

Embedded Solutions

Projects

Our domain expertise and vast experience in designing and developing mission critical embedded systems have helped us execute several multidimensional and complex embedded projects. The projects currently under execution cover different phases of the development lifecycle for a diverse range of geographically dispersed clients.

These projects pursue a strict quality system keeping in mind international standards. We have successfully executed projects for clients in USA, Ireland, UK, Germany, Japan, Australia and India in the following areas:

- A) Embedded Programming
- B) Embedded System Design
- C) Complete System Design
- D) Hardware
- E) Consulting

A) Embedded Programming

| Project | Software Platform | Project Description | Project Size (Man-Months) |
|--|-------------------------|---|---------------------------|
| GPS receiver software with Kalman filter | C | Software for receiving raw code from the GPS satellite constellation and converting them, using mathematical algorithms to 'position' and 'velocity' data. It implements the recursive Kalman Filter for noise reduction. | 24 |
| Email client for mobile platforms | C and TclTk under Linux | Software prototype for complete email client including GUI (in TclTk) and email functionality (in C). | 8 |

B) Embedded System Design - Firmware + Hardware

| Project | Target Processor | Software Platform | Project Description | Project Size (Man-Months) |
|--|---------------------------------|-------------------|--|---------------------------|
| Point-to-Point audio communication system with digital switching | 8751 microcontroller | Assembly | System includes a Central Control Unit and 100 slave stations in communication using a proprietary protocol and switching voice calls between the 100 stations. | 24 |
| Email add-on to payphone | PC, Atmel 89C52 microcontroller | C | <p>Special skills utilized: Developed protocols for PPP, POP3 and SMTP</p> <p>Add-on including hardware and software to add email functionality to an existing voice payphone.</p> | 16 |
| Clock and annunciator for refrigerator | Atmel 89C52 microcontroller | C | Real-time clock, temperature indicator, door-open alarm and compressor status indicator on a single add-on module to a refrigerator. | 4 |
| Fuzzy logic washing machine controller | Philips 89C58 microcontroller | C, Assembly | Control card with user interface, machine interface and fuzzy logic for a washing machine | 18 |
| Fully-automatic washing machine controller | PIC 16C77 | C, Assembly | Control card with user interface and machine interface for a washing machine | 14 |
| Fixed cellular terminal (FCT) | Atmel 89C52 | C, VB | <p>Special skills utilized: GSM module</p> <p>This unit is to be installed between EPABX systems and the PSTN / GSM networks. It intelligently diverts out-going calls onto PSTN or GSM networks to minimize the cost of the call. A host of on-site programming and call management features are included.</p> | 16 |
| CO2 insufflator | Philips 89C668 | C, Assembly | This is a CO2 (carbon dioxide) insufflator to be used | 24 |

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| | | | during abdominal operations. It controls the pressure and flow of the carbon dioxide to the patient. Functionality for operating using air instead of CO2 is also provided. | |
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C) Complete System Design- PC Software + Firmware + Hardware

| Project | Target Processor | Software Platform | Project Description | Project Size (Man-Months) |
|--|--|-------------------|--|---------------------------|
| Flash duplicator | RAM PC, Atmel 89C52 microcontroller | VC++, Assembly | System for interactively erasing, copying and verifying sectors from a Master Flash RAM to a Slave Flash RAM. | 8 |
| Automated equipment payphone | test for PC, 8031 microcontroller | VC++, C | Program running on PC communicates using RS232, with program running on 8031 inside the payphone, making the 8031 conduct internal tests on the payphone and submit results back to the PC. This allows automated testing and fault-diagnosis of the payphone in manufacturing / servicing. | 12 |
| Vehicle tracking system using GPS receiver and SMS | Philips 89C668 | C, VB, MS Access | <p>Special skills utilized: GPS interface, GSM and SMS protocols</p> <p>The system consists of:</p> <ul style="list-style-type: none"> • A Mobile Unit to be fitted on the vehicle • A Receiver station at the Control Center • Maps and GIS software at the Control Center <p>The mobile unit has as its front end a GPS engine board with an antenna. The microprocessor collects information from the GPS, processes it and transmits it to a central call center using</p> | 36 |

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| | | | <p>SMS technology on the GSM network.</p> <p>The receiver station at the control center receives messages coming from the fleet, processes them and stores them in a central database.</p> <p>This information is processed and the vehicles are shown as icons on a digitized map of the region.</p> <p>Many useful MIS and reporting features are included.</p> | |
| USB hardware lock | Microchip PIC16C745 | C, VB | <p>Special skills utilized: Low-level USB interface</p> <p>This hardware lock is a USB device that will be periodically monitored by the user's application software through an API that we have provided.</p> | 10 |
| Automatic calibration system for pressure transducers | Microchip | C, VB, MS Access | <p>Special Skills Utilized: CAN Bus, GPIB Bus</p> <p>This is an on-line calibration system for Pressure Transducers. It allows the user to simultaneously calibrate 50 transducers for Null Pressure and Full Scale Pressure.</p> <p>The system comprises:</p> <ul style="list-style-type: none"> • A software running on a PC • An interface hardware • A GPIB-based voltage measuring meter <p>The transducers are commanded by software</p> | 36 |

