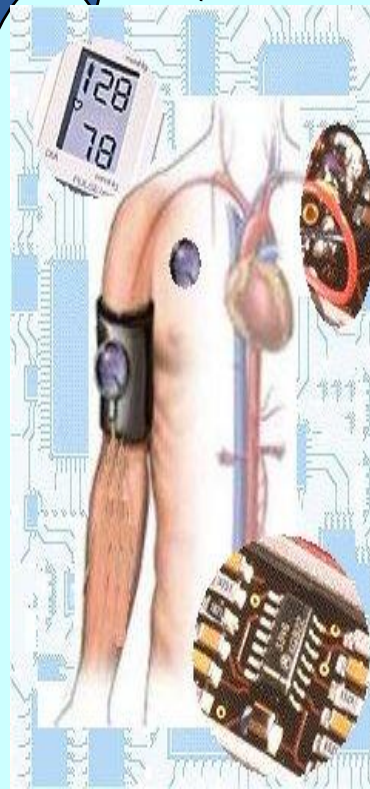




Graphical System Design for Biomedical Applications

Sanjeev Kubakaddi
itie Knowledge Solutions, Bangalore





itie Knowledge Solutions



- ❑ *itie* is a Software product development, Consultancy, and Technology Education Company started in 2006
- ❑ The *itie* team is grouped with number of experts from industry and academia, enabling us to deliver technology solutions in the areas of Embedded Technology, DSP, Bio-medical, Control engineering & automation to Automotive, Aerospace industries.

***i*bioSAQ**

Biomedical
Signal Acquisition
& Analysis
System

Center of Excellence
Modeling & Simulation



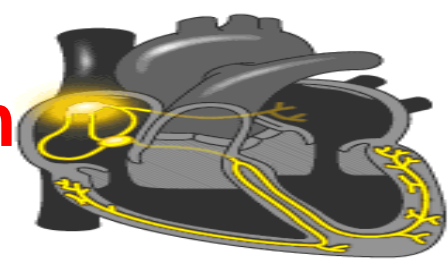
Working with....

- National Instruments
- KPIT Cummins
- General Motors India
- GE Global R&D, India
- Saffron Aerospace India
- Goodrich Aerospace India
- Vectormax (USA)
- ProSIM R&D
- Squarehoop (UK)
- IIT Delhi
- VIT Vellore
- PSG Tech, Coimbatore

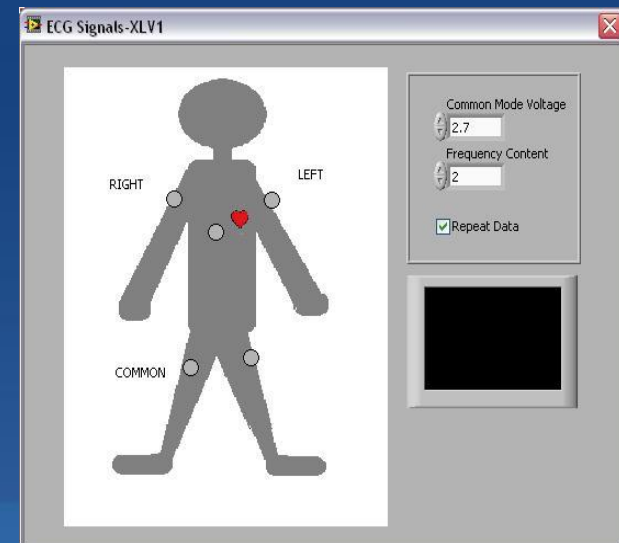
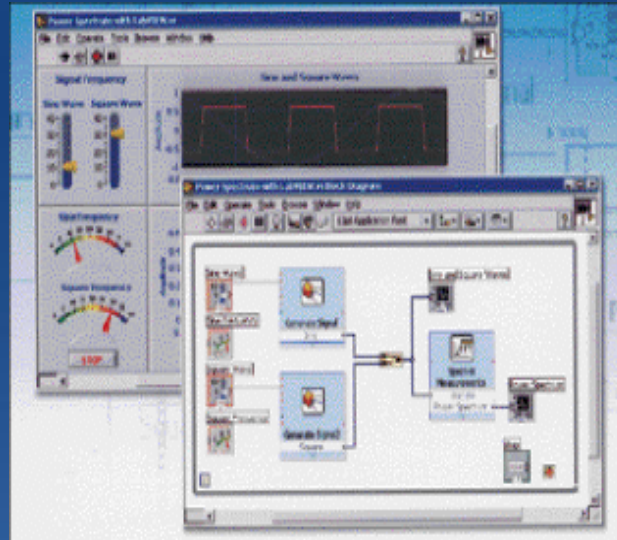
.....growing



