ELIC

https://phet.colorado.edu/

Holds simulations for all STEM fields

https://www.leifiphysik.de/

A portal that holds materials, experiments, tasks, quizzes and reading material – only german

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

Youtube channel in german with physics content

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

Youtube channel in german with maths content

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

App. With this tool the pupils can film moving objects and analyse them frame by frame or automatised. This is very specialized for mechanics.

https://de.khanacademy.org/

Khan Academy offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom.

http://www.qrg.northwestern.edu/projects/NSF/Cyclepad/aboutcp.html

CyclePad enables students to construct and analyze a wide variety of thermodynamic cycles. A hypertext explanation facility provides the student with access to the chain of reasoning underlying the derivation of each value.

https://www.scilab.org/

Open source version of the best known software for numerical computation MatLAB

http://www.toomates.net/

Portal with math courses in different languages.

http://blog.mrmeyer.com

Blog hosted by a maths' teacher

http://apliense.xtec.cat/arc/

Spanish site with learning ressources

https://www.engineergirl.org

The EngineerGirl website is designed to bring national attention to the exciting opportunities that engineering represents for girls and women.

http://www.ni.com/en-ca/shop/electronic-test-instrumentation/application-software-for-electronic-test-and-instrumentation-category/what-is-multisim.html

NI Multisim (formerly MultiSIM) is an electronic schematic capture and simulation program which is part of a suite of circuit design programs, along with NI Ultiboard. Multisim is one of the few circuit design programs to employ the original Berkeley SPICE based software simulation.

https://en.wikipedia.org/wiki/List_of_free_electronics_circuit_simulators

list from Wikipedia of freeware programmes which are electronics circuit simulators

https://collezioni.scuola.zanichelli.it/

Italian collection of materials, different subjects

https://lifterlms.com/

LMS that runs on WordPress

https://de.wordpress.org/plugins/learnpress/

LMS that runs on WordPress

https://www.techsmith.de/snagit.html

Software for screen capturing

https://www.youtube.com/watch?v=jdW1t8r8qYc

Functioning of a combustion enginge

https://www.wolframalpha.com/

Search Portal about different subjects

https://kahoot.com

Teachers can create quizzes for students usable with mobiles or PCs'

https://www.educreations.com/

Portal with creative tools that enable students and teachers to share ideas, collaborate, and learn new things.

https://www.edmodo.com

Portal where students, teachers and parents could get connected and study together.

https://phyphox.org/de/home-de/

App for physical experiments

https://play.google.com/store/apps/details?id=com.innoventions.sensorkinetics&hl=de_AT

App for physical measurements

https://edpuzzle.com/

With edpuzzle, the teacher can cut and VoiceOver an existing YouTube-video and enables adding control-questions at different points of the video. The answer to this questions must be right to contuine watching the video . This gives the teacher a good feedback of all his students. Edpuzzle can be used in all subject. It is Web-based and also App-based.

https://www.keytonature.eu/wiki/

identification keys for different organisms

https://www.bioinformatics.org/

a lot of free software for the structure of molecules, genetic data bank and other

http://www.tpack.org/

TPACK model of competences. It describes the necessary knowledge of teachers when using technologies in the classroom.

https://ed.ted.com/lessons/under-the-hood-the-chemistry-of-cars-cynthia-chubbuck#watch

TED talk about the chemistry of cars

https://ed.ted.com/lessons/the-ethical-dilemma-of-self-driving-cars-patrick-lin

TED talk about self driving cars

Assignments from the MOOC you can use in your lecture

Assignment 2.1

System engineering integrates the knowledge of different disciplines. Therefore we prepared materials to involve teachers from different disciplines.

Step 1: Please watch the introduction video

https://youtu.be/P2eOoQMdoW0

Step 2: Please read the slides below and watch the first lecture This material explains the concept of

an e-motor on a high level and outlines why teachers from physics, chemistry, mathematics, biology, ethics, informatics, languages are all involved in this system engineering topic.

https://youtu.be/eACgRp9XpYA

https://youtu.be/RHD4cGNbW2k

Step 3: Now we are asking you to post your findings and questions here. The facilitators will try to answer your questions and looking forward to a fruitful discussion with you!

Assignment 2.2

System engineering integrates the knowledge of different disciplines. Therefore we prepared materials to involve teachers from different disciplines.