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| | | | <p>running on a PC through the micro-controller based interface hardware. This communication uses a CAN Bus. The analog outputs from the transducers are collected using a GPIB-voltmeter through a scanner into a serial port for processing.</p> <p>This system has been designed for transducer output voltage sensitivities of 1 mV.</p> | |
| Bluetooth Network Access Point | Samsung ARM S3C4510B01-QERO | C, RTOS from US Software | <p>Special skills utilized: Bluetooth protocols</p> <p>Initial study for writing a Bluetooth stack and all relevant protocols on an ARM-based hardware to create a Bluetooth Network Access Point. This is to allow connecting a Bluetooth piconet to an Ethernet LAN.</p> | 12 |
| Multi-loop, network-able fire panel system | Philips ARM LPC2294 | C, VB, MS Access | <p>This is a complete fire panel system.</p> <p>It comprises :</p> <ul style="list-style-type: none"> • A multi-loop, network-able, fire panel for driving and communicating with detectors on loops • A PC-based software with GUI for configuring and monitoring panel functioning | 48 |
| Access control system | Philips 89C668 | C, VB, Assembly | <p>This is a remote programming and monitoring Access Control System.</p> <p>It consists of:</p> <ol style="list-style-type: none"> 1. Hardware modules at access points 2. A Receiver module at | 12 |

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| | | | <p>central control center</p> <p>3. Software for programming and monitoring access point modules</p> <p>The software allows each Access Point to be programmed for 'authorized' and 'unauthorized' access times. When any access point is activated (e.g. door opened), it checks whether the access is unauthorized and sounds a local alarm if it is. It also sends a message to the control center using SMS. The control center keeps a detailed log of all interactions with the access points.</p> | |
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D) Hardware

| Project | Project Description | Project Size (Man-Months) |
|---|---|---------------------------|
| High-frequency AC output power supply for halogen lamps | A special power supply designed for accepting mains voltage and powering a 24 V, 250 W halogen lamp. This system has a constant RMS output voltage at 34 Khz. Dimming controls are available to the user. | 10 |

E) Consulting

BioAnalytical Technologies™ experience in designing and developing embedded systems/ platforms can be also be availed of for consulting services.

| Project | Project Description | Project Size (Man-Months) |
|---------|---------------------|---------------------------|
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| Turnkey consultancy for electronic sub-systems | Turnkey consultancy contract to a leading manufacturer of Air-conditioning Equipment for the home, commercial and industrial segments. The scope of work included: <ul style="list-style-type: none"> • Writing a Standard for Electronic sub-assemblies • Designing Acceptance Test Procedures • Vendor Approvals • Product Evaluations & Upgradations • Service Training | 20 |
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Applications

We have executed and delivered embedded design solutions to customers in the Telecommunications, Automotive, Medical Devices, Consumer Durables, and Industrial Automation and Controls verticals. Our design solutions are flexible, highly efficient in terms of time and cost, and designed keeping in mind our clients current and future needs. Our solutions involve rapid prototyping and extreme optimization within hardware constraints.

Our expertise spans building embedded applications over a wide range of platforms including real-time operating systems (RTOS), writing bus/ connectivity drivers (USB, CAN, GPIB, MODBUS, etc.), firmware development, development of middleware software components and implementation of protocol stacks (TCP/ IP, Bluetooth, custom designed proprietary protocols, etc). Our software development services for the development of new products and reengineering existing ones has involved working on Renesa, ST, ARM, etc based processors and micro controllers.

We offer a wide range of value-added embedded services and solutions. With an experience of over a decade in embedded designing and development, we have significant competencies in the following application areas:

☞ GPS Tracking

- Vehicle tracking solution

☞ Core System Design

- Embedded software for GPS receiver

☞ Communication

- Email client software for mobile platforms
- Email client add-on for payphone
- Audio communication system with digital switching
- Fixed Cellular Terminal

☞ Automated Test Equipment

- Automated test equipment for payphone
- Automatic calibration equipment for pressure transducer

☞ Consumer Durables

- Controllers for washing machines
- Displays for refrigerators

☞ Lighting

- High frequency power supply for halogen lamps

☞ Bluetooth

- Bluetooth Network Access Point (NAP)

☞ Medical Electronics

- CO2 Insufflator

☞ Pc Peripherals

- Flash RAM duplicator
- USB hardware lock

☞ Air-Conditioning Controllers

- Electronic controllers for room and commercial air conditioners
- Refrigerant leakage detector

☞ Remote Measurements and monitoring

- Remote mains transformer monitor