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| **Activity Name** | **Description** | **Key concepts** |
| 1. Let’s move | Students discover the mBot2 and the mBlock software and learn how to drive the robot with precision. This knowledge will be used in most of the following lessons. Students will also design a simple maze and program the mBot2 to (manually) navigate through it. | Precise movements and corresponding coding blocks. |
| 2. Sensing = data | Students will work with the different sensors integrated in the mBot2; they will learn how to use them with their corresponding code blocks, and to visualize data from the sensors on the integrated full color display. | Mode of operation of the sensors.  Different approaches to display and visualize data on the display.  Differences between Live and Upload mode in mBlock 5. |
| 3. Listen to mBot2 | Students will learn how to control the speaker and microphone with the code blocks in mBlock 5. They will also create a program where the mBot2 plays a recorded sound if it meets a certain condition while driving around. | Text to speech (TTS) and Voice recognition  (Speech to Text, STT)  using the build-in speaker and microphone.  Running multiple tasks side by side. |
| 4. Seeing with sound | Students will learn what ultrasound is, how it is used in a sensor, and they will also create a program to make the mBot2 drive in a loop by turning after detecting obstacles on the road. | Detecting an obstacle or a range by using the ultrasonic sensor.  Using loops and conditional statements for making the mBot2  drive while avoiding obstacles. |
| 5. Sightseeing | Students will learn how a color sensor works, how are they used in real life, and they will program the mBot2 to become a tour bus that visits different landmarks in a city. This knowledge will be also applied in lessons 7 and 8. | Mode of operation (physics of light) of the color sensor/line  follower. Color and line identification – Making the mBot2  follow a line and having  it perform actions based on color detection. |
| 6. Careful drive | Students will learn how to use the gyroscope accelerometer of the mBot2 and its code blocks, and they will program the mBot2 to adjust its driving behavior if it detects inclinations on the road. | Mode of operation of gyroscopes and accelerometers (as Inertial  Measurement Units, IMU). Coding the mBot2 to adapt to  road conditions based  on IMU data. |
| 7. A network game | Students will learn to have multiple mBot2s communicating with each other wirelessly without the need of a WIFI access point. They will program a simple game where multiple mBot2s search for a color and the first one to find it wins. This knowledge will also be used in lesson 8. | Wireless data transfer in ad-hoc networks. Data exchange in  loops and events. |
| 8. mBot2 at your service | By learning how to set up a WIFI connection with the mBot2, students will also learn to use onboard speech recognition, and they will apply this knowledge in an activity where the mBot2 becomes a robot waiter who talks to its customers. | Using WIFI infrastructure mode with the mBot2 for speech  recognition and speech synthesis. Offloading heavy computing  like speech recognition to  cloud services.  Structuring code by applying “own blocks” (functions). |
| 9. mBot2 in the wild | In this special lesson, students will learn some principles of Artificial Intelligence by using the Teachable Machine extension in mBlock5. They will apply their knowledge to recreate a natural ecosystem where the mBot2 behaves like an animal. | Learning about Machine Learning and applying it with local  processing only on block-based programming.  Establishing a new communication protocol between the  mBot2 and the computer. |

Hatice PEHLEVAN

Bilişim Teknolojileri Öğretmeni