulatorami ze sprzężeniem zwrotnym? Wszędzie! ;) Wokół nas, na nas i w nas.



Source: wikipedia.org
See also: waymo.com

Hugh Herr: How we'll become cyborgs and extend human potential, TED 2018
https://www.ted.com/talks/hugh_herr_how_we_ll_become_cyborgs_and_extend_human_potential
Rafaello D'Andrea: The astounding athletic power of quadcopters, TED 2013
https://www.ted.com/talks/raffaello_d_andrea_the_astounding_athletic_power_of_quadcopters

Zamknięty układ regulacji na przykładzie GyroBoy'a



Some spectacular closed-loop motion control systems:
https://www.youtube.com/watch?v=LikxFZZO2sk (Boston Dynamics)
https://global.yamaha-motor.com/showroom/motobot (YAMAHA MOTOBOT)
https://www.youtube.com/watch?v=8BtDuzu2WeI (Ballbot by Carnegie Mellon University)

Numeracy is the modern literacy

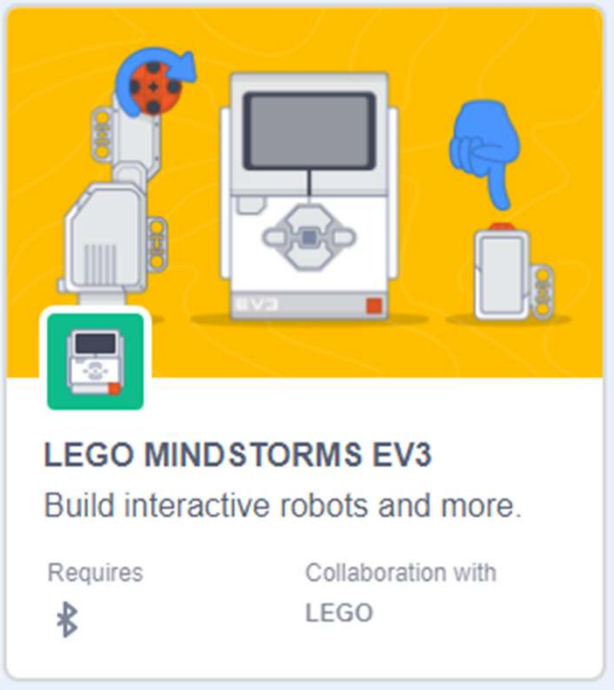
A ja chcę być artystą – czy potrzebna mi do tego umiejętność programowania?

Świat mówi do Was obecnie językami programowania – warto umieć mu odpowiedzieć :) Zobaczcie o ile poszerzyły się Wam horyzonty dzięki znajomości języka angielskiego. Daliście sobie w ten sposób praktycznie nieograniczoną możliwość komunikowania się ze światem analogowym (bloodware, wetware). Rozwijając umiejętność porozumiewania się w językach świata cyfrowego stwarzacie sobie niemalże nieograniczone możliwości spełniania swoich marzeń. A przy okazji możecie oprogramować np. GyroCopernicus'a.

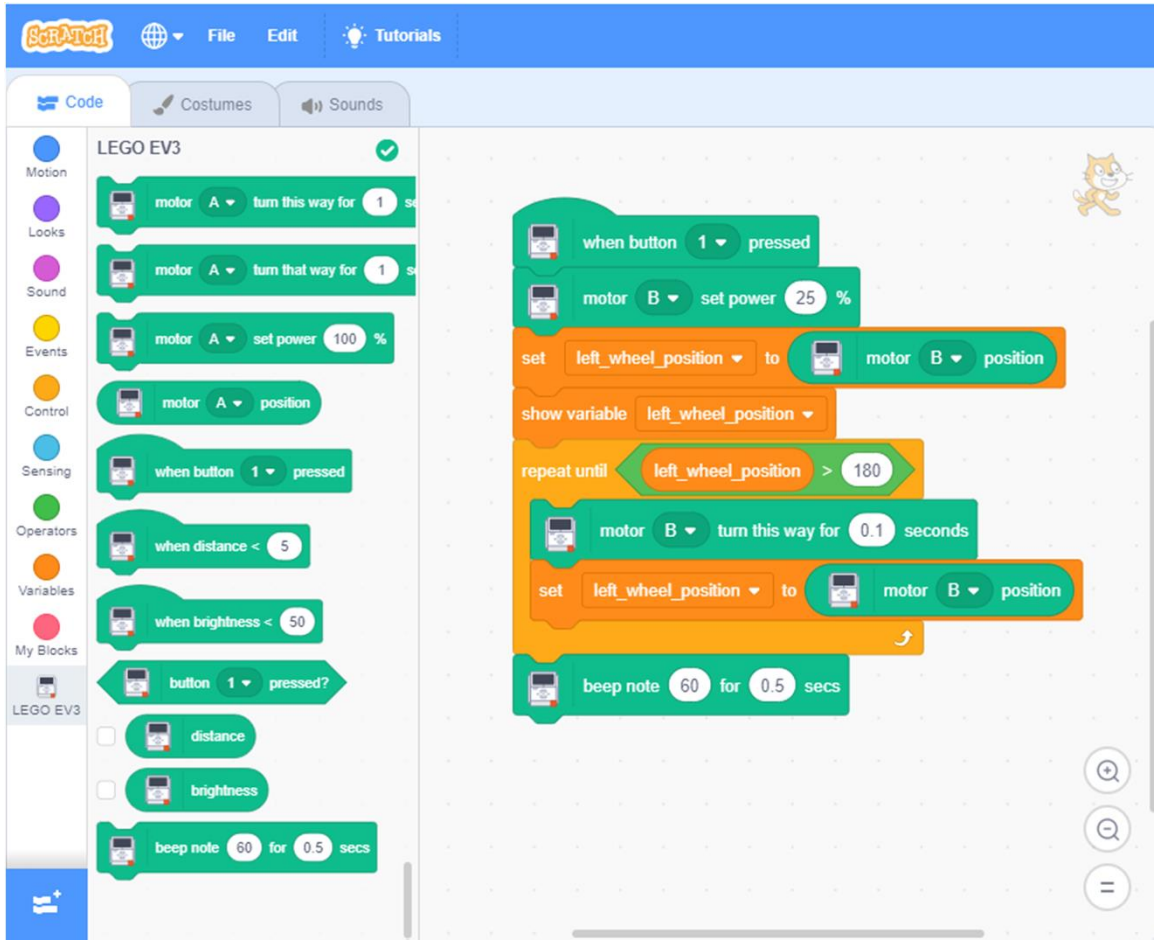
Probably the three most important literacies nowadays: technological literacy,
data literacy
and human literacy.

Once Upon an Algorithm: How Stories Explain Computing by Martin Erwig, 2018

Programming for your younger siblings (ca. 8–12 year olds)



Scratch
https://scratch.mit.edu/

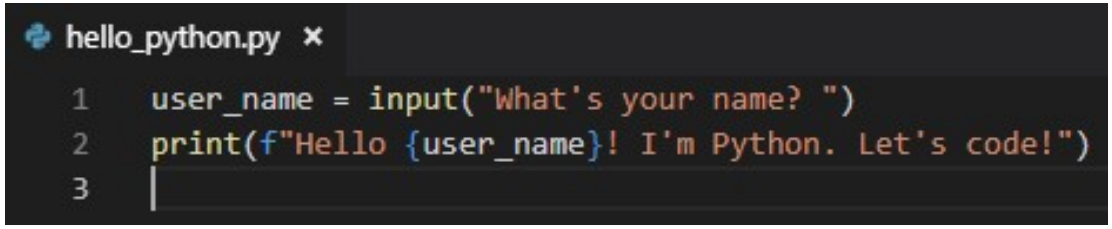


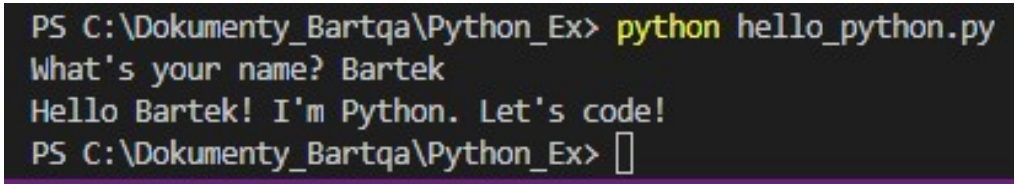
Zmiana retoryki --> zmiana sposobu myślenia

Język angielski i programowanie jest dla wszystkich

Angielski jako lingua franca współczesnego świata przestaje być traktowany jak język obcy. Jeżeli pada pytanie o znajomość języków obcych, to często pytający ma na myśli Waszą znajomość języków innych niż polski i angielski. Angielski jest dla wszystkich! A jako języki obce mamy np. **hiszpański** i **chiński**.

