

**Projects in  
Healthcare & Biotech Instruments Domain**

BY

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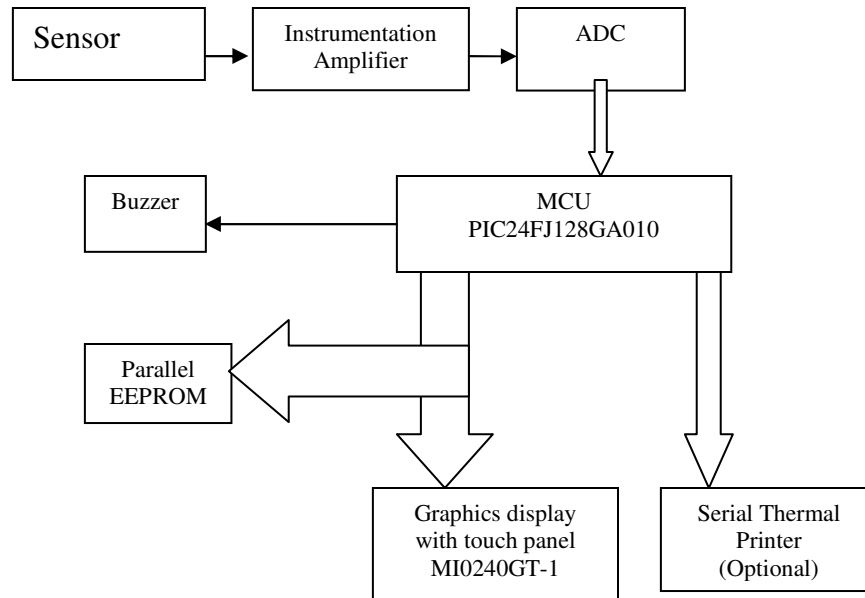
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## DEVELOPMENT OF GLUCOMETER

This project involved development of a Glucometer including its controller board. A proprietary sensor was used which provided analog output. PIC 24 series processor was used to take this input and show calibrated results on 2.8" graphics LCD having a resolution of 320 x 240 pixels and also touch panel was used to take user's inputs.

### Block Diagram



Following Peripherals were used as resources

- Debugger and Programming Interface.
- Analog Input – Two Nos for sensor.
- Analog Output – One No for generating ref. voltage for sensor
- Discrete Outputs – Four Nos for status LEDs
- Parallel EEPROM for storing graphics image data.
- Interface for LCD controller
- Interface for Touch panel
- Serial interface for Thermal printer

### Project Scope

Our involvement in this project was from very initial conceptualization stage and identifying and selecting necessary components for preamplifier and processor circuitry. Entire hardware and firmware was developed for volume manufacturing. Sensors required time critical performance aspects to be supported by firmware. Usability aspects were also well covered and graphics designers were deployed to have excellent user experience. All design documents were generated so as to have easy production batches from contract manufacturers. Necessary test jigs and fixtures were also developed. Suitable housing for Glucometer was obtained and complete product prototype was delivered.

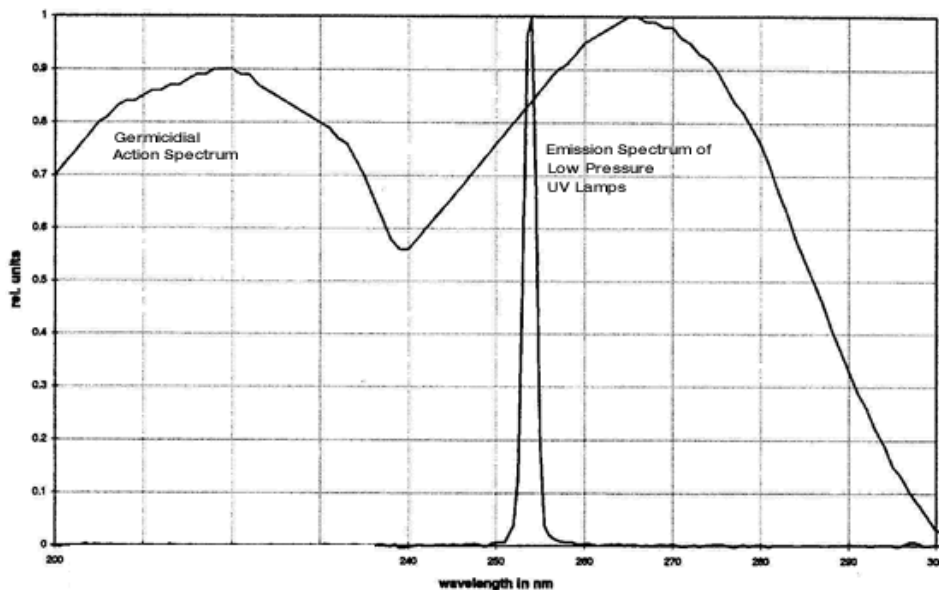
## ULTRA VIOLET DISINFECTANT KEY BOARD/MOUSE

### Background

Increased pollution of the environment by inorganic and organic substances has led to UV disinfection gaining increased acceptance and use for treatment of surfaces across a wide spectrum of applications.

