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Justification of the Viability of Application of the Methods Remote Control System of Segment Shutter

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ABSTRACT: The article considers the methods of the remote-control system, which recently attracted the attention of researchers of control systems, one of the most important places is occupied by the methods of the remote-control system. Let us consider the capabilities of the remote-control system methods in order to identify their applicability in the tasks of remote control of the segmented gate of the reservoir.

I. INTRODUCTION

The high rate of development of the software and hardware base of the modern remote-control system causes profound changes in the functional and algorithmic appearance of automated process control systems. The level of automation of processes increases, new functions of automatic and automated control are mastered, new mathematical methods for solving functional problems appear in the developers database. Among the methods of the remote-control system, which recently attracted the attention of researchers of control systems, one of the most important places is occupied by the methods of the remote-control system. Let us consider the capabilities of the remote-control system methods in order to identify their applicability in the tasks of remote control of the segmented gate of the reservoir.

Monoblock and modular controllers, as a rule, use a parallel bus for data exchange with I / O modules, which makes it possible to increase the speed of their interrogation by an order of magnitude compared to the serial bus. Parallel buses can be standard (ISA, PC / 104, PCI, ComactPCI, VME, CXM) or privately owned. The serial controller bus (based on the RS-485 interface) is used to connect remote (distributed) I / O modules to it.

Programming low-power controllers is performed using the buttons located on the front panel or using a portable remote for programming. In recent years, a laptop computer has been used as a remote control. Powerful controllers are programmed using a personal computer on which special software is installed, such as CoDeSys or ISaGRAF, which translates the technological language of the IEC 61131-3 standard into the executable code of a processor that is loaded into the PLC ROM, for example, via an Ethernet port.

GSM information and communication tools and their connections

Call Forwarding. The possibility of transferring incoming calls to another phone number in cases when the number is busy or the subscriber is not responding; when the phone is turned off or out of coverage, etc. In addition, fax and data forwarding is possible.

Call barring. Barring all incoming / outgoing calls; ban on outgoing international calls; Barring incoming calls, with the exception of on-net calls.

Call waiting. This service allows you to receive an incoming call during an ongoing conversation. At the same time, the first subscriber will either stay in touch, or the conversation with him may be terminated.

Call Hold (Call Holding). This service allows, without breaking the connection with one subscriber, to call (or answer an incoming call) to another subscriber.

Global roaming (Global roaming). When you visit any of the countries with which your operator has signed an

agreement, you can use your GSM cell phone without changing the number.

II. SIGNIFICANCE OF THE SYSTEM

How to connect GSM module SIM900D. An important component of the automation of any object is the monitoring and control system. If you control the object at short distances (up to several hundred meters) does not cause major problems - you can use individual low-power transceivers. Then, with monitoring of remote objects, such a reception will not work, to organize your own radio channel, say 100 km, so simply will not work. But there is one way out - you can use the network of cellular operators deployed throughout the country. To do this, there is even a specialized GSM-module, pretending to be in the network opsos simple mobile phone.



Fig.1. Appearance SIM900D

SIM900D is essentially a complete device that can use most cellular services: make and receive calls, send and receive SMS and MMS, use GPRS and access FTP. Plus, such buns as a built-in Li-Ion battery charge controller, a real-time clock, a PWM output interface for connecting a display, and an analog-to-digital converter (ADC).

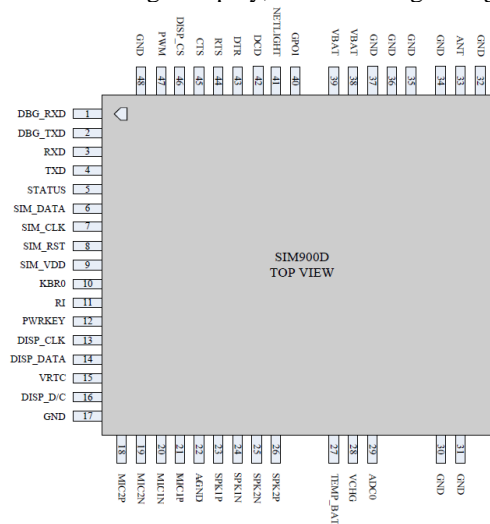


Fig.2. Ports SIM900D

Nutrition. The module must be powered with a constant voltage in the range of 3.2-4.5 volts. Plus, power is supplied to pins 38-39 (VBAT). The earth comes to all the GND pins [1]