Podobnie umiejętność programowania/kodowania przestaje być domeną jedynie informatyków/programistów/deweloperów/koderów. **Kod** to lingua franca współczesnego świata cyfrowego. Programowanie jest dla wszystkich! Nawet dla artystów! Zacznijcie przygodę od np. **Java**, **C/C++/C#** lub **Python**.





python™

Python Software Foundation
www.python.org

Visual Studio Code
https://code.visualstudio.com

Learn Python 3 the Hard Way: A Very Simple Introduction to the Terrifyingly **Beautiful World of** Computers and **Code** by Zed Shaw, 2017
https://learncodethehardway.org/python

You can program your LEGO Mindstorms EV3 using Python

Option one: ev3dev2

```
leds.all_off()
sound.speak("Eyem ready", espeak_opts=opts+'en+f2', play_type=1)
while not ts.is_pressed:
    ir.process()
    if button_pressed==TOP_LEFT:
        steer_pair.on(steering=0, speed=40)
    elif button_pressed==BOTTOM_LEFT and us.distance_centimeters>20:
        steer_pair.on(steering=0, speed=-40)
    elif button_pressed==TOP_RIGHT:
        steer_pair.on(steering=90, speed=30)
    elif button_pressed==BOTTOM_RIGHT:
        steer_pair.on(steering=-90, speed=30)
    else:
        steer_pair.off()
```

EV3dev
https://www.ev3dev.org/

EV3 python
http://www.ev3python.com

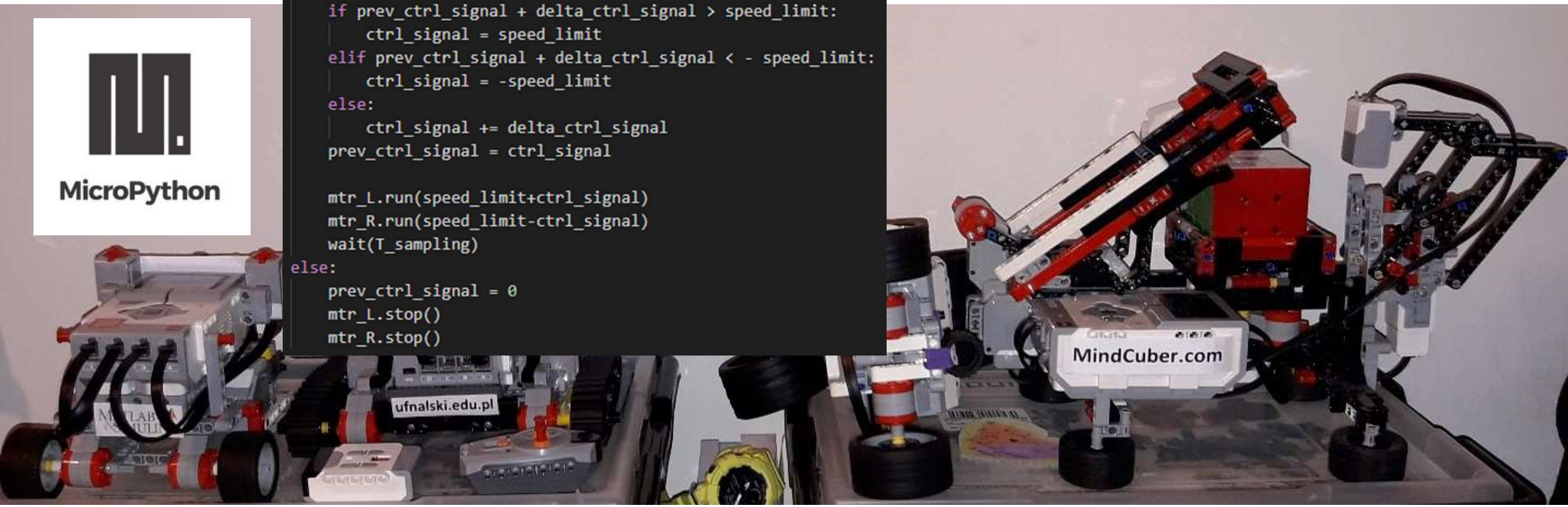
You can program LEGO Mindstorms EV3 using MicroPython

Option two: pybricks (MicroPython)

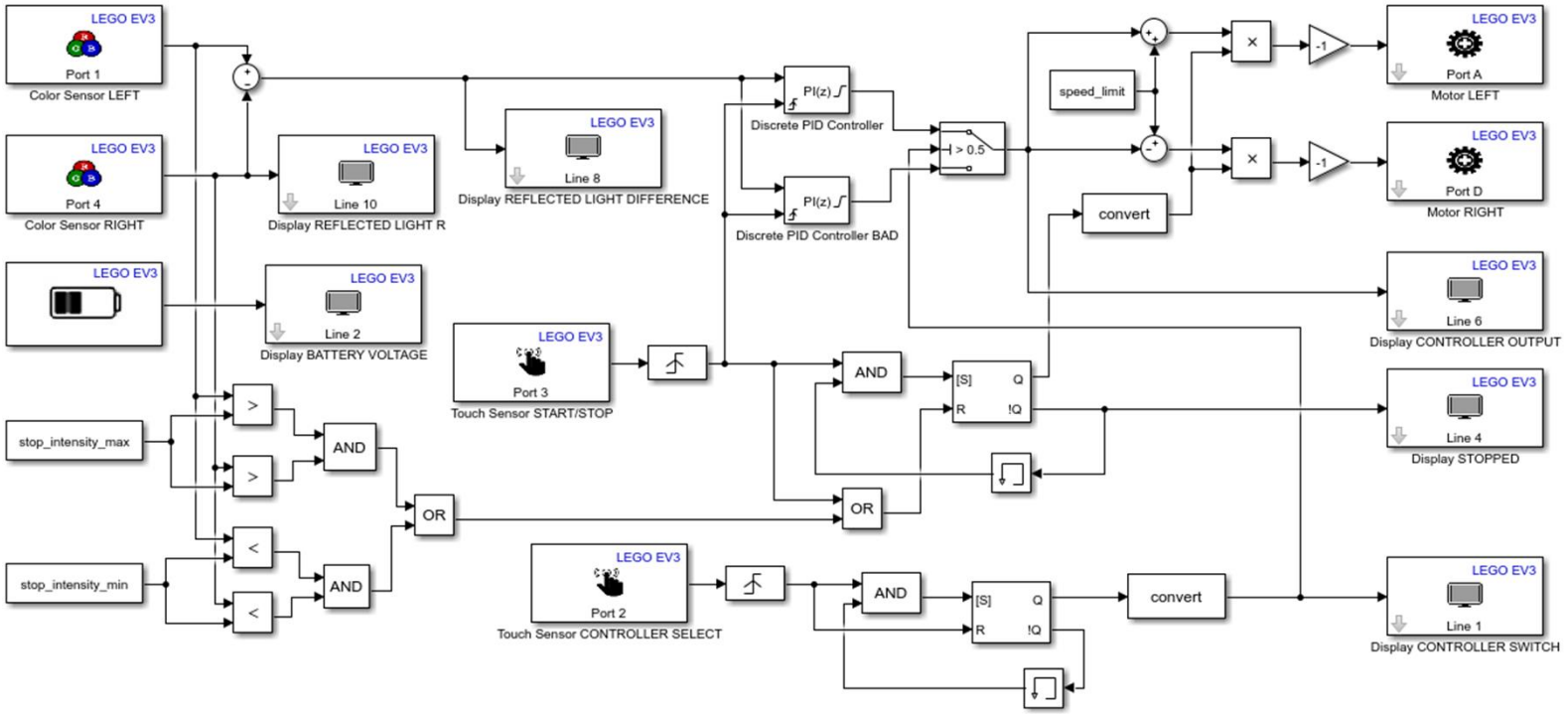
```
if LEtsGO:
    ctrl_error = cs_L.reflection() - cs_R.reflection()
    # PI controller with anti-windup algorithm (clamping)
    delta_ctrl_signal = (k_P + T_sampling * k_I) * \
        ctrl_error - k_P * prev_ctrl_error
    prev_ctrl_error = ctrl_error
    if prev_ctrl_signal + delta_ctrl_signal > speed_limit:
        ctrl_signal = speed_limit
    elif prev_ctrl_signal + delta_ctrl_signal < - speed_limit:
        ctrl_signal = -speed_limit
    else:
        ctrl_signal += delta_ctrl_signal
    prev_ctrl_signal = ctrl_signal

    mtr_L.run(speed_limit+ctrl_signal)
    mtr_R.run(speed_limit-ctrl_signal)
    wait(T_sampling)
else:
    prev_ctrl_signal = 0
    mtr_L.stop()
    mtr_R.stop()
```