The process is simple, reliable and economical and is employed either as a stand alone solution or in combination with other methods such as filters, Ozone and chemicals.

UV treatment initiates a photochemical reaction which effectively damages the DNA molecule to such an extent that cell division, and thus multiplication, can no longer occur. The relative effectiveness of UV light wavelengths for this process is known as the germicidal action spectrum which peaks at a maximum wavelength of 265nm and is illustrated in Figure 1.



There are a wide variety of micro-organisms (germs) which cause contamination and include bacteria, viruses, moulds, yeasts, algae and protozoan. All vary in their structure and sensitivity to UV-C irradiation. These can be destroyed by using a treatment of UV Light of various intensities.

### Objective of the Project

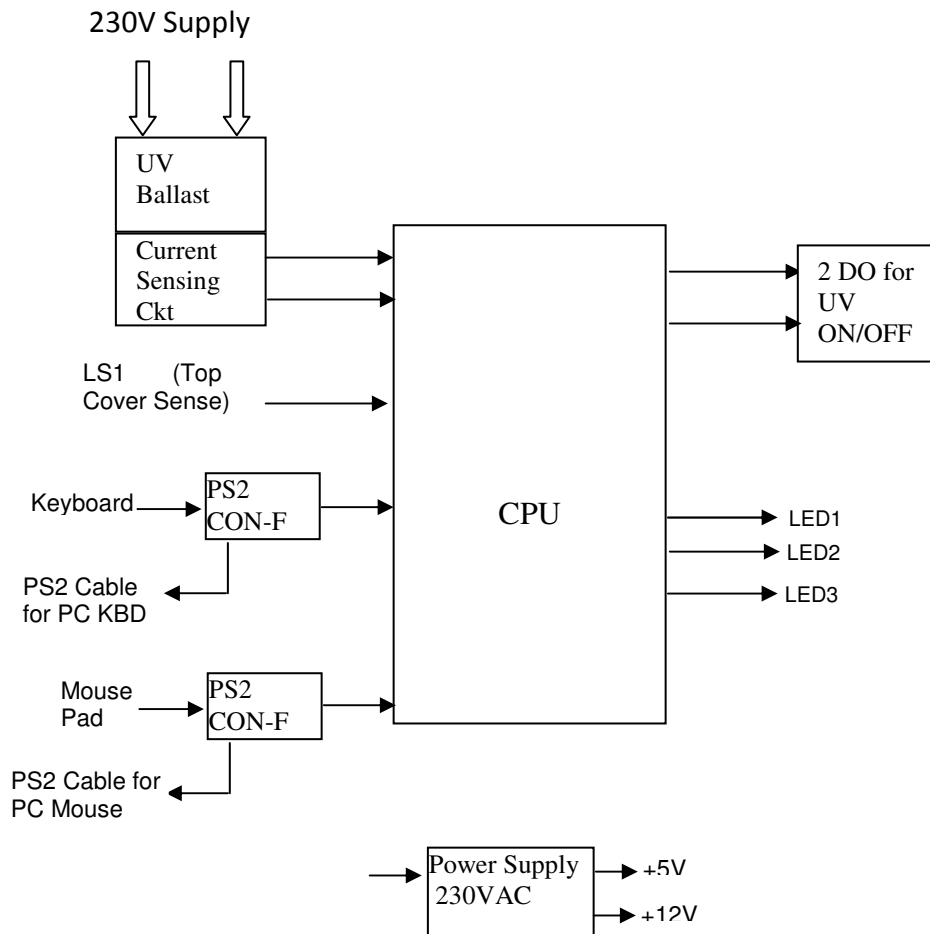
The intension of this project is to develop a UV Light Disinfection System for PC Keyboard / Mouse.

### Customer

UK Based hospital equipment supplier



**Block Diagram**



## **General Overview**

The system is attached to a Keyboard. The Touch Pad Mouse is integrated in to Keyboard Housing. The Keyboard and Mouse functionality as per standard PC Keyboard / Mouse is maintained. Both the devices work with all Operating Systems and all types of PC Motherboards. The Device has a USB Interface and no Software Drivers are required.

Whenever a person (generally a Doctor or nurse) using the Device, finishes the work with the Device, he/she will close the Top Cover on the Keyboard and the UV Tube is lit and the Disinfection starts. This will continue till 15 seconds. And after the Disinfection, the keyboard/mouse is ready for operation again. Also if the Device remains idle for more than 2 minutes, keyboard is locked and needs Disinfection. The Device consists of the UV Tube and the Ballast required for it. The Device can also sense proper functioning of the UV Tube.

The said product is targeted for use in Intensive Care Units to fight spread of bacteria like MRSA.

## **Challenges**

Engineering design, enclosure design, UV tube ballast & its control.

## FDA COMPLIANCE VERIFICATION FOR BLOOD ANALYZER

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The customer, a leading medical instrument company, produces point-of-care blood analyzers that provide clinicians with rapid blood-constituent measurements for both humans and animals. The analyzers are designed to be portable, require minimal training, and provide on-the-spot results, and offer built-in quality control and calibration.