III. SYSTEM ANALYSIS

Consumption in standby mode is only 1mA, but it should be borne in mind that during the registration of a network or a bad signal, the module lifts the power and consumption can briefly rise to 2 A. The power supply should be ready for this and electrolytes for a couple thousand microfarads will not be superfluous here. The module on the module shows the recommended power scheme on the MIC29302WT stabilizer:

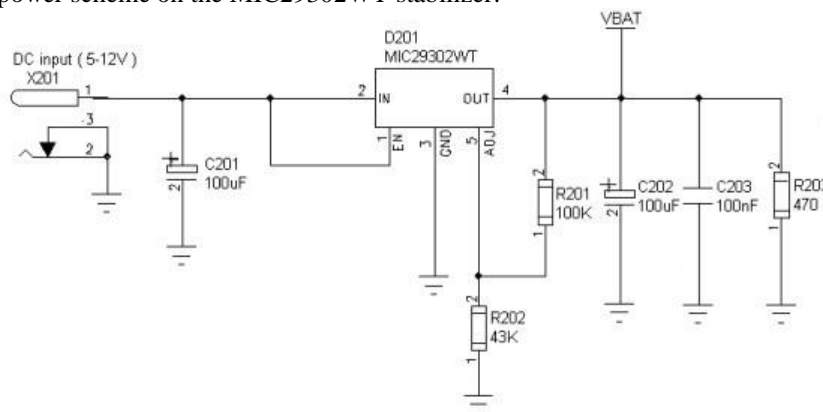


Fig.3. Wiring diagram stabilizer MIC29302WT

In the case of autonomous operation, it is recommended to use Li-Ion batteries, which the module can recharge itself. For this there is a built-in charge controller. To enable the module to control the charging process, there is an input TEMP_BAT (27 pin). The third battery terminal is connected to this output (this is the output of the thermistor built into the battery) and in case of overheating of the battery, the charging will stop.

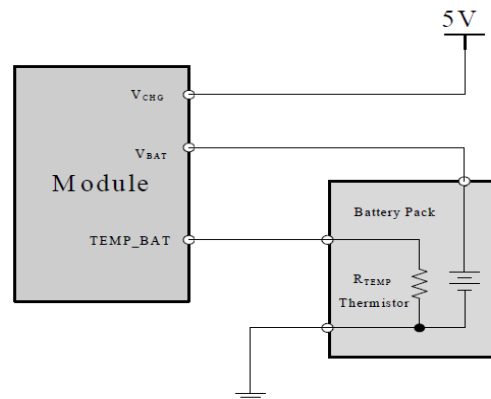


Fig.4. Connection diagram with batteries

The source voltage can be in the range of 5-6 Volts with the ability to draw a current of up to 750 mA. The charge starts automatically when the voltage is applied to the VCHG pin, so the control program should organize a survey of the battery status and, if necessary, apply a charge voltage, for example, using a transistor switch [2].

SIM card connection. The next major element is the sim card. This is the key to entering the mobile network. To work with the module, you need SIM cards with a supply voltage of 3 or 1.8 volts (the old five volt sims will not work). General wiring diagram below.

IV. INPUT DESIGN

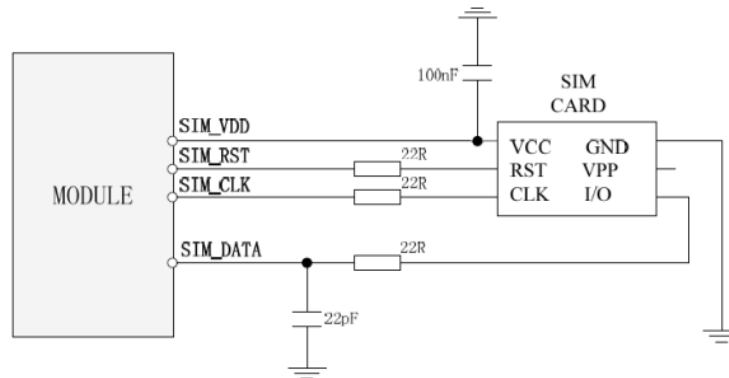


Fig.5.Simma connection SIM-card

It is connected to the terminals SIM_x (conclusions 6-9). In order for the supply voltage to appear at the SIM_VDD pin, it is necessary to press the KBR0 pin (pin 10) to the ground.