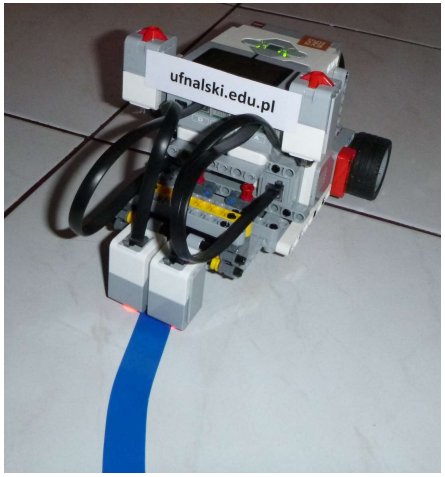
https://micropython.org

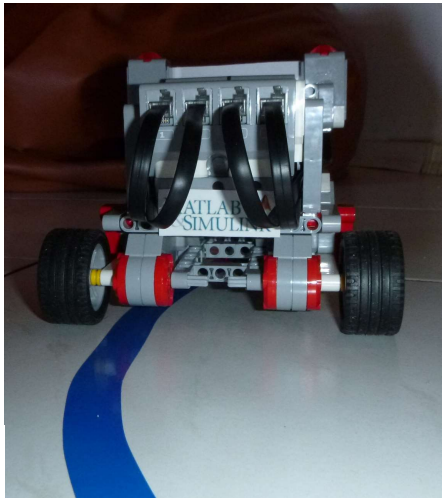
https://education.lego.com/en-us/support/mindstorms-ev3/python-for-ev3



You can program LEGO Mindstorms EV3 using Matlab/Simulink







MATLAB® & SIMULINK®

Oprogramowanie Naukowo-Techniczne sp. z o.o. sp. k.

LEGO MINDSTORMS EV3 Support from Simulink

https://www.mathworks.com/hardware-support/lego-mindstorms-ev3-simulink.html

Matlab/Simulink for your school for only 399 EUR + VAT.

Contact Remigiusz.Lipiec@ont.com.pl to get the license.

Programming languages

Front-end web development:
JavaScript

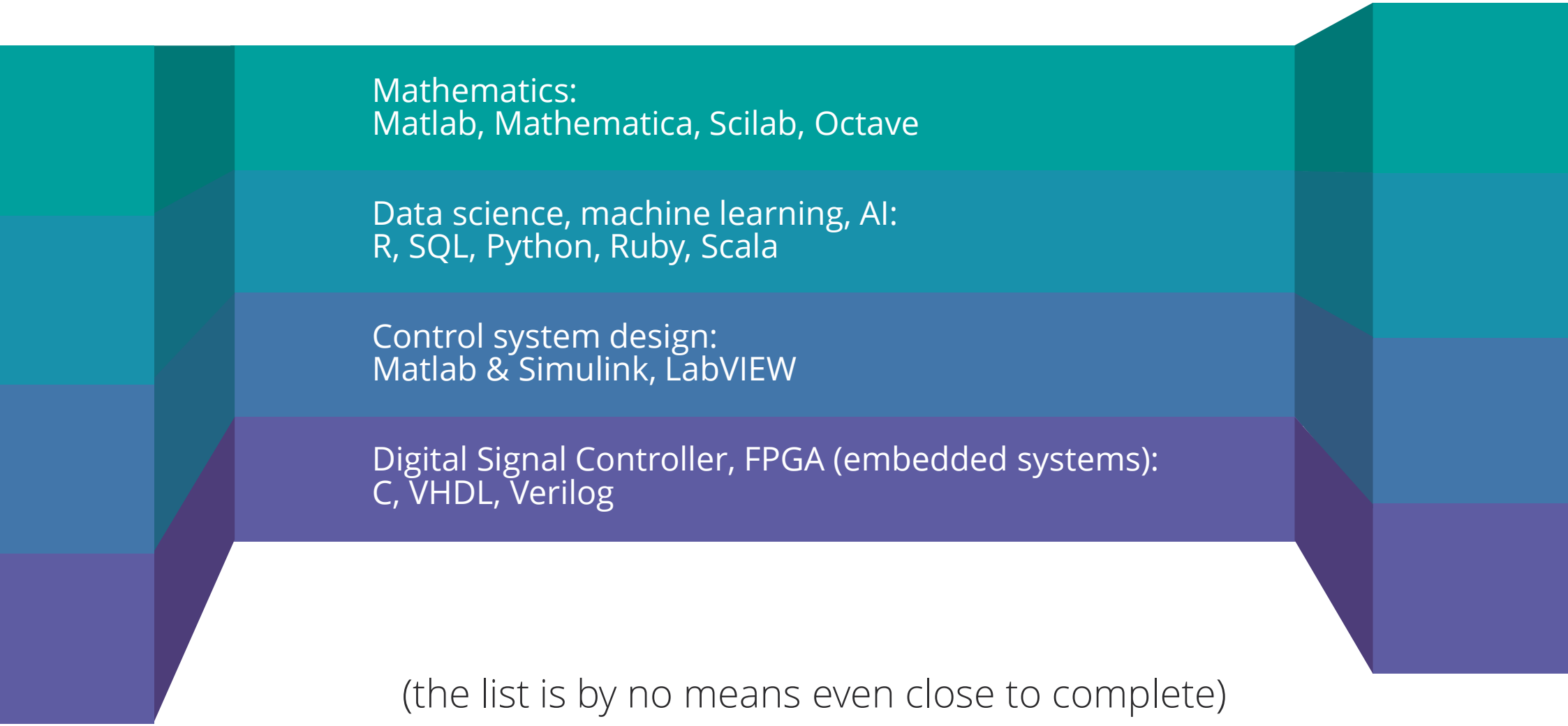
Back-end web development:
JavaScript, Python, Java, PHP, Ruby

Desktop application:
Java, C++, Python

Mobile development:
Swift, Java, C#

The Complete Software Developer's Career Guide by John Sonmez, 2017

Programming languages



(the list is by no means even close to complete)

Programming languages

1.	Python	✓	✓	✓
2.	C++		✓	✓
3.	Java	✓	✓	
4.	C		✓	✓
5.	C#	✓	✓	

Digital arts and typesetting:
processing.org, LaTeX (e.g. MiKTeX)

LEGO Mindstorms EV3:
EV3-G (LabVIEW), Matlab&Simulink

Robotics and AI:
ROS.org, OpenAI, Dataiku

Dzieciaki i młodsza młodzież:
Scratch

http://www.legoengineering.com/alternative-programming-languages
https://scratch.mit.edu/download
https://spectrum.ieee.org/at-work/innovation/the-2018-top-programming-languages
https://miktex.org/ + www.xm1math.net/texmaker or www.texstudio.org
https://www.overleaf.com

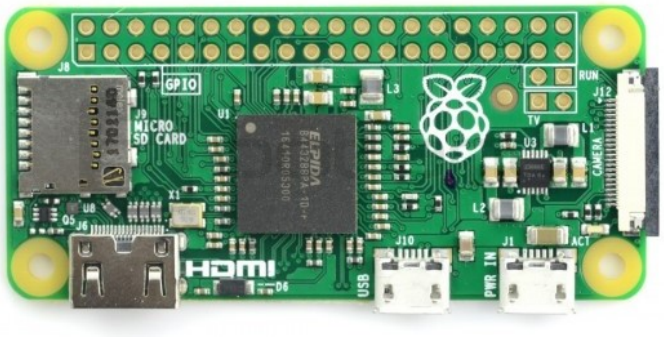
And now let's play with GyroBoy (an inverted pendulum)

https://education.lego.com/en-us/support/mindstorms-ev3/building-instructions#program-core

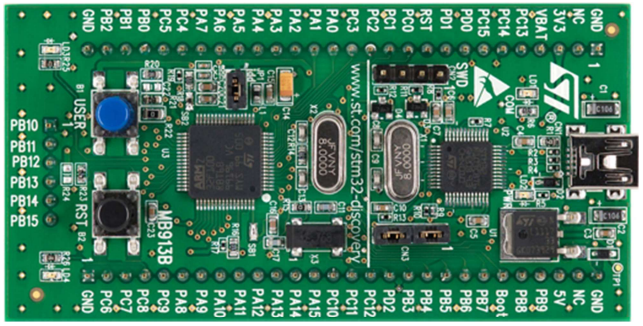
https://www.mathworks.com/matlabcentral/fileexchange/60322-gyroboy-self-balancing-two-wheel-robot-segway-based-on-lego-ev3

Jak zacząć przygodę z automatyką jeszcze przed maturą – przykładowe zestawy ewaluacyjne/edukacyjne do nauki programowania w automatyce i robotyce w cenie dwóch pizz (koszt wejścia 60 PLN)

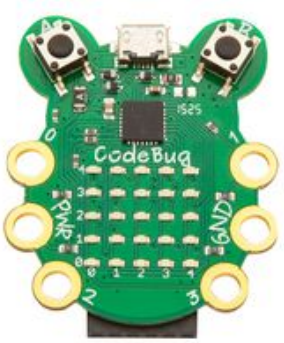
Raspberry Pi: od 25 PLN

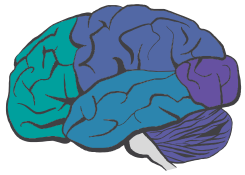


STM32VLDISCOVERY: 65 PLN



CodeBug: 75 PLN

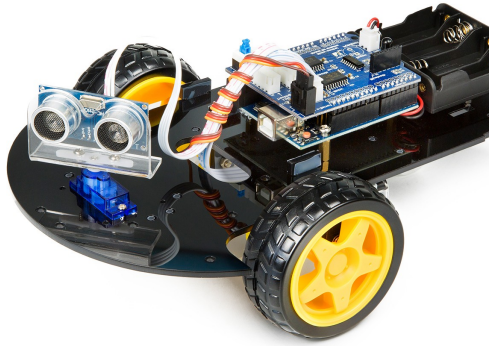




Play with microcontrollers! It's a no-brainer! Learn to speak their language!
Visit e.g. www.tme.eu, farnell.com or digikey.pl (thousands of evaluation kits!).

