



***Bringing an all-in-one
solution to IoT
prototype developers***

WHITE PAPER

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MIKROE

Click Cloud IoT solution is a versatile, all-in-one solution which integrates both the data exchange and the data management. It consolidates the functions of three elements: IoT devices, Click Cloud, and the mobile/web app. The system enables multiple IoT devices to connect to a Cloud service via the gateway Click board™ - Go to Cloud (G2C) click, while offering a simple visual interface to manage the connected IoT devices.

The world of embedded electronics is developing and advancing at exponential rates. The modern, integrated circuit design imposes an everlasting evolution of the embedded industry as it allows many of the simple devices to become smart. Besides the technological advancements, there's an increasing need to control and manage the ever-expanding data. Such an approach enables a more effective, cost-efficient management as it optimizes the expenditure of efforts to utilize the maximum out of any given system, by connecting its elements.

IoT Challenges and Click Cloud solution

Smart tools development is not an easy task. A set of specialized tools for both the hardware and the software development are required. Those tools need to simplify the development, cut the time to market and provide a high level of reliability. For the past 17 years, MikroElektronika has been providing a range of rapid development tools for embedded development, including small and big-form factor development boards, add-on boards, compilers, libraries, working examples, and many other tools aimed at rapid development and simplified workflow.

A solution which joints the software, hardware and cloud storage

Relying on an already well-established set of rapid development and prototyping tools, MikroElektronika has developed Click Cloud, a brand new IoT cloud service, which rounds up the complete MikroElektronika ecosystem. All of our existing clicks are compatible with the new Click Cloud solution. A Click board™ specifically designed as a cloud gateway, the Go to Cloud (G2C) click,

enables the click boards from Mikroë versatile lines of clicks to be connected to a cloud and remotely manipulated.

Envisioned as a simple solution to the issue of complexity of the IoT solutions, Click Cloud solution represents a new milestone in the development of the existing Mikroë ecosystem.

The Click Cloud solution consists of the three parts:

1. Hardware:

- **Development board,**
- **Click boards™ product line now enriched with the gateway Click board™, the Go to Cloud (G2C) click**

2. Cloud service

3. Client application

- **Web and mobile application for accessing and managing the data on the cloud.**

Proof of Concept and Minimum Viable Product

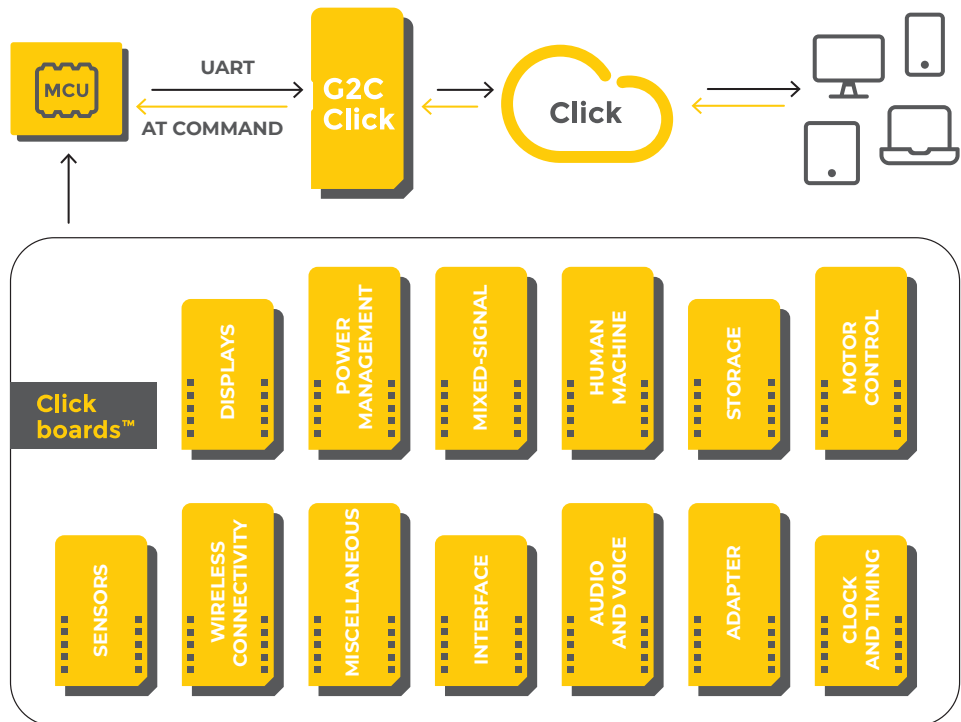
The growing IoT industry is knee-deep in production of advancing IoT solutions. The rush for time is real – a 2017 study by Cisco has shown that nearly 60% of all IoT projects end at the proof of concept phase.* Development of a prototype is often costly, as it requires both skilled engineers and financial investment, with a huge risk of it to be a failure. Despite the learning value the companies receive from failures, Mikroë is offering a tool to decrease the costs of these ventures. It offers you a simplified path toward a prototype, be it a personal project or a part of the industry.