Customer entrusted us with the assignment of creating all the software life cycle documents, considering the requirements specified by the Food and Drug Administration of the US Government. We studied the code, approximately 27000 LOC in 'C', and created requirement, design, V&V and traceability documents based on IEEE guidelines. We also carried out complete testing to confirm quality of the product.

### PROJECT SIZE

18 man-months

## **EMBEDDED GUI FOR GASTROINTESTINAL DISORDERS TREATMENT EQUIPMENT**

The customer develops innovative products for the treatment of gastrointestinal disorders. They have two products used for the treatment of Gastro esophageal Reflux Disease (GERD) and Fecal Incontinence. Both systems use Radio Frequency Thermal Ablation (RFTA) as a surgical method to create targeted tissue ablation resulting in tissue volume reduction.

The project involved development of GUI on a dedicated display processor. GUI application provides complete control on the functioning of the equipment to the user. It also acquires information such as temperature, power and other control parameters from RF generator and presents in the form of trends, charts and graphical animation. Patient records and data logs are also maintained.

### **TECHNOLOGY**

Windows CE, embedded C++ and embedded visual basic 3.0

### **PROJECT SIZE**

6.5 man-months

## **AUTOMATED TESTING OF A CATHETER NAVIGATION SYSTEM**

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The customer is the world's largest medical device company dedicated to less-invasive therapies. The project involved testing of equipment used for real-time position monitoring of catheters. The equipment determines in real-time, the 3D position of catheters within the heart. A 3D computer display provides a method for catheter navigation and documentation of mapping and therapy locations.

Objective of the project was to develop complete test strategy, test plans and automated test suites for functionality, performance and stress testing of the equipment. Entire testing is carried out using a command interface provided to operate the equipment from a remote location. The test suite provides complete flexibility of selection, configuration and pre-scheduled execution of test cases for a test run. Test results are recorded and reported in a format suitable for the company's standards compliance requirements.

### **TECHNOLOGY**

Test Stand from National Instruments, Visual Basic, VC++ and COM

### **PROJECT SIZE**

12 man-months

## **QUANSOFT (BIO-INFORMATICS SOFTWARE)**

The customer is the world's largest medical device company dedicated to less-invasive therapies. The project involved testing of equipment used for real-time position monitoring of catheters. The equipment determines in real-time, the 3D position of catheters within the heart. A 3D computer display provides

### OBJECTIVE

- To design & develop software which would work as a PC based user interface for Thermal Cycler Unit.
- To develop various modules of the software like Layout Editor, Program Editor, Experiment Editor, etc.
- To analyse results provided by the Thermal Cycler.
- To design & develop user friendly GUI.
- To develop database independent software.
- User should be able to send program, layout, experiment, results files created using the software by mail and open those files by just double clicking in respective editors.
- Software should be able to detect and update the instrument status on connection and disconnection of respective instrument.

### SOLUTION

Thermal Cycler is the instrument, mainly used in Bio-Informatics laboratories for research purpose. This instrument is having a Tray which consists of 96 test tubes in which you can place DNA samples. Program is created in a way that, instrument will heat or cool the samples at particular temperatures and readings of each DNA sample at the respective temperatures are taken and returned in the XML format.

With the help of the software you are able to create complex programs and experiments & download to the instrument on just one click. You can set; reset the analysis methods and properties with the help of self explanatory wizard. Software will detect the connected and disconnected state of the instruments and update the status accordingly. With the help of software, Program, Layout, Experiment and Result files are generated in XML format. User is able to change the Instrument settings very easily without knowing the internal details of the instrument. Software will show the details of the currently running program with the help of run module. If there is power failure or system shutdown, software is powerful enough to gather the lost readings of the instrument.

## FEATURES

- Powerful Graphical User Interface.
- Easy interaction with the instrument.
- Able to connect four Thermal Cyclers at a time to a PC through USB ports.
- Run experiments simultaneously on all four Thermal Cyclers.
- Ability to retrieve lost readings from the instrument in case of power failures or disconnection of instrument during experiment run.
- Ability to retrieve the experiment file from the results file.
- Wizard based analysis methods selection and assignment.
- Instant results calculation with graphical display on change of analysis method or property.

## PROJECT SIZE

60 man-months

## PCR ANALYSER SOFTWARE SYSTEM

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The customer is a scientist & a head of a US based Startup organization holding patents for rapid PCR technologies. The project involved development of software used for real-time temperature controlling & displaying status of PCR products. The software determines in real-time, the temperatures of the PCR product. Using Keithly-3108 PCI card, the software can control the PCR temperatures. This gives the facility of heating /cooling PCR temperatures through software. There was a requirement of reading the optical intensity through software. The software reads the optical intensity using Ocean Optics spectrometer. It shows all the outputs graphically.

Objective of the project was to develop complete software which suites for functionality & performance of the PCR technology. The software is so user friendly, that the end user can easily get adjusted with the framework. This software is a best test research tool for the PCR technology. All the results in this software are stored in the disk for the future use.

### TECHNOLOGY

S/W: Visual Basic, VC++ and COM

H/W: Keithly-3107 PCI card, Ocean Optics USB2000 Spectrometer

### PROJECT SIZE

6 man-months