Jak zacząć przygodę z automatyką jeszcze przed maturą – przykładowe zestawy ewaluacyjne/edukacyjne do nauki programowania w automatyce i robotyce w cenie pięciu pizz (150 PLN)

Source: uctronics.com



Source: uctronics.com

Słowa kluczowe:

zestaw rozwojowy
zestaw uruchomieniowy
zestaw startowy
komputer jednoukładowy
mikrokontroler
system wbudowany
embedded system
eval kit
evaluation kit
evaluation board
starter kit

Na przykład: uctronics.com, conrad.pl, botland.com.pl, sklep.avt.pl, kamami.pl, diolut.pl, aliexpress.com
Przykładowe porównanie: https://www.robocamp.pl/pl/test-narzedzi-nauczania-robotyki-powyzej-10/

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Instytut Elektroenergetyki

http://www.ien.pw.edu.pl/

IETiSIP

Instytut Elektrotechniki Teoretycznej i Systemów Informacyjno-Pomiarowych

http://www.iem.pw.edu.pl/

ISEP

Instytut Sterowania i Elektroniki Przemysłowej

https://www.isep.pw.edu.pl/

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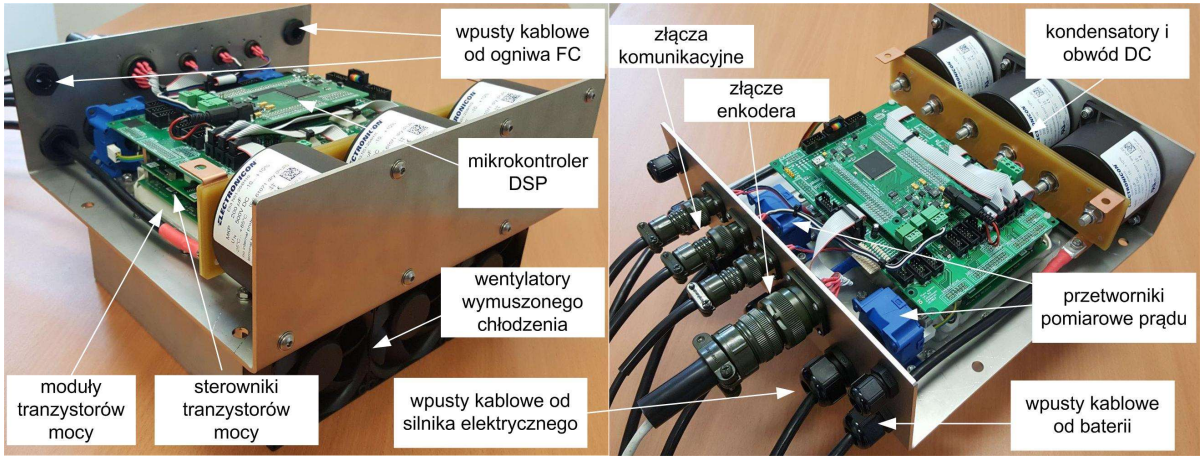

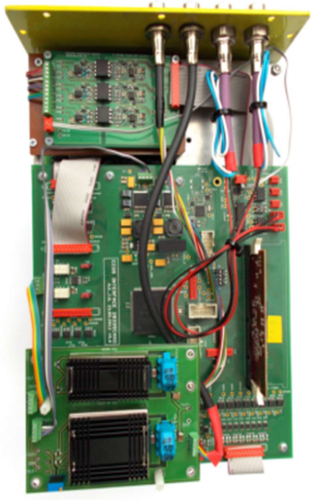

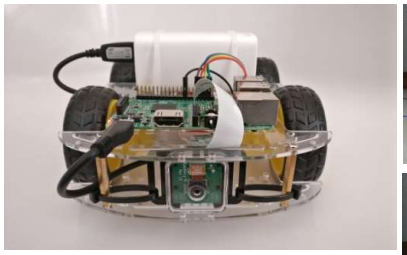

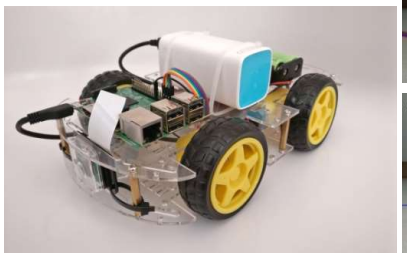

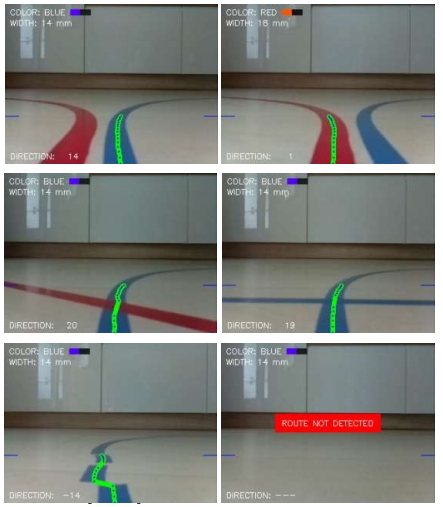

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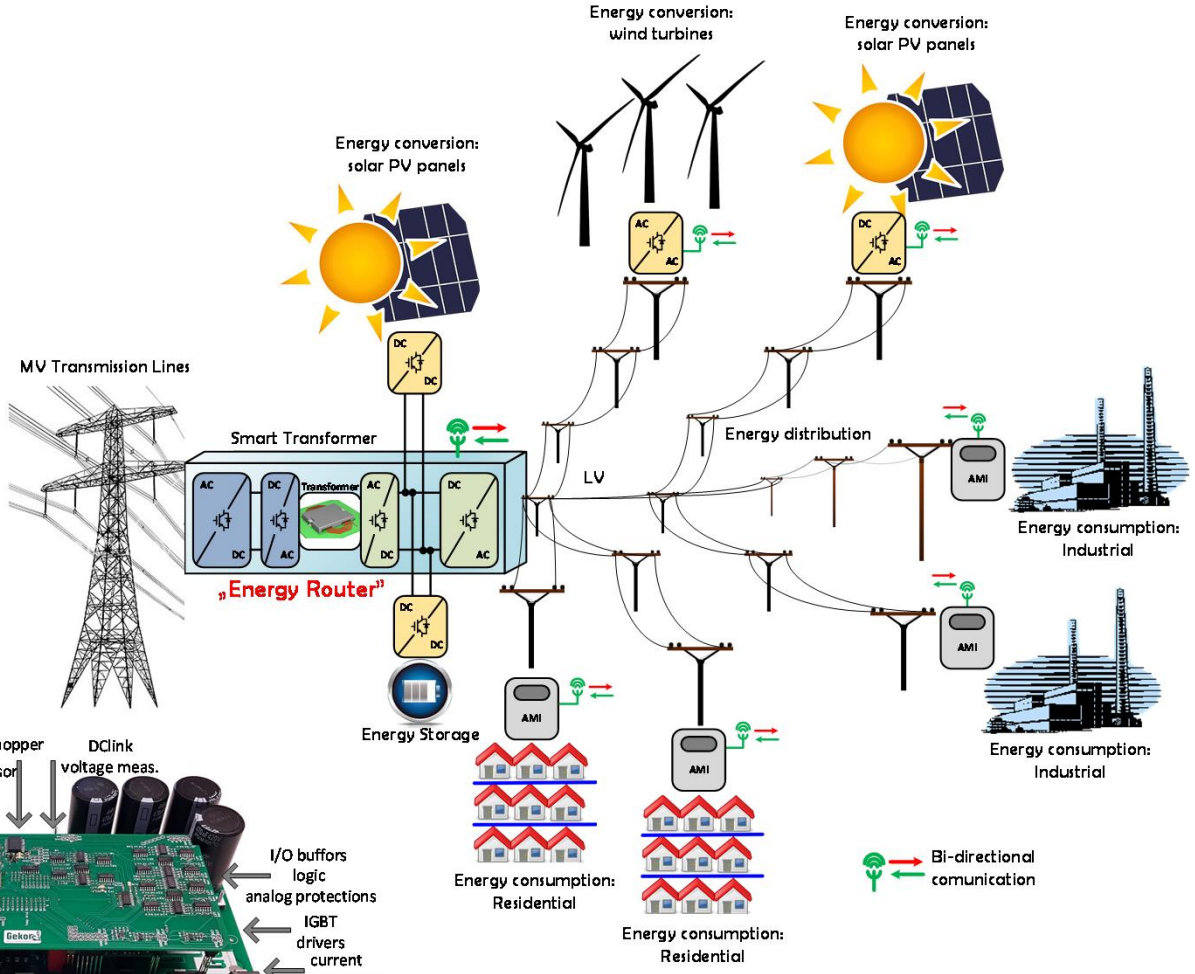