Biomedical on NI platform

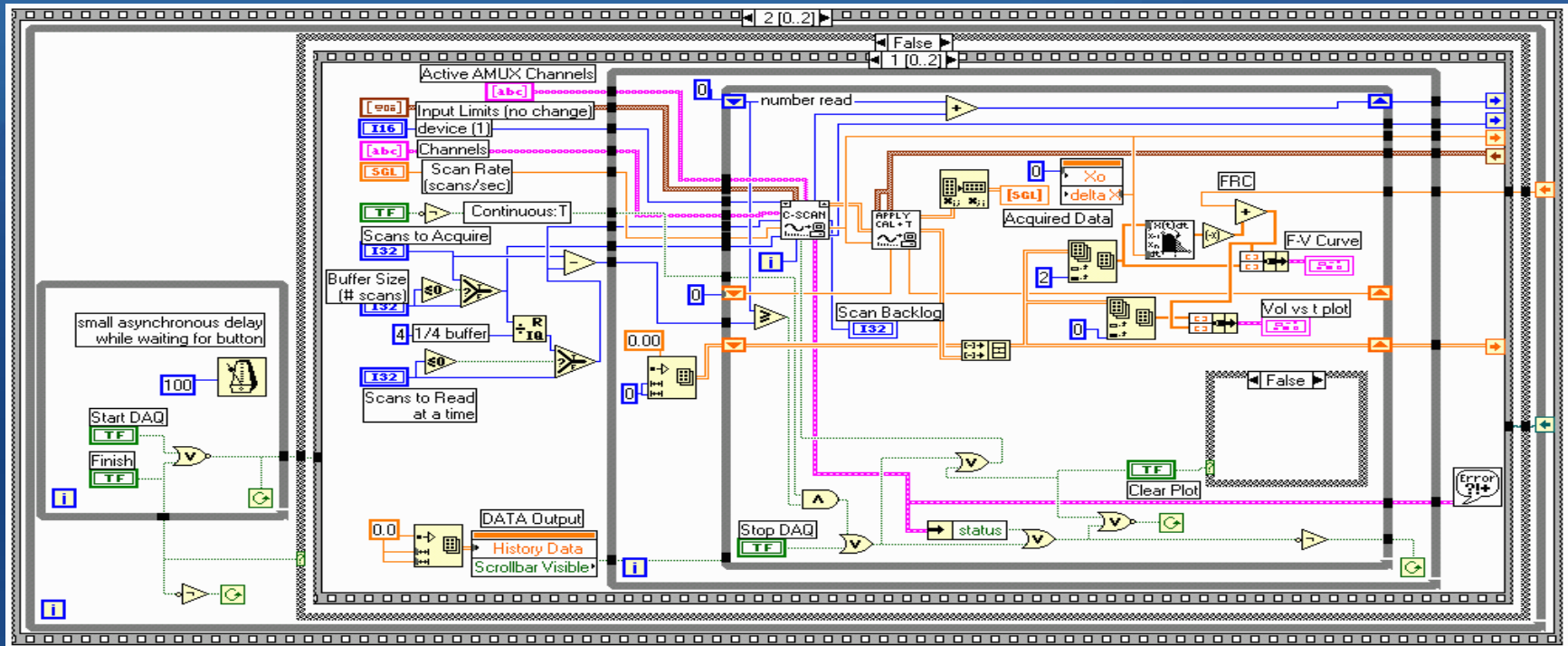


GET READY For THE
SCINTILLATING
EXPERIENCE!!!





