Making your automation dreams a reality...

Software&Hardware Development

Software Development

Networking

Hardware Development

Automation Systems

BJR LABORATORIES
RESEARCH & DEVELOPMENT

Audio

Wireless Communication

Making your automation dreams a reality…

INTRODUCTION

BJR Labs, Inc. of Bulgaria is a full-service design and professional services firm specializing in project development, process engineering, and facility design for the Industrial Process and Manufacturing industries.

Our services include consulting and front-end project planning and development as well as detail design in all disciplines.

PROCESS AUTOMATION

Automation Engineers are experienced with many hardware and software platforms. We are also familiar with the latest developments in instrumentation and process control. Process and Equipment Automation and control services include:

- Functional Specification Development
- Hardware/Software Specification and Procurement
- Detail Design
- Application Software Development
- Application Hardware Development / Prototyping
- Manufacturing Software Integration
- Network Integration
- System Checkout and Start-up
- Control System Upgrades
- System Support Services

PROJECTS

We have many completed R&D projects for different companies; some of them are:

Aerospace purpose:
- Secondary Surveillance Radar - SSR (developed for "**Space Research Institute – Bulgarian Academy of Sciences**")

Industrial electronics:
- Intelligent temperature sensors

Medical Electronics
- Reaction test and diagnostic equipment for the bus drivers (for the bus driving license)

Measurement, control & Automation:
- Security control system for the SIMEX LTD (developed for "**BTC – Bulgarian Telecommunication Company**")

Communication:
- Equipment for intercommunication in an emergency (developed for "**Agency For Civil Protection**")
- Radio-modem designs for custom remote control applications

Audio/Video systems
- DVB cable and terrestrial receivers design
- Analogue VU meters
- Audio amplifiers and Pre-amplifiers
- Loudspeaker systems design

TECHNOLOGIES

Our knowledge covers wide range of systems. Some of familiar technologies are:

Electronics:
- PCB & Schematic design
- Prototyping
- Analogue electronics design
- Digital electronics design

Embedded systems:
- Some familiar buses used in the design: I^2C, SSP, SPI, UART
- Some sensor types: industrial temperature sensors, industrial humidity sensors, pressure sensors, level sensors, presence sensors, magnetic sensors, optical sensors
- Some familiar technologies: 1Wire, iButton
- ADC/DAC modules for measurement of analogue parameter of processes
- Familiar with DSP processing (Digital Signal Processing)
- Monitoring via LCD/LED/VFD displays
- Some familiar microcontrollers: Microchip PIC based; Philips LPC210x; Motorola/Freescale; Dallas/Maxim; BECK IPC, etc.

Communication & Navigation technologies familiar with:
- WiFi, 802.11a/b/g; ZigBee, Bluetooth
- Omni & Bi-Directional antennas design for 1GHz-10GHz
- Custom wireless data transmission modules based on ASK/FSK/PSK working on ISM license free radio bands
- M2M/GSM/GPRS modules
- GPS modules
- RFID readers for security systems

Automation technologies:
- SOAP
- Embedded Ethernet applications

Our current interests are focused to foreign projects for specific/custom system research end development for the automation, control and measurement applications by user specifications.

PLANING

The whole process of planning follows five urgent stages:
- Functionality
- System Specification
- System Design
- Research & Development
- Integration & Support

Functionality covers the required specification for the existent or new system. If describes what the system do and specify all of the action of the system parts (functionality of the process to be automated).

System Specification describes the parameters of the actions. It specifies the required standards to be done, parameters of the sensors and the quantity and the sensor type for every action in the automated process.

System Design stage covers the designing process that includes hardware prototyping, programming of the software part of the embedded modules, calculation and valuing the parameters of the parts in the system, etc.

Research & Development stage covers the investigation of functionality of specific actions, process parameters and new technologies implementation.

Integration & Support is the final stage after that the system functionality is automated. Integration includes development and test of

the prototype, test of the actions that were part of system automation. Support covers the integration of additional functionality by the user requirements. It covers the system renewal to the newest technologies, including new sensors support, etc.

TEAM EXPERIENCE

We are small team of software, hardware and embedded engineers with great experience in developing of custom hardware systems/solutions for automation and control. Currently many of our engineers are taking their Ph.D. education to increase their knowledge on IT. Some brief profiles of our stuff are placed down:

Boris Ribov received his technical qualifications from Technical School of Plovdiv in 1995 at department of Industrial Electronics. He received his BSEE & MSEE from Technical University of Plovdiv in 2002, where he studied computer sciences. He has worked as embedded & application engineer and RF designer for many Bulgarian companies for over 10 years. Currently he is a Ph.D. student in Space Research Institute at Bulgarian Academy of Sciences and his research is directed to contemporary spread spectrum methods used in wireless radio communications.