Below you find the introduction video to Assignment 2.2!

https://youtu.be/CxgqoLmIysA

Step 1: Please go on and read/listen to the material which includes interesting technical data to be considered for the e-motor system engineering approach for all subject teachers.

https://youtu.be/53BVIIaNE7w

Step 2: Now again please go on and post your thoughts, ideas and questions below! The facilitators are ready to interact with you!

Assignment 3.1

Purpose:

Estimate the real-life utility in your personal life habits of Internal Combustion Engines

transports.

Task:

Analyze your usual means of transportation: Which vehicle do you use? How far do you go, how long does it take? Would your everyday routine be compatible with Electric Vehicles, bicycles, trains and public transport only? Share with us how these alternatives could worsen (time, practicality…), improve (no driving in traffic jams, …) or simply change your days.

Interaction:

Review other people's stories and compare their needs to yours!

Assignment 3.2

Purpose:

Gasoline, Diesel, Natural Gas and other fuels seen from the driver's point of view.

Task:

Which fuel powers your car? Why did you prefer it over its alternatives (money, practicality, performance, fuel/gas stations availability)? Will your next car still use it? Try to sum up your experience and tell us the main advantages and disadvantages of using that fuel.

Interaction:

Read and comment other peer learners' experiences!

Special question: Did you ever put the wrong fuel into your tank?

Assignment 4.1

Batteries include some toxic materials like mercury, lead, and cadmium.

What do you think about the influences of the previously mentioned materials?

What do you think about the future disposal possibilities as the mass battery production for EV and HEV expands?

Why do you think it is important for the BMS (Battery Management System) to communicate with other electrical systems implemented in modern electric vehicles?

Which physical parameters need to be monitored in BMS (Battery Management System)?

What are the values of these parameter used for in the BMS?

Assignment 4.2

Go through the presentation about lighting systems to gain a brief knowledge for the topics. Answer the questions and compare your answer with the others.

Think about what is the main advancement in the field of lighting systems which is brought by AFS (Adaptive Front- light System)?

Assignment 5.1

Purpose:

Climate change has become noticeable today and we humans should understand that we need to change or adapt our behaviour. But what are you willing to do?

Task:

Determine your personal CO2 Footprint using one of the CO2 Footprint calculators available on the Internet. What do you think of your result? Would you have expected such a result?

Imagine that climate change is progressing even further and that it is imperative that each of us reacts to it. How would you personally try to change something? Would you give up flying? Maybe change from car to train or bike? Or would you rather pay a kind of penalty/fee in order to keep on living like you do. Work out things you can and want to change.

Interaction:

How do you feel about the opinions of the other participants? Do you think that their activities are sufficient to lower their Co2 footprint? Or do they even go too far? Do you have ideas to motivate the others, who do not understand the necessity and are seeing it the "Trump-Way"?

Assignment 5.2

Purpose:

Imagine you are part of an ethics and moral commission of a major automaker. You have the task to make decisions about the behaviour of the autopilot in safety-relevant situations.

Task:

Try to figure out how you personally feel about the topic. Should the autopilot actively intervene in dangerous situations and abruptly change lanes or should it not change direction and thus avoid a possible collision with other road users in the other lane? Should the autopilot always put the personal well-being of the driver above that of other road users? Should the autopilot make a difference between men and women? Children and adults? Humans and animals?

Who do you think should be part of such an ethics and morality commission? Which people with which professional backgrounds should be involved besides the developer?

Interaction:

Try to explain your opinions on these morally very difficult questions to the other members of the Commission. Try to understand each other's point of view and discuss the decision-making behaviour of an autopilot.

What parameters should an autopilot use to make decisions?

Assignment 5.3

Purpose:

Due to technical progress, digitalization and industry 4.0, devices connected to the Internet, smart homes and self-driving cars are no longer an issue of the future but taking place and happing right now. But does this progress also make us more attackable and how are we protecting ourselves and our personal data?

Task:

Try to describe how "connected" and digitized you are. Do you use many smart devices? Now think about what you are doing against the dangers of cyberattacks on yourself and your data. Do you feel safe and sufficiently informed? Do you change your passwords regularly? Do you use the same password for all applications and services?

Interaction:

Discuss in the comments how aware you are of the dangers of cyberattacks and what you might want to change in the future to better protect yourself against them. Which device, from your point of view, is the most sensitive device in regards to the usability and the frequency it is used.

For quizzes please see the slides on week 4

https://www.elic-mooc.com/?page_id=927