Role of Virtual Instrumentation



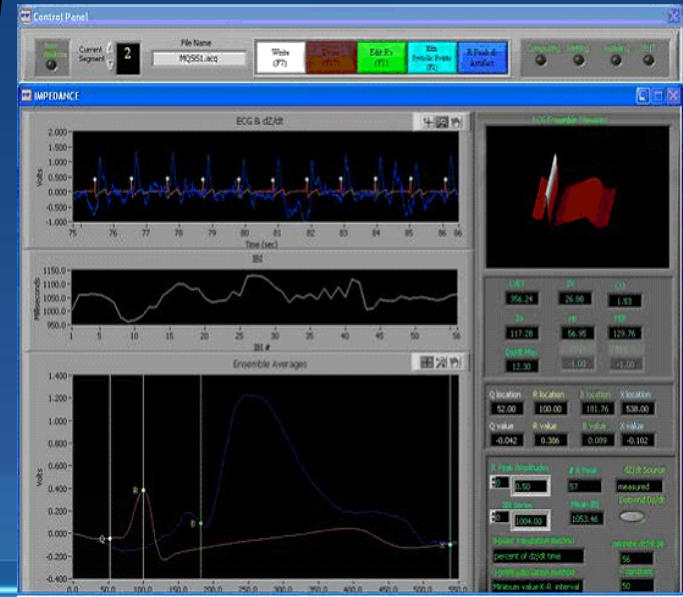
- User-friendly GUI for experiments and analysis
- Modular development scheme
- Flexibility/adaptability



Advantages using NI products



- Efficient and cost-effective way of acquiring and analyzing these signals.
- The advanced analysis techniques becoming invaluable to the practicing physician
- Diagnostic decision accurate.
- Lot of in build signal processing algorithms
- Filtering biomedical signals in different ways is a challenge that has to be solved.

