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Approaches to Designing a Wireless Sensor Network Node for IoT Solution

Anton Sukov

dept. Design and Operation of Electronic Devices
Kharkiv National University of Radioelectronics
Kharkov, Ukraine
anton.sukov@nure.ua

Alexey Zayanchukovsky

dept. Design and Operation of Electronic Devices
Kharkiv National University of Radioelectronics
Kharkov, Ukraine
oleksii.zaianchukovskyi@nure.ua

Vyacheslav Olizarenko

dept. Design and Operation of Electronic Devices
Kharkiv National University of Radioelectronics
Kharkov, Ukraine
viacheslav.olizarenko@nure.ua

Pavlo Galkin
ORCID 0000-0002-0558-6448
dept. Design and Operation of Electronic Devices
Kharkiv National University of Radioelectronics
Kharkov, Ukraine
pavlo.halkin@nure.ua

***Abstract*—The object of the research is the hardware component for building a test platform for wireless sensor networks. The aim of the work is to develop a software and hardware test platform for wireless sensor networks. As a result of the analysis, the node structures, wireless sensor network modules, CC2530 peripherals were analyzed. A module based on the CC2530 PA was chosen as the hardware. Given to optimize the structure of the node for as one of approach to designing a wireless sensor network node. Also given report about difference in approach to designing nodes and uses areas. All developments will receive life in the educational process of the department. Sample production is already underway.**

Keywords—approach, CC2530, software and hardware test platform, node, wireless sensor network

I. INTRODUCTION

The Wireless sensor networks (WSN) systems have a lot of problems like security, energy consumption, heterogeneity and other disadvantages that need be solved [1]. Therefore, it is quite difficult to design a sensor network node so that it satisfies the necessary criteria for optimality. If such a node is also used for testing and training, then additional requirements for the construction will be propose to, for example, as in articles of designing microprocessor systems [2] or embedded control systems [3]. Energy monitoring [4] is a key factor for the successful prolongation of life times each nodes in wireless sensor network, for examples reducing the power consumption of nodes [5]. Therefore, can set the task to optimize the structure of the node for as one of approach to designing a wireless sensor network node.

The purpose of the work is to develop a software and hardware test platform for the Internet of Things.

The first part the development of a test IoT layout, namely, a communication module based on the CC2538 radio transceiver.

The second part development of a test IoT layout. Communication module based on the CC2530 radio transceiver.

The third part is development of a test IoT layout, namely, a communication module based on the ESP8266 radio transceiver.

II. CC2530 NODE FOR IOT

The CC2530 contains many peripherals that provide everything to develop various applications. The debugging interface uses I / O ports P21 (data) and P22 (synchronization) in debug mode. In this case, in the debug mode, the other 19 ports pins can be active, which gives a great opportunity to debug the module, while at the same time it can be connected to quite a few different devices. In other cases, the ports for debugging can work in the normal GPIO mode. In general, the debugging interface allows you to track all processes that occur in the module when it is in an active state (user program execution), and also to change the parameters of these processes (for example, values in registers) and in real time to observe changes in the work of the module.

As a result of the analysis, the node structures, wireless sensor network modules, peripherals CC2530 were analyzed. A module based on CC2530 PA was chosen as the hardware. Elements such as:

- LEDs ;
- push buttons;
- photoresistor;
- humidity sensor;
- ultrasonic sensor;
- exits to the outer periphery.

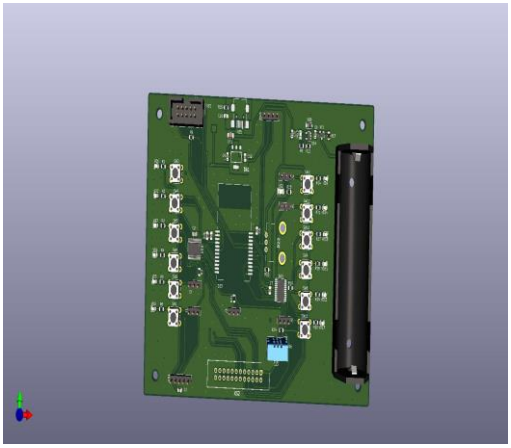

Fig. 1. Developed PCB board base on CC2530.

III. CC2538 NODE FOR IOT

The CC2538xFnn is the ideal wireless microcontroller System-on-Chip (SoC) for high-performance ZigBee applications. The device combines a powerful ARM Cortex-M3-based MCU system with up to 32KB onchip RAM and up to 512KB on-chip flash with a robust IEEE 802.15.4 radio. This enables the device to handle complex network stacks with security, demanding applications, and over-the-air download.

As a result of the analysis, the node structures, wireless sensor network modules, CC2538 peripherals were analyzed. A module based on the CC2538 was chosen as the hardware. As elements of the periphery, the following elements were chosen:

- LEDs ;
- push buttons;
- Temperature, humidity and pressure sensor in the one case;
- Buzzer;
- hall sensor;
- lighting sensor;
- voltage divider with adjustable resistor.

A contact switch is selected to switch between the peripheral elements, and electrical switch for switching between external and internal peripheral (Fig. 2).

IV. ESP8266 NODE FOR IOT

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability, produced by Espressif Systems in Shanghai, China.

Proposed developed PCB board base on ESP8266 shown on Fig.3.

V. CONCLUSION

The topic of the modern concept of IoT and the possibilities of the ZigBee protocol were considered. Similar devices were considered. The selected module and its capabilities were considered. The model is developed, its separate possibilities and components are considered.

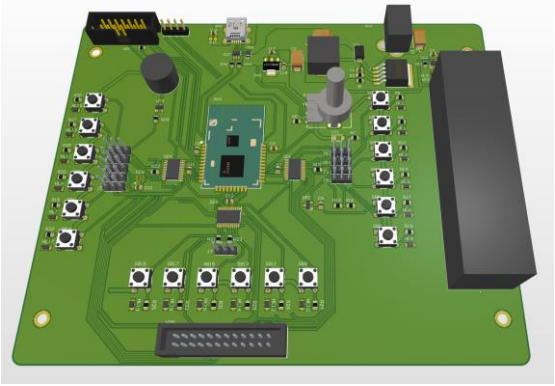

Fig. 2. Developed PCB board base on CC2538.

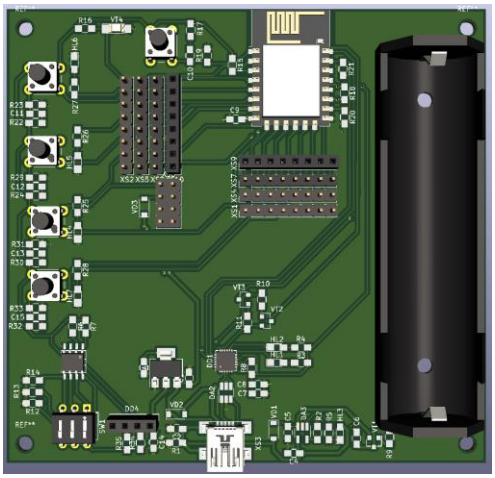

Fig. 3. Developed PCB board base on ESP8266.

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