Vo/Legorian 20210827 ICT Robotic Week Proposal short

**Curricular considerations for a Robotic Week of 240 minutes with 8 pupils in 4 teams**

**We use the LEGO®-MINDSTORMS EV 3 Software Teachers Version at „Hier geht´s los“ ):**

**Day 01**

**01 Unboxing, Connecting Charger, Assorting Parts, Starting Software, Checking Sensors and Actors**

- Try 1st Program with *Wait for Touch of Switch* and *Run Large Motor for 5 seconds*.

- Try 2nd Program with *Wait for Colour Red* and *Run Medium Motor for 3 Circles*.

- Try 3rd Program with *Wait for Distance less than 10 cm* and *cause sound of a barking watchdog*.

- Try 4th Program with *Wait for Distance more than 10 cm* and *show GO on the Display*.

Discuss Dis-/Advantages or job-consequences for security guards and watch-dogs! (Challenging.)

**02 Follow** **LEGO®-MINDSTORMS EV 3 Software for Vehicle-Assemblage** independently in **46 steps**!

- Keep material well organized for quick success!

- Prevent connector of BrainBrick against damage; install a 90°-cable permanently!

**03 Programming of Robot-Vehicle**

- Drive the robot-vehicle a dedicated distance! (Using number of wheel-circuits!)

- Stop in front of a barrier! (Using ULTRA-SONIC-SENSOR!)

- Stop at dedicated colour! (Using COLOUR-SENSOR!)

**Day 02**

**04 Drive a dedicated trace!**

- Drive the robot-vehicle a dedicated trace. (Direct commands; Colour Sensor just voluntary.)

- The robot-vehicle reacts on colours. (Using COLOUR-SENSOR for stopping, starting etc.!)

**05 Loop is necessary, otherwise restart of program after every stop?**

- RED traffic-light; Robot-vehicle stops.

- … on YELLOW roaring motor noise.

- … starts on GREEN traffic-light.

**06 Management for Lego® - Projects and implemented Programs** (Mandatory for **teachers**.)

- How to **downlod** a **PROJECT**

- How to **manage PROJECTS and PROGRAM-files in the PC: Changefolder** vs **Personal Folder**

- how to **manage** **PROJECTS** and **PROGRAM-files** in the **BrainBrick**

**Teacher´s robot welcomes participants:** (Voluntary; performed by teacher or very quick pupils.)

“Hello, Yessi!”, “Hello, Vladimir!”, “Hello, Rita!”, “Hello…!”

WelcomeParade may be a **Download-Example**, become tried out, modified with own soundfiles.

Discuss Dis-/Advantages or job-consequences for employees and clients in nursing services!

**07 Have you got own ideas? I**nvent**, C**onstruct, **A**ssemble, **P**rogramme, **T**est, **R**efine (VOLUNTARY)

- Robot stops in a [certain area](http://www.ict-robotic-ethic.de/index_htm_files/20191024%20StopDistance.mp4); 10 trials (Direct command by number of wheel´s circuits.)

- Robot stops at [RED](http://www.ict-robotic-ethic.de/index_htm_files/20191024%20StopRED.mp4) (Using COLOUR-SENSOR and LOOP)

Each team refers progress, obstacles and solutions to the others. (Recommended, challenging.)

**Day 03**

**08 If-clause** in a program needs a **Switch!**

- **Linefollower** (how and where to mount the sensor; how to adjust velocity of adaptation?)

01VoLineFollow0120190723.ev3 in LineFollow05

Alternatives: Extraordinary Experiments with additional Sensors (available differentiation):

**09 Create a Key by Code** and **Explore the Display** (VOLUNTARY)

**- ColourKeyCode can**

- starta **motor** (triggering noise from BrainBrick)

- trigger a **fork-movement**

- open a **bar**

- **unlock** a door etc.

- **Display can** show

- text

- signs

- individual graphics (Additionaly for very quickly working smart pupils.)

**10 Robot-Vehicle for Parcel-Service** or service in a restaurant or residential.)

- Robot recognises colour of a parcel  
 - Bar is going down  
 - Robot is pulling/pushing the parcel to a defined adress

Discuss Dis-/Advantages or job-consequences for employees and customers in parcel services!

**This might be the space for excursions to Miniatur-Wunderland, Driverless Car or Canal-Ship-Lift.**

**Then Day 04 and 05 are to be solved compressed in division of tasks and exchange of experiences by means of short lectures with demonstrations between each other.**

**Day 04**

**11 Our Robot is organizing coloured boxes automatically**

- Assembling the Coloursorter following the LEGO®-Software,

BUT **Modify the Colour-Sorter in Construction and Programme**:

- Place the Colour-Sensor above the edge of the ramp, where the boxes leave the shutter

- Create a programme ***without arrays***, just using integrated switches in a loop

- If possible, add comments concerning the function of program-steps.

Discuss Dis-/Advantages or job-consequences for employees and customers in ware-houses!

**Day 05**

**12 Robot-Arm**

- Assembling the Robot-Arm following the LEGO®-Software

BUT **Modify the ARM in Construction and Programme**

Discuss Dis-/Advantages or job-consequences for employees in industrial production!

Install automatical recognition of brick´s colour; shifting bricks to colour-related destinations.

**This might be the end of the robot-project-week.**

**The pupils may contrive a lecture with experiments for a parents-evening.**

**But in case of a lot of time left, the following tasks are recommended:**

**13 – 14 Engineers improve, integrate and innovate inventions**

- **LineFollower** **Keep distance** by stops; using Ultrasonic-Sensor  
 **Adapt velocity** by Cruise-Control; using BrainBrick´s Control Buttons

**Driverless car adapts velocity** to a slower one, using **variable SPEED**, **data-store** and **-transfer**

Discuss Dis-/Advantages (Safety, Comfort, Reliability) in public traffic!

- **Robot-Arm**  Write your own program for the Robot-Arm  
 Modify the Robot-Arm with Remote and IR Sensor

Discuss Dis-/Advantages or job-consequences for employees in industrial production!  
Discuss Dis-/Advantages or job-consequences for employees and clients in nursing services!

- Individual **Display Design**Discuss Dis-/Advantages or job-consequences for employees and clients in super-markets!

**15 – 16 Sequential activities of Robots, Interaction of Robots, Relation between Robots**

**Robot Arm puts empty Coloured Containers from A to B or C   
 Vehicle transports empty Coloured Containers towards the Colour-Sorter  
 Colour Sorter is spitting coloured Bricks into the coloured Containers**

**17 – 18 Finishing Reports by Comments on Modified Constructions and on Programs**

**19 – 20 Demonstration for parents-evening, course-advertisement for interested potential pupils.**