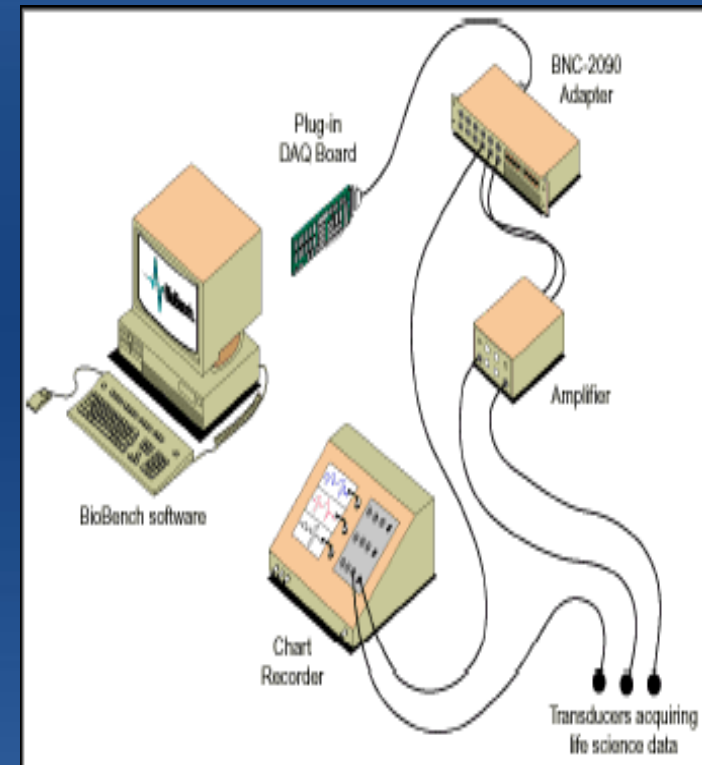
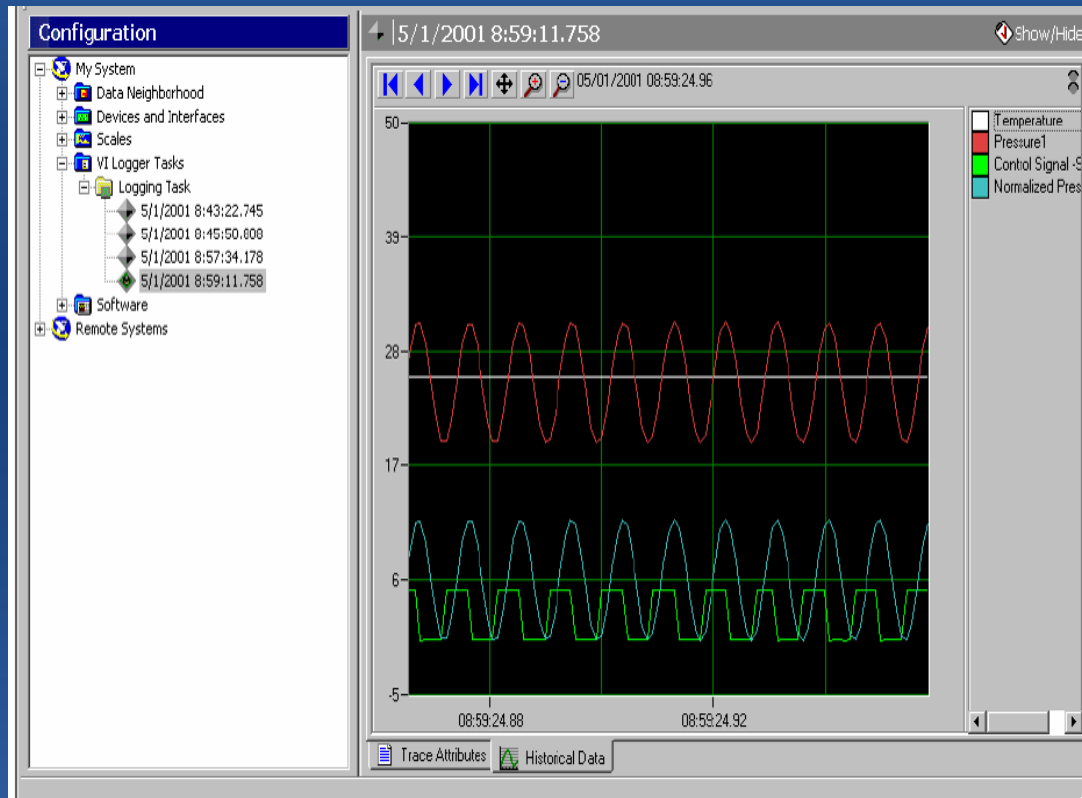




Introduction to DAQ

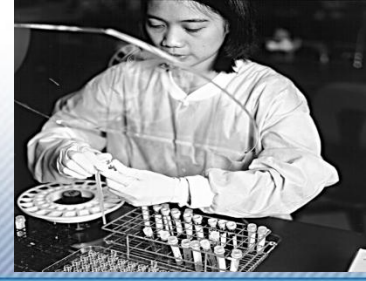


- Data Acquisition – “Sampling of the real world to generate data that can be analyzed and presented by a computer.”

