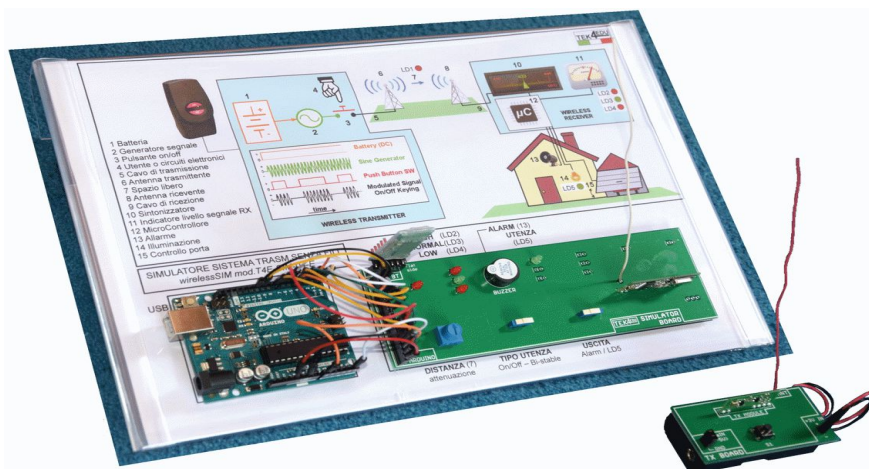


wirelessSIM-Easy MOD. T4E-SIM-04-E

Process Simulators



App



wirelessSIM-Easy mod.T4E-SIM-04-E is a compact simulator that shows the operation of wireless transmission system using an **Arduino UNO** board.

The unit is designed to allow the learning of **coding** allowing:

- demonstration of the code (**sketch**) for **Arduino UNO** board handling the simulator
- demonstration of **Apps** that communicate with the simulator via **Bluetooth**

It allows the study and understanding of the functioning of a true digital transmission system (0/1) that uses radio frequency (band 433 MHz) complete of:

- digital transmitter unit: portable, powered by battery, 0-5V input for external Data
- digital receiver unit: mounted on the electronic circuit of the main base, managed by Arduino UNO board, it detects the presence of any signal with the same frequency (radio-control, opening door control, wireless weather stations...) indicating the RF level
- the pressure of the push-button on the transmitter sends the command to the receiver that enables the lighting of a LED or a buzzer
- "transparent" communication mode: each press corresponds to a high state (1) in the receiver
- "bistable" communication mode: each press corresponds to change state (0→1 or 1→0) in the receiver

It consist of:

- a transparent and ergonomic base which contains the block diagram of the system with all main components
- an **Arduino UNO** board
- an electronic board with receiver, **Bluetooth** interface and already assembled electronic components
- a portable electronic board with transmitter and electronic components already assembled

The **Bluetooth** interface allows the simulator to connect to a mobile **Android** device (smartphone or tablet).

Wiring is minimal to reduce the chance of errors and the time needed for setting up the exercise:

- only the connection from the Arduino UNO card to the electronic card is required

The **mySIM-E** app, downloadable using the **QRcode** on the page, makes it easy to use the simulator with an **Android** device.

Students, following the instructions of the manual, can build their own **Android** apps that will communicate with the simulator, using:

- simple free apps downloadable by **Google Play** or
- other development environments, such as **MIT App Inventor 2 (AI2)**, which uses drag-and-drop object programming.

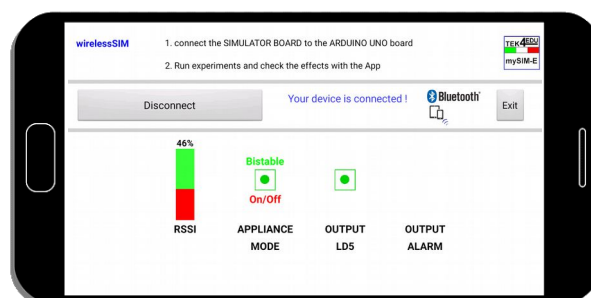
The simulator allows the **learning-by-doing** method with which the student has an active role in learning technology:

- Analyze how the system has been designed and modified to evaluate its effects and understand the meaning of the actions taken.

It allows teaching with increasing levels of in-depth, which are modulated by the Teacher.