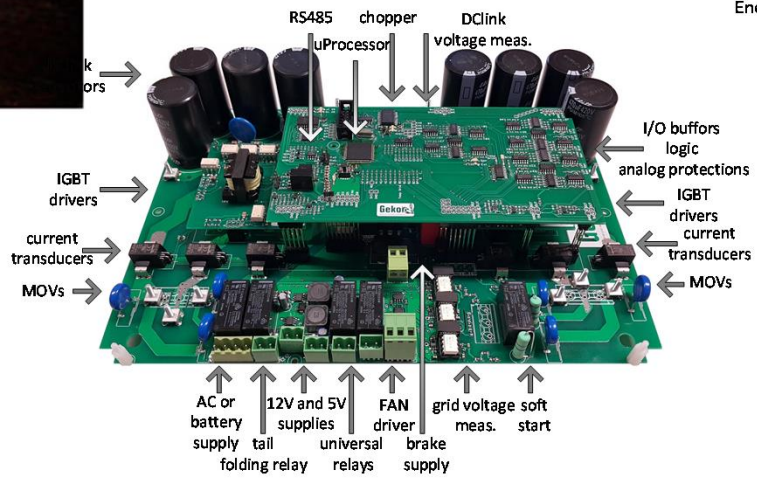

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ADek

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https://pl-pl.facebook.com/elektrakolo/
https://pl-pl.facebook.com/adekkolo/

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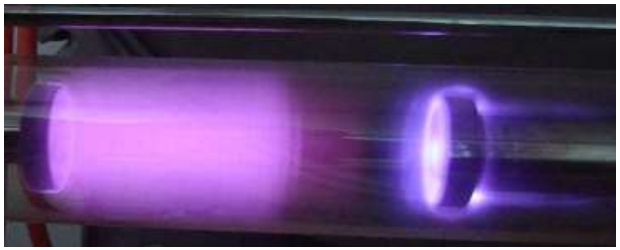
www.ee.pw.edu.pl



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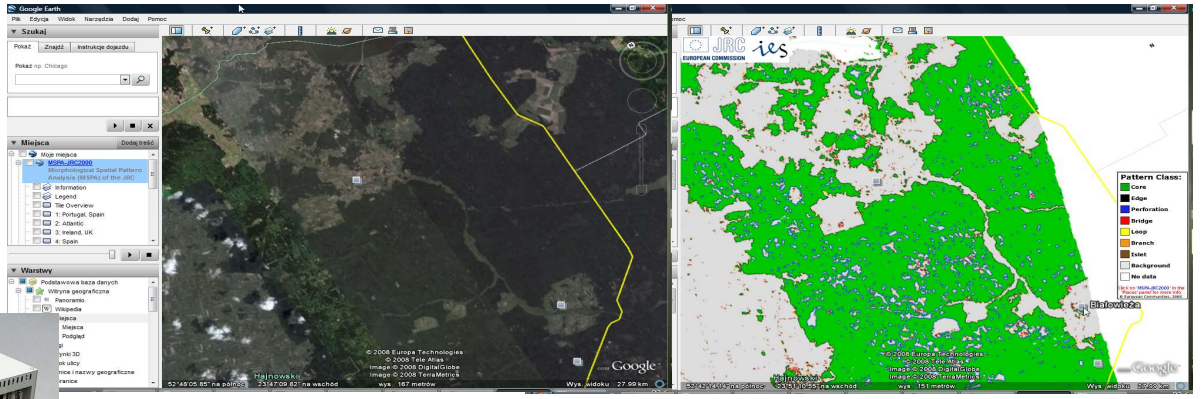