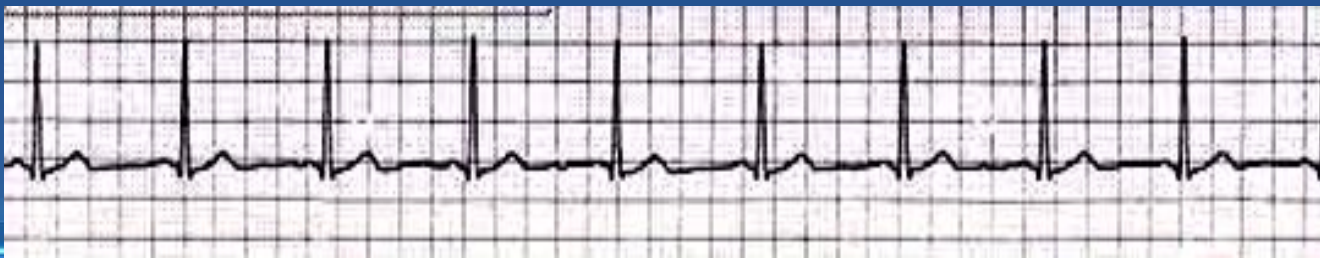
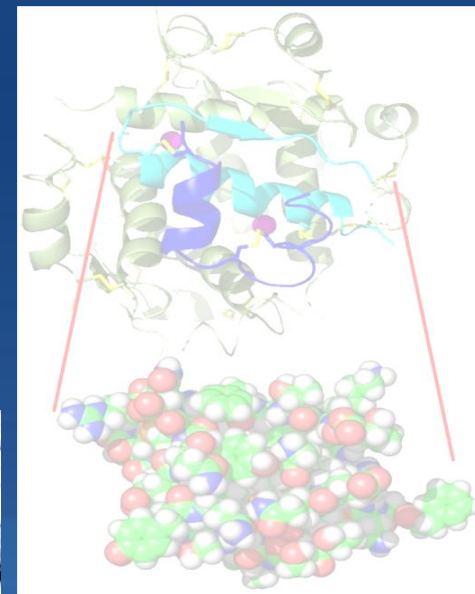
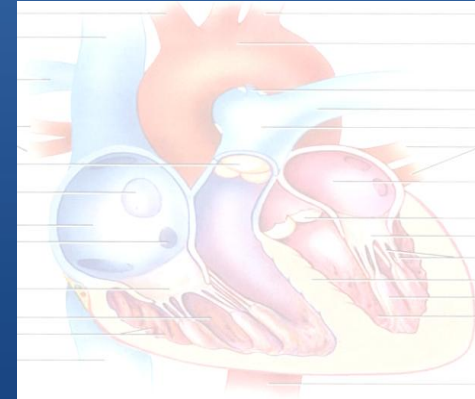
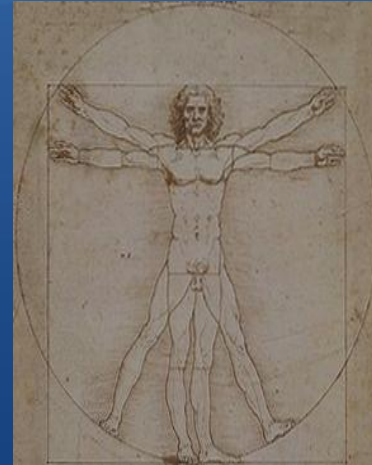




