**Uyamak ecosystem**

Uyamak ecosystem is a combination of hardware and software tools, which lets the users to graphically program their algorithms through block diagrams, that are implemented to:

1. Numerically simulate static or dynamic mathematical models to analyze or predict their behavior.
2. Control or monitor physical processes in real-time using a microprocessor that is connected to a microcontroller that carries data-acquisition via a wired (USB) or a wireless communication (Wi-Fi or Bluetooth).

**Highlights:**

1. Uyamak ecosystem uses a web-based platform to capture user algorithm
2. Since it runs on web-browser, it doesn’t need any installation and it is compatible with all the operating systems.

**List of hardware:**

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| Sl. No. | Name | Functionality |
| 1 | Uyamak Server | A 64-bit multicore microprocessor-based computer, which works with Linux based OS, is adapted to work as a Uyamak server with the help of GO. This server lets the users to capture their algorithms and to run them. The algorithms can run on (1) the client browser, or (2) on the server. The users can make their algorithms to interact with the Uyamak hardware by means of a USB module, Wi-Fi module, or Bluetooth module. Since client browsers are not allowed to access the hardware, the Uyamak modules should be connected to the server. However, by installing an Uyamak Bridge on the client computer, the users can interact with the hardware modules directly. |
| 2 | Uyamak USB module | A 32-bit microcontroller module with USB device capability is employed to achieve communication with the Uyamak server or client computer via an Uyamak Bridge. It contains digital input/output ports, analog input/output pins, encoder, I2C, UART, RS485 and SPI interfaces. Through this module, real-time data acquisition can be carried out with a sampling-time equal or larger than a millisecond. |
| 3 | Uyamak Wi-Fi module | A 32-bit microcontroller module with Wi-Fi device capability is employed to achieve communication with the Uyamak cloud, Uyamak server or the client computer. In this case, the Uyamak Bridge is not needed. The Uyamak Wi-Fi module contains digital input/output ports, analog input/output pins, encoder, I2C, UART, RS485 and SPI interfaces. Real-time data acquisition can usually be carried out with a sampling-time larger than ten milliseconds, but it depends on the network latency. This module can be directly connected to the Uyamak Cloud. |
| 4 | Uyamak Bluetooth module | A 32-bit microcontroller module with Bluetooth device capability is employed to achieve communication with the Uyamak server or client computer via the Uyamak Bridge. It contains the digital input/output pins, analog input/output ports, encoder, I2C, UART, RS485 and SPI interfaces. The sampling-time for the real-time data acquisition can be selected equal or larger than a millisecond. |

**List of software:**

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| Sl. No. | Name | Functionality |
| 1 | Uyamak Server | A HTTP server developed in GO works as the Uyamak Editor. The captured graphical algorithm is compiled to an executable GO code, that permits communicating with USB, Bluetooth, and HTTP. The compiled code is saved as per the algorithm requirements. |
| 2 | Uyamak Editor | It is a HTML, JavaScript, and CSS based graphical editor to capture the algorithms. It has several mathematical and logical codes embedded in the blocks. Users can connect several blocks to achieve the required block diagram algorithm. The algorithm can be simulated on the browser as a simulation. This editor is generated from Uyamak Server and Uyamak Cloud. The first version of the Uyamak Cloud based Uyamak Editor is available to users at <https://umk.skgadi.com/> |
| 3 | Uyamak Cloud | Uyamak cloud is running on a third-party NodeJS based servers such as Google’s Firebase. It serves the Uyamak Cloud and allows to connect with the Wi-Fi modules that directly interact with it. The Uyamak algorithms are directly executed on the cloud and the Uyamak Wi-Fi modules interacts with these algorithms. |
| 4 | Uyamak Firmware for USB module | It is a C++ code to achieve the required functionality for the Uyamak USB module. |
| 5 | Uyamak Firmware for Wi-Fi module | It is a C++ code to achieve the required functionality for the Uyamak Wi-Fi module. |
| 6 | Uyamak Firmware for Bluetooth module | It is a C++ code to achieve the required functionality for the Uyamak Bluetooth module. |
| 7 | Uyamak Bridge for USB | It is a GO code which runs on the client’s computer to work as a bridge between it and the Uyamak USB module. |
| 8 | Uyamak Bridge for Bluetooth | It is a GO code which runs on the client’s computer to work as a bridge between it and the Uyamak USB module. |