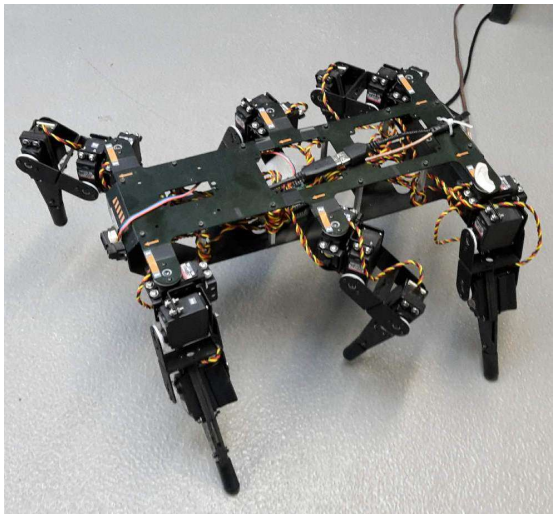

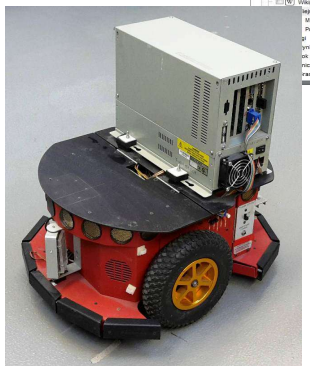

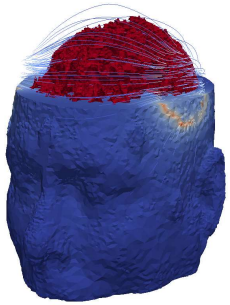

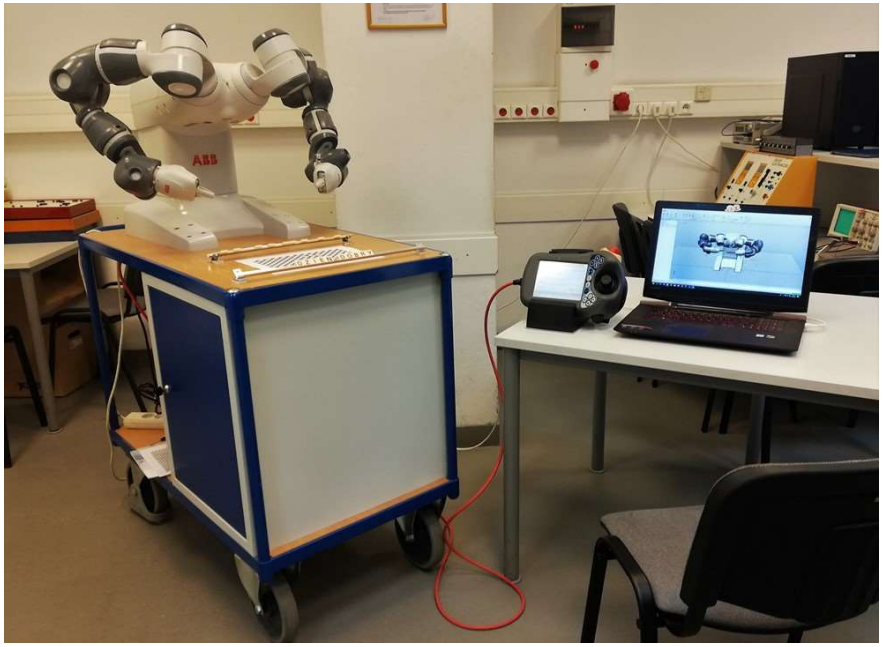

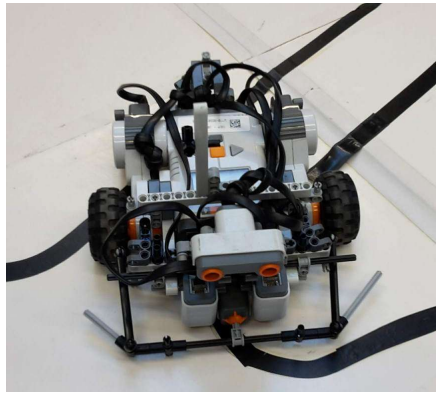

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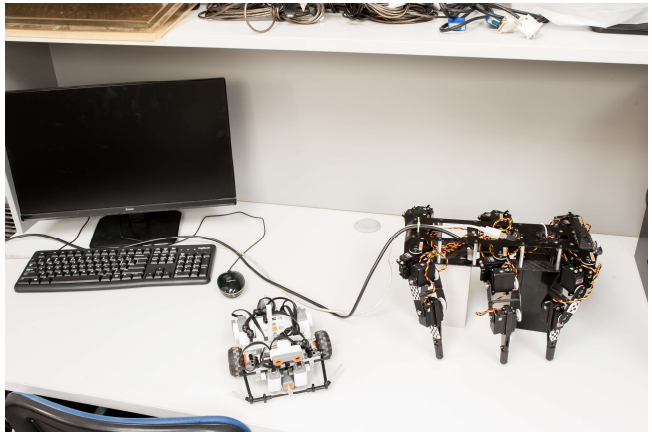
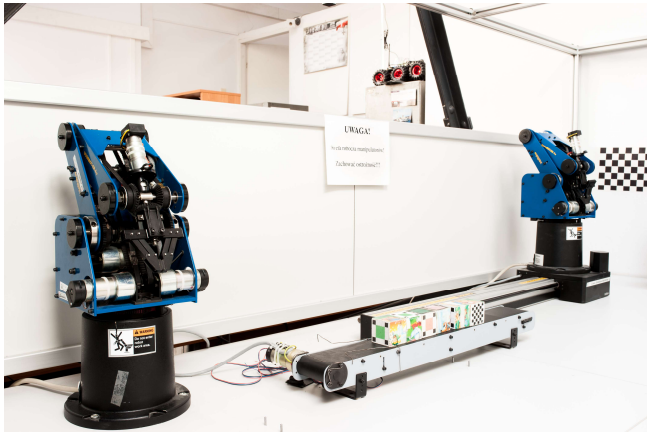
www.ee.pw.edu.pl





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Critical thinking skills wanted more than ever!!!

free energy, free internet, free wifi, magnet motor, quantum energy generator
https://revolution-green.com/yilditz-magnetic-motor-update/
http://arizonaenergy.org/News_13/News_Jan13/AssistantProfessorPresentsScientificModelforYildizMagnetMotor.html
www.borderlands.de/Links/ModelingYildizMotor_v01.pdf
https://www.youtube.com/watch?v=40ld-JeEbsA (8 mln views in 30 days!!!)
One of the comments: **Spreading disinformation to children is a crime against humanity.**

Post-Truth by Evan Davis, 2017
Post-Truth by Lee C. McIntyre, 2018
The godfather of fake news by Anisa Subedar, 2018
https://www.bbc.co.uk/news/resources/idt-sh/the_godfather_of_fake_news

Pseudoscience , cargo cult science and fake science

Never say that you'll give a talk unless you know clearly what you're going to talk about and more or less what you're going to say.
RICHARD P. FEYNMAN

See: phrenology

Is most published research wrong?
https://www.youtube.com/watch?v=42QuXLucH3Q
Fake science factory
https://www.youtube.com/watch?v=ras_VYgA77Q
https://www.youtube.com/watch?v=nkW9aS2EelE

Psychology Gone Wrong: The Dark Sides of Science and Therapy by Tomasz Witkowski and Maciej Zatonski, 2015

Psychology Led Astray: Cargo Cult in Science and Therapy by Tomasz Witkowski, 2016

www.tomaszwitkowski.pl

http://calteches.library.caltech.edu/51/2/CargoCult.pdf

Sprawdzam.

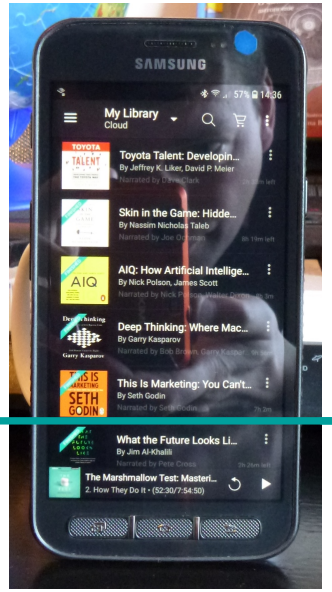
The Big Short by Michael Lewis, 2010
https://www.audible.co.uk/pd/The-Big-Short-Audiobook/B004FTZ69C

The Big Short by Adam McKay, 2016
https://www.amazon.co.uk/Big-Short-DVD-Brad-Pitt/dp/B01AD980BS

Work-life balance? Or maybe mind, body and soul balance?
Do what you love, and you'll never have to work a day in your life?
Or maybe do what you're good at and the money will follow?

body

www.greyp.com



www.audible.co.uk

mind

Study-life balance? Or maybe mind, body and soul balance?
Find your element and studying will blend with your life.
We ALL learn ALL the time. The funny thing is that the most successful learners out there rarely call it learning.

I highly recommend you read (or listen to) also the following books:

TED Talks by Chris Anderson, 2016
The Official TED Guide to Public Speaking

Our Iceberg is Melting by John Kotter and Holger Rathgeber, 2006
Changing and Succeeding Under Any Conditions

A Conversation About Economics by Richard Werner, 2013
Changing and Succeeding Under Any Conditions

You, Your Child and School by Sir Ken Robinson and Lou Aronica, 2018
Navigate Your Way to the Best Education

Talking to My Daughter About the Economy by Yanis Varoufakis, 2017
A Brief History of Capitalism

Richard Dawkins' letter to his 10 year old daughter, 2004
(how to warn your child about this irrational world)

Astrophysics for Young People in a Hurry by Neil Degrasse Tyson, 2019

Deep Work by Cal Newport, 2016
Rules for Focused Success in a Distracted World

Hyperfocus by Chris Bailey, 2018
Rules for Focused Success in a Distracted World

Digital Minimalism by Cal Newport, 2019
On Living Better with Less Technology

The Laws of Medicine by Siddhartha Mukherjee, 2015
Field Notes From an Uncertain Science

Small Change by Dan Ariely and Jeff Kreisler, 2017
Money Mishaps and How to Avoid Them

Artificial Unintelligence by Meredith Broussard, 2018
How Computers Misunderstand the World

Weapons of Math Destruction by Cathy O'Neil, 2016
How Big Data Increases Inequality and Threatens Democracy

Prediction Machines by Ajay Agrawal, Joshua Gans and Avi Goldfarb, 2018
The Simple Economics of Artificial Intelligence

Life 3.0 by Max Tegmark, 2018
Being Human in the Age of Artificial Intelligence

The Deep Learning Revolution by Terrence J. Sejnowski, 2019
Artificial Intelligence Meets Human Intelligence

The Master Algorithm by Pedro Domingos, 2015
How the Quest for the Ultimate Learning Machine Will Remake Our World

Algorithms to Live By by Brian Christian and Tom Griffiths, 2017
The Computer Science of Human Decisions

A Field Guide to Lies and Statistics (a.k.a. **Weaponized Lies**) by Daniel J. Levitin, 2017
A Neuroscientist on How to Make Sense of a Complex World (a.k.a. How to Think Critically in the Post-Truth Era)

The Four by Scott Galloway, 2017
The Hidden DNA of Amazon, Apple, Facebook and Google

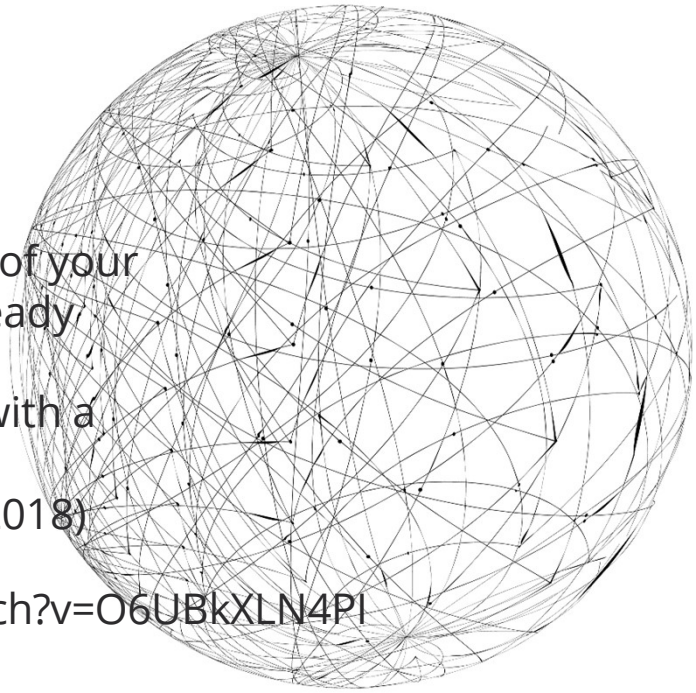
Hello World by Hannah Fry, 2018
How to be Human in the Age of the Machine

Human + Machine by Paul R. Daugherty and H. James Wilson, 2018
Reimagining Work in the Age of AI

Everybody Lies by Seth Stephens-Davidowitz, 2017
Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are

Outnumbered by David Sumpter, 2018
From Facebook and Google to Fake News and Filter-bubbles – The Algorithms That Control Our Lives

Too many books too choose from? Too many topics mentioned in the presentation? Keep calm and apply philosophy and math!