Nikolay Kakanakov received his BSEE from Technical University of Plovdiv in 2003, where he studied Computer science. He received his MSEE from Technical University Sofia – branch Plovdiv in 2004. Currently he is a doctoral student in Technical University Plovdiv, Dept. Computer Systems and Technologies and his research is directed to Computer Networks, Embedded systems and Distributed Systems. He is also a member of Union of Automatics and Informatics and a student member of IEEE for 2006.

Ivaylo Mashev received his technical qualifications from Technical School of Plovdiv in 2000 at department of Microprocessors Electronics. Currently he is taking his BSEE at Technical University of Plovdiv, where he is studying Electronics. He has worked as Software design assistant and PCB designer. Also he is well grounded in PCB manufacturing.

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High-speed narrow band radio modem

- ISM band at: 433,92MHz
- Very high sensitivity of: -107dBm
- Output power: +17 to +20dbm
- Transparent modem principle

Reference oscillator design for SSR radar

This was a test bench and prototype for a reference oscillator designed for use in the extractor within the secondary surveillance radar. This oscillator was the main reference generator for the sample and hold circuit; so the oscillator must be very
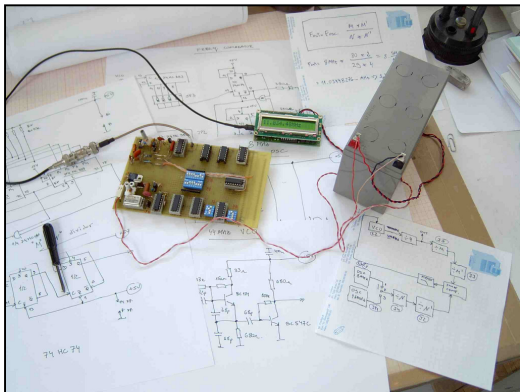
stable and sample frequency must be constant, sharply corresponding to the following requirements: the period of the signal must be equal to 1/16 of 1,45uS and the duty cycle must be 50%. This is infinite fraction, so the corresponding frequency is around 11,03448276...MHz. The task was to design stable generator with corresponding prescalers for this frequency synthesis, to use it in the military equipment.

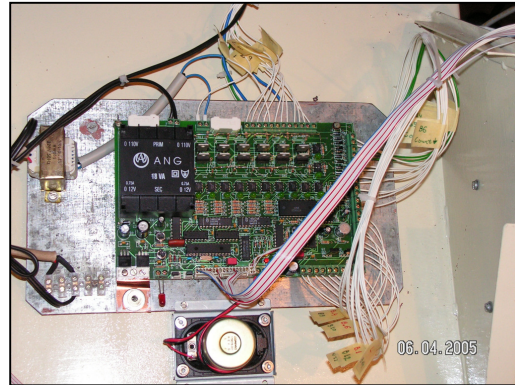## Monitor sound screens for studio use

- Flat frequency range from 55Hz to 34khz
- Max output power: 35W RMS
- Sensitivity: 89dB
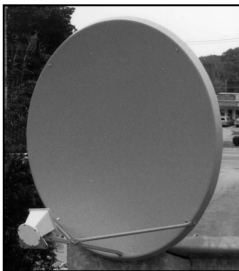- Frequency response (+/- 3dB): 42Hz-38kHz

Some developed prototypes:

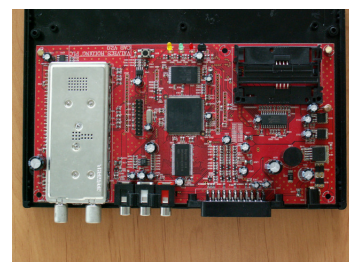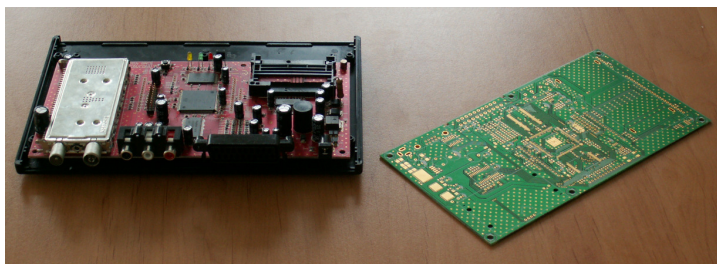## Reaction test and diagnostic equipment for the bus drivers

Wireless Omni & Bi-directional antennas for the 2.4GHz ISM band

- Frequency band: ISM 2.4GHz
- Omni-directional gain: 9dbi
- Offset antenna Gain: 20-28dbi (depends on diameter)

DVB set-top-box design

- Full complain with DVB-C specification
- Single chip (system on chip) design
- Low-cost, high performance solution