Biomedical Fields for DAQ

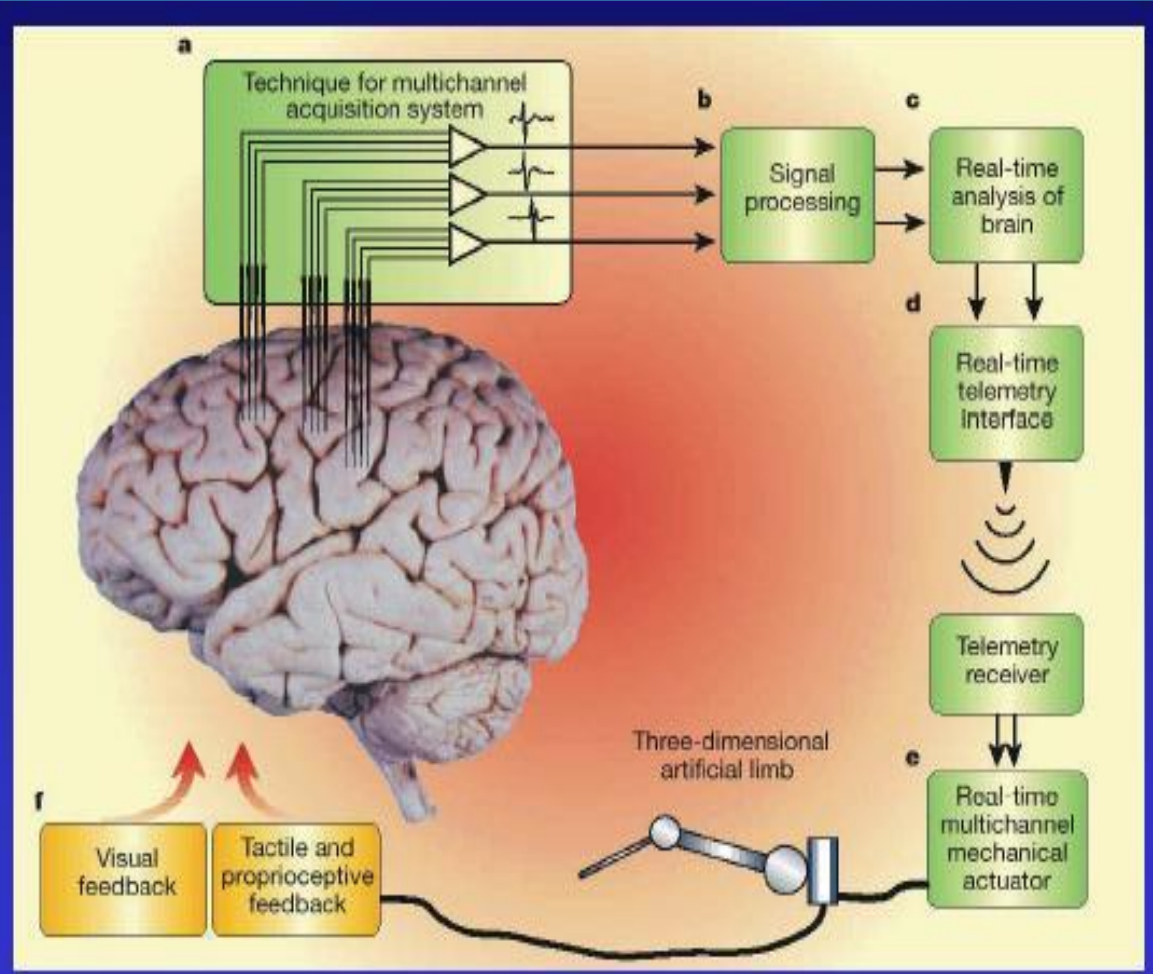


- Common mechanical stimuli
 - Pressures, flows, temperatures
- Biopotentials
 - ECG, EMG, ERG, EEG, ENG, etc
 - $\mu\text{V}/\text{mV}$ levels, > 20 kHz sample rate
- Imaging techniques
 - Echocardiogram, blood vessel contraction
 - Edge detection, microscopic imaging
- Clinical instrumentation
 - Acquisition from existing equipment (mostly serial)