A tool that decreases the costs of ventures

Reaching Proof of Concept as a step of internal validation now requires much less investment. Minimum Viable Product, an external validation step is easier to produce, too, as the problems of connectivity to the Internet, expensive hardware development, and storing and managing the data are solved within the Click Cloud Solution.

The issue of communication between development systems and Cloud platforms, and Mikroe out-of-the box solution

Establishing the communication between the IoT device and a cloud platform is a complex task. It requires using a range of different technologies, along with the engineers able to implement them. Starting with the embedded network communication technologies, user interface development, command parsing, and data conditioning, and then the development of the web service itself, interfacing with the web service, GUI design, database maintenance - it is certainly not something easily achievable. Each of these areas requires lengthy devotion and resources. In most cases, undertaking such a big project and the



An extremely viable solution

associated risk that comes with it, simply renders the whole concept of IoT - inapplicable. Therefore, specialized and ready-made IoT solutions such as the Cloud Click offer extremely viable option. Especially so as the whole concept is based on proven solutions from within the MikroElektronika ecosystem. Both the connection and the data communication issues are solved for the user, by simply connecting the Go to Cloud (G2C) click to the IoT application being developed.

The link between the development platform and the Click Cloud service can

be established using the Go to Cloud (G2C) click. This Click board™ is an out-of-the-box connection solution. **It represents an all-in-one solution so that the developer can focus on the target embedded application, as the needed web applications, Wi-Fi communication, hardware development, and other time-consuming tasks are taken care of.** This also allows the less experienced users to utilize the Click Cloud service, as all the development related to Click Cloud and establishing the link between the service and the IoT application is reduced to just a few simple commands sent to the Go to Cloud (G2C) click over the UART interface.

A complete control over an IoT project

Within the Click Cloud, you can develop, deploy, and maintain any kind of IoT network fairly easily. The Click Cloud app is developed with the user in mind: it has a very clean and comprehensive user interface. Offering the possibility to use the service with a dedicated Android application, it supports push notifications, dashboards, and widgets with charts, statistics, data analysis, etc. Click Cloud gives you the complete control over your IoT network. Hundreds of IoT devices that can be located anywhere in the world, are just under your fingertips.

Benefits of using Click Cloud solution and how it works

The key resource to explore in the Click Cloud Solution is the Mikroe existing ecosystem. Hundreds of click boards available, now expanded with the gateway add-on board (Go to Cloud (G2C) click board), are time-saving tools as is. Leaning on the Mikroe comprehensive, all-around eco-system which includes complete hardware for development, out-of-the-box software – libraries and examples, as well as the ever-growing Libstock community and expert support personnel, make the Click Cloud Solution a reliable and convenient tool for any IoT development.

Cloud Click service offers the option of choosing and assigning the description to the so-called device manifest. Afterward, it is attached to a designated device. Device manifest is a description of a real, physical device (click board), and it enables the IoT Click Cloud platform to read the data from it or to operate the device. This concept enables the integration of the click board into the Click Cloud IoT platform environment, offering a simple interaction with the

Easy-to-read graphics interface

device. When the click board or another device is integrated into the system, working with it becomes exceptionally easy. Every device manifest contains one or more parameters [a sensor or an actuator] which are being operated or read. The display of the data is adjustable, enabling an instant understanding. For example, adding the position sensor will offer that the data is instantly read in radians, with border values defined. The data from the devices is possible to display in the form of widgets, on the so-called dashboards. It is possible to trigger the alarm in case of passing the thresholds, then send the notification to a mobile device, or, most importantly, enable and work an interaction with another device – e.g. to start a motor.

A simple and easy-to-read graphics interface enables a clear overview, and the visualization of the widgets is left to a user to define by their preference. It is possible to group certain devices, to process the data received from the sensors of various devices connected to the IoT network, and to show current values or values accumulated over time.

The values are designed with the user in mind, as well as conversions from one type of value to another. The help section is intuitive, easy to reach on the server so that you can summon the help and get information about a certain aspect of the service you are interested in at any time.

The bulk of data is sorted by the device it was gathered by, through the Click Cloud service. Such data can be shown in tables and graphics, allowing both for following the current updates of the devices, and the review of the past activity.

Conclusion: Why choose the Click Cloud solution?

With the advancing IoT global development, managing data on the cloud makes an expected prospect. The call for a more efficient, less-energy-consuming way of operating businesses, and rapid prototyping, are ensuring that investing in IoT development is a win bet.

Mikroe Click Cloud represents a complete solution, enabling even less experienced users to create an IoT network and use the benefits of a powerful Click Cloud service. An abundance of options for data management, the simplicity of use, integrated support, lengthy directions of use, all of it is given to a user which can establish a connection to a service and create their own IoT device by only a few lines of code.

Within the IoT industry, Click Cloud solution is a tool for rapid development, prototyping, and Minimum Viable Product testing. The complete solution encompasses issues of connecting to the Internet being resolved, data storage and management, and it enables developers to focus on what really matters, relying on the out-of-the-box solution that the Click Cloud solution offers.

* 2017 Cisco Study

<https://newsroom.cisco.com/press-release-content?articleId=1847422>



clickcloud.io



mikroe.com/mikrobus



libstock.com

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