V. OUTPUT DESIGN

Real time clock.The module has its own RTC, capable of maintaining time even in the absence of the main power supply. For this, a backup power source must be connected to the VRTC pin (pin 15), for example, a 3-volt CR2032 battery or ionistr. In the case of connecting a non-chargeable source (as a simple battery), it is necessary to use a Schottky diode to limit the reverse current. Below are two diagrams on the left; right - batteries.

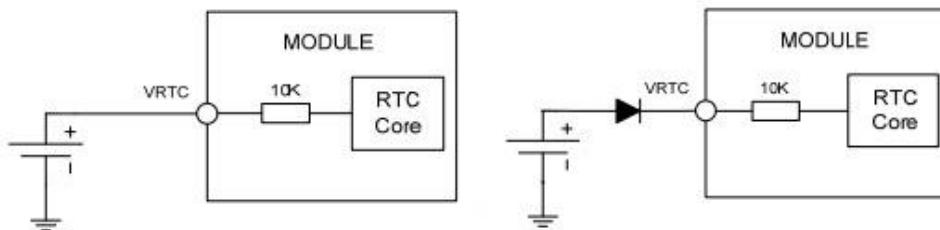


Fig.6. Real time clock circuit

Indication (alarm).To indicate its own state in the process of work, the module has several conclusions for connecting LEDs. The first one is the NETLIGHT output (output 41). When this module is running, a meander appears on the pin, with a frequency depending on the state of connection to the cellular network: during search and registration, a high level appears on this pin with a period of 800ms, after registering the network - with a period of 3 seconds. The LED can be connected to this pin only via a transistor switch:

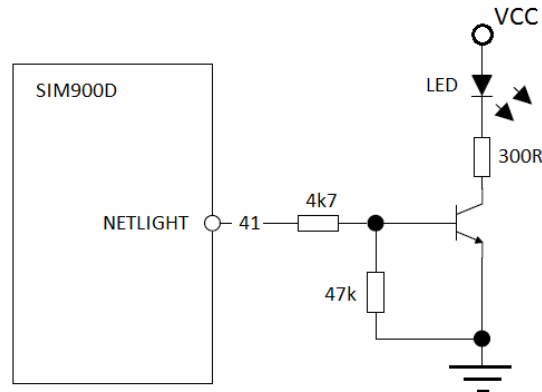


Fig.7. Connect the LED through (NPN) transistor switch

To indicate the operation of the module, there is one more conclusion - STATUS (5 output). A high level appears on it when the module is in operation. The LED to this foot is connected as well as to the output NETLIGHT (through NPN transistor).

Run the module. The module starts with a negative pulse length of at least 1 second. on the leg PWRKEY (pin 12). For the pulse is recommended to use the following scheme:

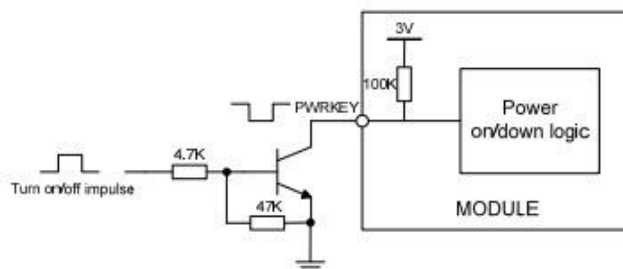


Fig.8. Run with a negative impulse

VI. RESULTS

To open the transistor, you can use the button or pulse from the microcontroller. If you again give impetus to this leg, the module will turn off.

PWM and ADC and other ports I / O. In addition to the basic functions, the module is able to generate a PWM signal by command in the range of 200-5000 Hz with a resolution of 10 bits. The output for PWM is at the foot of the PWM (47 pin).

Another useful feature of the module is an integrated 10-bit ADC capable of measuring voltages up to 2.8 V with a sampling frequency of 200 kHz. The input for the converter is located at pin 29 - ADC0.

VII. CONCLUSION

The remaining conclusions are of less interest. For example, pins 13,14,16 are the line for connecting the display via the SPI interface, but the standard firmware of the module does not allow using this function.

For flashing the module, the pins DBG_RXD (1) and DBG_TXD (2) are used.

And now the most important and interesting - MANAGEMENT. The module is controlled via a standard UART, using AT commands. Here I will not describe them, this is the topic of a separate article, I will say only that the module can operate at speeds from 1200 to 115200 baud. When enabled, the auto-speed setting mode is set from 1200 to 57600, 8 data bits, no parity, and 1 stop bit. To synchronize, you must wait a few seconds after switching on and send the "AT" command.



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