It can be used in schools of different level and degree:

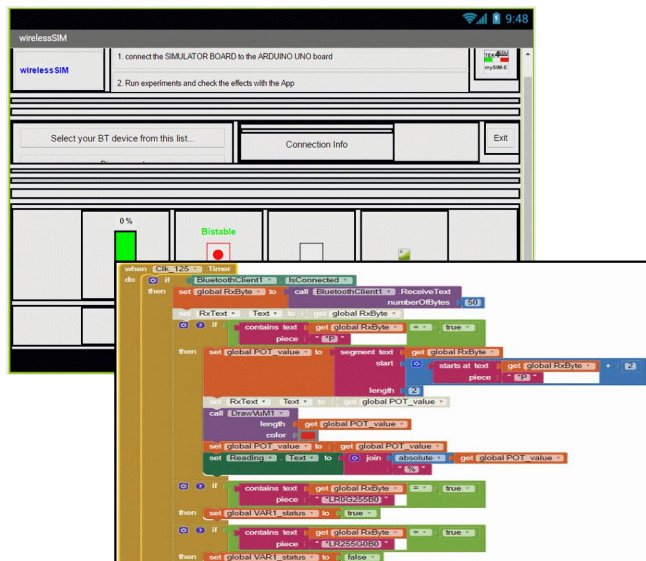
- **primary school**: it is possible to demonstrate, very simply, the operating principle of the hydroelectric power station, its simulation (eg adjusting the level of water in the reservoir) and the installation and use of the App
- **Secondary/Vocational school**: the experiences listed in the previous point add to the ability to show the technology adopted and the Arduino code, make code changes to evaluate the effects, and make an App
- **High Level School**: The experiences listed in the previous points add to the greater interaction, creativity and understanding of the codes used for the Arduino card and to implement the App



App
mySIM-E

COURSE PROGRAM

- Installation of the simulator by placing the Arduino UNO board, the electronic board and the Bluetooth module
- Reading of electrical diagram attached, identification of electronic components supplied and mounted on the electronic board
- Check that the circuit is made consistent with the electrical diagram
- Connecting the Arduino UNO board to the PC with the USB cable and start the PC
- Installing the **Arduino Software IDE** and opening the file that contains the **included code (Sketch)**
- Installing the **included Android App** (file .apk), pairing the simulator with the mobile device and launching the App
- Selection of input commands (potentiometer, pushbutton switch, switches) and observation of the unit state by the output (leds, buzzer)
- Analysis of the operating logic of the simulator
- Code analysis to observe the similarities between the operating logic of the simulator and the development of the code itself: it is supplied the **flow- chart** of the code
- Changing the code, upload from PC to Arduino UNO board and verification of the effects
- Description of how to build a simulator-compatible **Android app** using a free downloadable app from **Google Play**
- Analysis of the proprietary **Android app included** (file source .aia for **MIT App Inventor 2** development environment) that allows the receipt and viewing of data sent by the simulator to the **Android device (not included)** using **Bluetooth** technology



source file .aia (included) of the mySIM-E App developed with AI2 (sections **Designer** and **Blocks**)

TECHNICAL SPECIFICATIONS

The Block diagram contains the following components:

- Battery, sine wave generator, "modulator" button, cables, antennas, free space, tuner, received signal level meter, microcontroller, applications (lighting, alarm, opening door control)

Nr.1 Arduino UNO board

Nr.2 electronic boards which includes electronic components and Nr.1 Bluetooth module

Electronic components:

- leds, buzzer, potentiometer, resistors, capacitors, pushbutton switch, switches, TX module, RX module, stilus antennas

Wiring: flexible jumper cable, mix color and length, male to male

User controls:

- distance between transmitting and receiving antennas: continuously adjustable
- type of appliance: on/off, bistable

- output appliance: alarm, lighting

Light indicators:

- distance between antennas
- received signal level: low (receiver disables), normal, high
- appliance: lighting

Sound indicator: alarm

Simulator is ready-to-use:

- Arduino UNO board is already programmed with its code
- electronic board already assembled with electronic components
- the App is already ready to be used

Accessories included:

- Student manual: contains exercises that describe how to use the unit, the code (sketch) and the proprietary App
- USB cable
- proprietary Android App

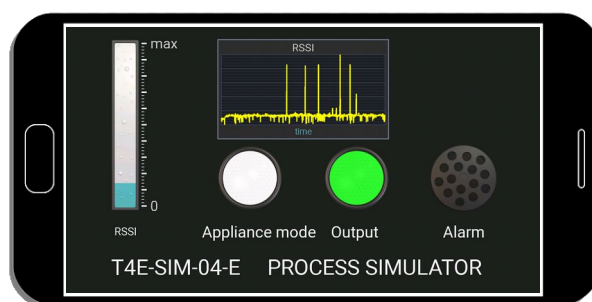
Power supply:

- by USB port of Arduino UNO board connected to a **Personal Computer or Power bank (not included)**
- by external power supply (**not included, option suggested T4E-ACC-03**)

- Nr.2 1.5 AA battery (**not included**) for the transmitter unit

Dimensions and weight:

- 310x210x70 mm
- Total weight: 1kg



App developed with free application downloadable from **Google Play**



Option:

- 12V PS ADAPTER mod.T4E-ACC-03



Accessories included:

- Student manual
- USB cable
- proprietary Android App

Accessories not included:

- Computer
- Android Device