My five not-so-easy steps:

1. Connect the dots.
2. Determine the big rocks of your life.
3. Apply theory of early stopping, i.e. be an effective administrator of your limited time and choose the very first option better than the already examined 37% of all options presented to you.
4. Remember that knowledge is always conditional – if presented with a new piece of information, use Bayesian reasoning.
5. Don't be afraid of being wrong. („That was a perfect fail." ~Julia, 2018)

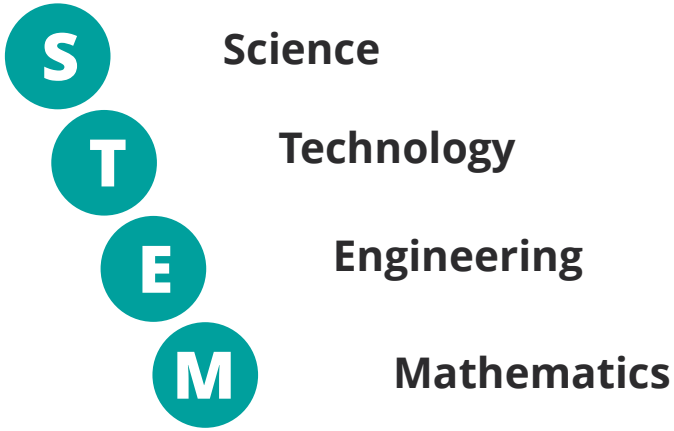
Dots by Włodek Markowicz, 2015: https://www.youtube.com/watch?v=O6UBkXLN4PI
Interview with Simon Sinek on Inside Quest by Tom Bilyeu, 2014

First Things First by Stephen R. Covey at al., 1994

Optimal stopping: https://en.wikipedia.org/wiki/Optimal_stopping
Secretary problem: https://en.wikipedia.org/wiki/Secretary_problem
Monty Hall problem: https://en.wikipedia.org/wiki/Monty_Hall_problem

Dlaczego jestem takim orędownikiem kształcenia w STEM?

Ok. 1870 roku połowa populacji USA pracowała w rolnictwie. Obecnie jest to poniżej 2%. Te 48% populacji nie stało się bezrobotne. Kombajny nie są naszym wrogiem, ale przyjacielem. Analogicznie uczenie maszynowe i sztuczna inteligencja nie spowoduje bezrobocia – jedynie wyręczy nas w żmudnych pracach. Moim zdaniem ok. 2060 połowa populacji będzie zatrudniona w STEM lub jego pochodnych, dlatego promujcie STEM zarówno wśród Waszych rówieśników , jak i Waszego młodszego rodzeństwa! Wiem, wydaje się to abstrakcyjne – tak samo jednak abstrakcyjne dla rolnika z 1870 było stwierdzenie, że za ok. 140 lat liczba osób zatrudnionych w jego sektorze zmaleje 25-krotnie, bo przecież jeść musimy wszyscy.



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POLITECHNIKA WARSZAWSKA

Dziękuję za zaproszenie!

dr hab. inż. Bartlomiej Ufnalski, prof. uczelni

Politechnika Warszawska

Wydział Elektryczny

Instytut Sterowania i Elektroniki Przemysłowej

Zakład Napędu Elektrycznego

https://www.mathworks.com/matlabcentral/profile/authors/2128309-bartlomiej-ufnalski

https://www.youtube.com/channel/UCLED0zzPdsxxwWTQ51eL93A

bartlomiej.ufnalski @ ee.pw.edu.pl

www.pw.edu.pl

www.ee.pw.edu.pl

www.isep.pw.edu.pl

www.isep.pw.edu.pl/zne

Kampus główny Politechniki Warszawskiej

Gmach Elektrotechniki, pok. 401, kl. B

https://goo.gl/maps/D5Pmy6auMcw

+48 22 234 6138

Looking for a gift for your parents or teachers?

Make It Stick by Peter C. Brown et al., 2014
The Science of Successful Learning

Creative Schools by Ken Robinson and Lou Aronica, 2016
Revolutionizing Education from the Ground Up

You, Your Child and School by Ken Robinson and Lou Aronica, 2018
Navigate Your Way to the Best Education

The PBL Playbook by A. J. Juliani, 2018
A Step-by-Step Guide to Actually Doing Project-Based Learning

Robot-Proof by Joseph E. Aoun, 2017
Higher Education in the Age of Artificial Intelligence

I Love Learning; I Hate School by Susan D. Blum, 2017
An Anthropology of College

Rewiring Education by John Couch and Jason Towne, 2018
How Technology Can Unlock Every Student's Potential

The Intelligence Trap by David Robson, 2019
Why smart people do stupid things and how to make wiser decisions

Looking for a gift for your parents or teachers? (cont.)

Why? by Mario Livio, 2017
What Makes Us Curious

The Road Less Stupid by Keith J. Cunningham, 2018
Advice from the Chairman of the Board

The Creativity Code by Marcus du Sautoy, 2019
How AI Is Learning to Write, Paint and Think

The Four Horsemen by Richard Dawkins et al., 2019
The Discussion That Sparked an Atheist Revolution

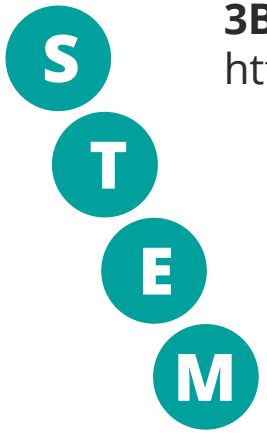
Count Girls In by Karen Panetta and Katianne Williams, 2018
Empowering Girls to Combine Any Interests with STEM to Open Up a World of Opportunity

The Class by Heather Won Tesoriero, 2018
A Life-Changing Teacher, His World-Changing Kids, and the Most Inventive Classroom in America

Team Human by Douglas Rushkoff, 2019

Creating and Capturing Value Through Crowdsourcing by Christopher L. Tucci (editor) et al., 2018

STEM (Science, Technology, Engineering, Mathematics) is fun!



3Blue1Brown
https://www.youtube.com/channel/UCYO_jab_esuFRV4b17AJtAw

minutephysics
https://www.youtube.com/channel/UCUHW94eEFW7hkUMVaZz4eDg

Real Engineering
https://www.youtube.com/channel/UCR1IuLEqb6UEA_zQ81kwXfg/featured

Mathologer
https://www.youtube.com/channel/UC1_uAIS3r8Vu6JjXWvastJg

MajorPrep
https://www.youtube.com/channel/UCpCSAcbqs-sjEVfk_hMfY9w

Numberphile
https://www.youtube.com/channel/UCoxcjq-8xIDTYp3uz647V5A

Veritasium
https://www.youtube.com/user/1veritasium

SmarterEveryDay
https://www.youtube.com/user/destinws2

Vsauce
https://www.youtube.com/user/Vsauce

Image by rawpixel on Pixabay

All science is either physics or stamp collecting

Ernest Rutherford

LHC

Smashing Physics by Jon Butterworth, 2014
Inside the Discovery of the Higgs Boson
https://www.audible.co.uk/pd/Smashing-Physics-Audiobook/B00LUVOS42

LIGO

Black Hole Blues and Other Songs from Outer Space by Janna Levin, 2016
https://www.audible.co.uk/pd/Black-Hole-Blues-and-Other-Songs-from-Outer-Space-Audiobook/B01D0MQ40O

BICEP

Losing the Nobel Prize by Brian Keating, 2019
A Story of Cosmology, Ambition, and the Perils of Science's Highest Honor
https://www.audible.co.uk/pd/Losing-the-Nobel-Prize-Audiobook/1541443985

Quantum Physics by Michael Raymer, 2017
What Everyone Needs to Know
https://www.audible.co.uk/pd/Quantum-Physics-Audiobook/B07LFJ9XRC

For the Love of Physics by Walter Lewin, 2011
From the End of the Rainbow to the Edge of Time - A Journey Through the Wonders of Physics
https://www.audible.co.uk/pd/For-the-Love-of-Physics-Audiobook/B005ESYH4S

The first principle is that you must not fool yourself – and you are the easiest person to fool.

Richard Feynman

Image by geralt on Pixabay

Image by OpenClipart-Vectors on Pixabay

Image by wir_sind_klein on Pixabay

Bad Blood by John Carreyrou, 2018
Secrets and Lies in a Silicon Valley Startup

EEVblog: Solus Graphene Heater Kickstarter BUSTED!
https://www.youtube.com/watch?v=JnM4UcSDDpk

Cartoonium: 28314 Years Before Commercials
https://www.youtube.com/watch?v=jmHG92lARUQ

Information wants to be free.
Stewart Brand

MOOC = Massive Open Online Course

Brilliant Udacity Stanford Online

MIT OpenCourseWare edX Udemy

Skillshare Coursera Khan Academy

Biblioteka Główna
POLITECHNIKA WARSZAWSKA

http://www.bg.pw.edu.pl/#zasoby-elektroniczne

Revolution in Higher Education by Richard A. Demillo and Andrew J. Young, 2015
How a Small Band of Innovators Will Make College Accessible and Affordable
https://www.audible.co.uk/pd/Revolution-in-Higher-Education-Audiobook/B0147QJ51M


Image by Pexels on Pixabay

Miscellaneous

SciFun: Czy Sztuczna Inteligencja zabierze nam pracę?
https://www.youtube.com/watch?v=LSPPQPryIAQ

To Już Jutro: Czy elektronika zastąpi kierowców?
https://www.youtube.com/watch?v=BUqTvujw-fU

EEVblog: Car ECO OBD2 Fuel Saver SCAM!
https://www.youtube.com/watch?v=XgXwfBTKLGU

Tim Minchin: 9 Life Lessons
https://www.youtube.com/watch?v=yoEezZD71sc

Simon Sinek: 5 Rules to Follow as You Find Your Spark
https://www.youtube.com/watch?v=8l-YpiiBH4o

Simon Sinek: How to Get People to Follow You
https://www.youtube.com/watch?v=lPwYUDD9Pd4

Simon Sinek: The Infinite Game
https://www.youtube.com/watch?v=tye525dkfi8

Miscellaneous (cont.)

SmarterEveryDay: Circular Saw Kickback Killer
https://www.youtube.com/watch?v=OdW7vhYYSdM

NASA Valkyrie Robot: Valkyrie Scaffolding Demo
https://www.youtube.com/watch?v=ARvBAwB0g10

FightMediocrity: WHY I QUIT YOUTUBE
https://www.youtube.com/watch?v=Ii-EwaPfAC0

FightMediocrity: Why I Stopped Reading Self-Help and Self-Improvement Books
https://www.youtube.com/watch?v=XgXwfBTKLGU

Grammarly: Are You Ready to Try Grammarly?
https://www.youtube.com/watch?v=3YIpF1hlwm8

DeepMind: Game highlights of AlphaStar versus Team Liquid's TLO and MaNa
https://www.youtube.com/watch?v=6EQAsrfUIyo

Wintergatan: Marble Machine (muzyk czy inżynier?)
https://www.youtube.com/user/wintergatan2000

Miscellaneous (cont.)

UczelniaASBIRO
https://www.youtube.com/user/UczelniaASBIRO

Miłosz Brzeziński
https://www.youtube.com/watch?v=4sf18oNBQ7M

PhD Comics
http://phdcomics.com/

xkcd
https://xkcd.com/

Dollar auction
https://en.wikipedia.org/wiki/Dollar_auction

Maurice Conti: The incredible inventions of intuitive AI
https://www.ted.com/talks/maurice_conti_the_incredible_inventions_of_intuitive_ai

Education works best when all the parts are working
https://www.reddit.com/r/facepalm/comments/2hxzda/education_works_best_when_all_the_parts_are/

Miscellaneous (cont.)

ColdFusion: Deepfakes - Real Consequences
https://www.youtube.com/watch?v=dMF2i3A9Lzw

ColdFusion : Boston Dynamics New Robot - Will it Take our Jobs?
https://www.youtube.com/watch?v=nvz3ODBtFlo

See Bloggers: Jak nie być debilem i nie rozprzestrzeniać głupot w sieci
https://www.youtube.com/watch?v=KKjd9S3RY24

Uniwersytet SWPS: Pseudorecepty charyzmatycznych mówców motywacyjnych
https://www.youtube.com/watch?v=miC90F_D-DQ

Neil deGrasse Tyson: Lecture at the University of Washington, 2011
https://www.youtube.com/watch?v=wp6cnp1kZBY

fullychargedshow
https://www.youtube.com/user/fullychargedshow

EEVblog: Digital Energy Savers BUSTED!
https://www.youtube.com/watch?v=yw6mf2sWk2k

Miscellaneous (cont.)

MajorPrep: The Most Misleading Patterns in Mathematics
https://www.youtube.com/watch?v=kp1C0E8Za7k

Jalopnik
https://www.youtube.com/watch?v=pgu6mkKZwNg

Robohub
https://robohub.org/

Bartlomiej Ufnalski: LEGO Mindstorms EV3 BallBot using MATLAB Simulink
https://www.youtube.com/watch?v=1UPRloKwicM

Marketoonist
https://marketoonist.com/

Sheperd Doeleman: Inside the black hole image that made history, 2019
https://www.ted.com/talks/
sheperd_doeleman_inside_the_black_hole_image_that_made_history

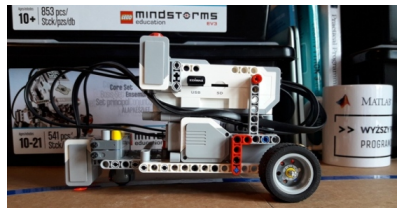
Projekt edukacyjny STEM PW
https://stem.pw.edu.pl/

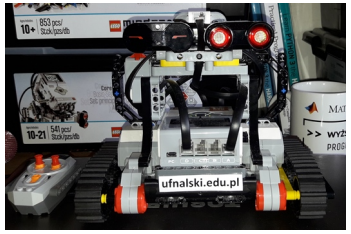
Exemplary programs/models/codes

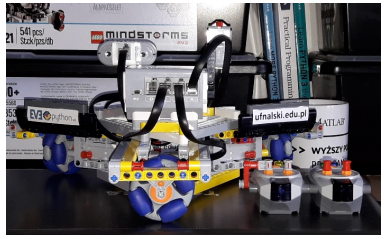
LEGO Mindstorms EV3 Gyro Boy using Simulink
https://www.mathworks.com/matlabcentral/fileexchange/71279-lego-mindstorms-ev3-gyroboy-using-simulink

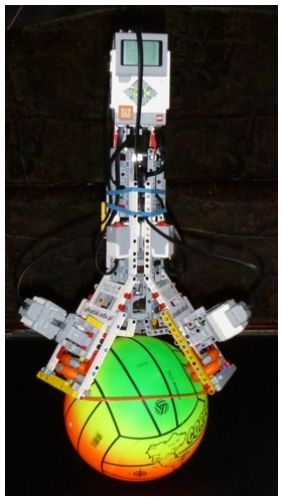
LEGO Mindstorms EV3 Line Follower using Simulink
https://www.mathworks.com/matlabcentral/fileexchange/71382-lego-mindstorms-ev3-line-follower-using-simulink

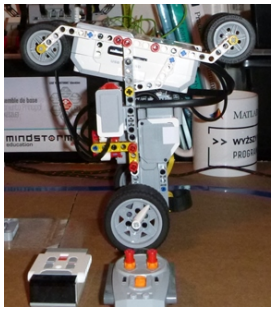
LEGO Mindstorms EV3 BallBot using Simulink
https://www.mathworks.com/matlabcentral/fileexchange/71544-lego-mindstorms-ev3-ballbot-using-simulink











LEGO Mindstorms EV3 DogoSorter using pybricks Python library
http://ufnalski.edu.pl/python_projects/lego_ev3/ev3_dogosorter.zip

LEGO Mindstorms EV3 TankBot using ev3dev2 Python library
http://ufnalski.edu.pl/python_projects/lego_ev3/ev3_tankbot.zip

LEGO Mindstorms EV3 OmniBot using ev3dev2 Python library
http://ufnalski.edu.pl/python_projects/lego_ev3/ev3_omnibot.zip

More on the way! Stay tuned!
https://www.youtube.com/channel/UCLED0zzPdsxxwWTQ51eL93A

Awesome third-party stuff for your LEGO EV3 projects

Mindsensors
http://www.mindsensors.com/

Rotacaster
https://www.rotacaster.com.au/

Robotistan
https://www.robotistan.com/

RobotShop
https://www.robotshop.com/

Tu już byłem w 2019 ☺

PODZIĘKOWANIE

dla

dr. hab. inż. Bartłomieja Ufnalskiego

KOPERNIKALIA 2019

XXXIII Liceum Ogólnokształcące Dwujęzyczne im. M. Kopernika w Warszawie
01-225 Warszawa, ul. Bema 76
tel./fax 022 632-75-76, 022 633-53-31, 022 632-13-76
Regon: 000799204, NIP: 527-21-65-120

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Technikum Mechatroniczne nr 1

LXXX Liceum Ogólnokształcące im. Leopolda Staffa