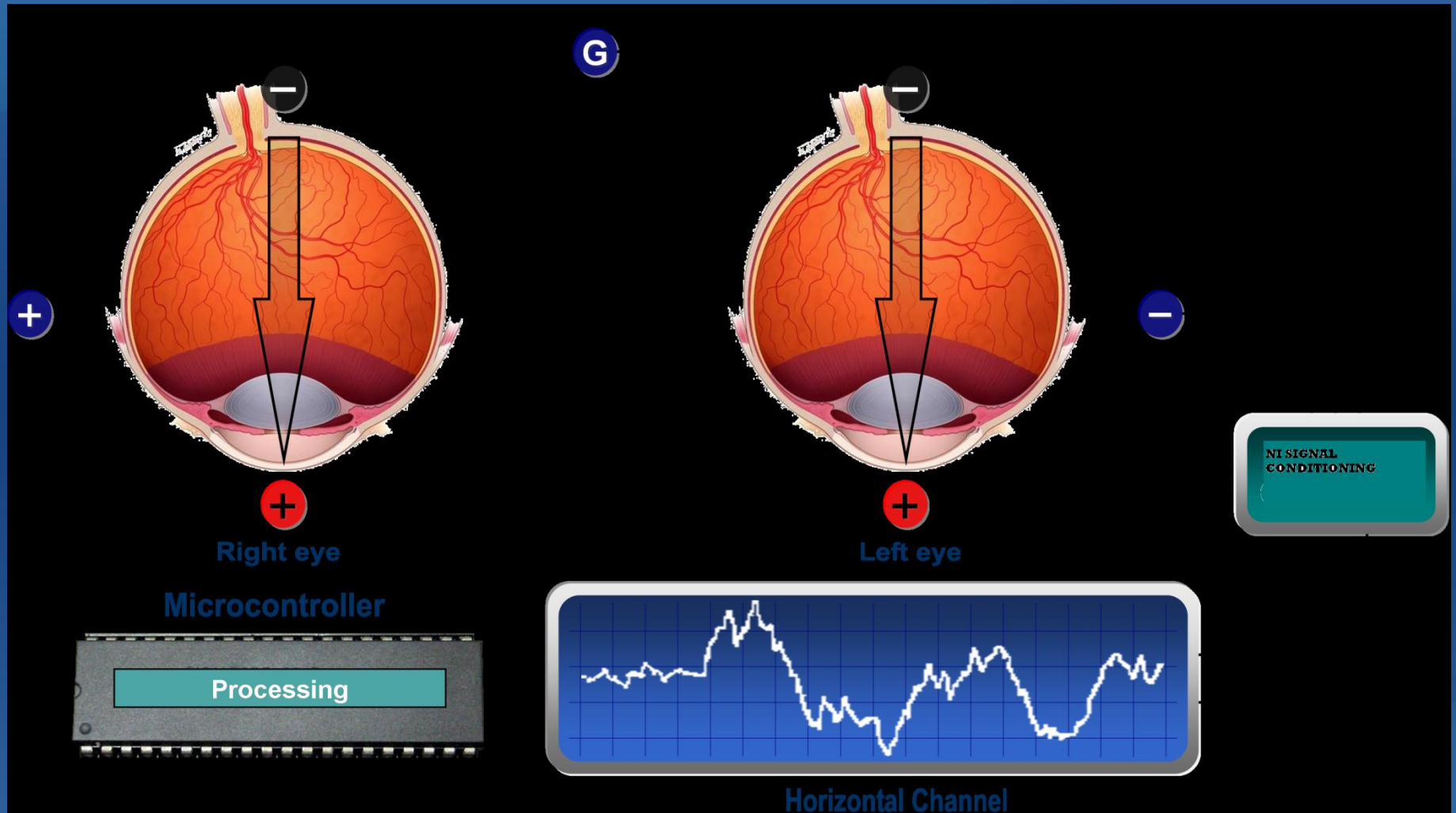
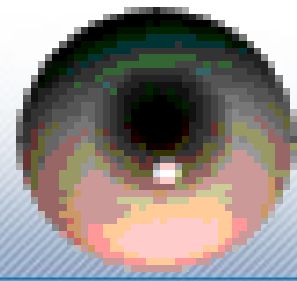


Brain-Computer interface using Electroencephalograph(EEG)





EOG Signal Analysis – Horizontal Eye Movement

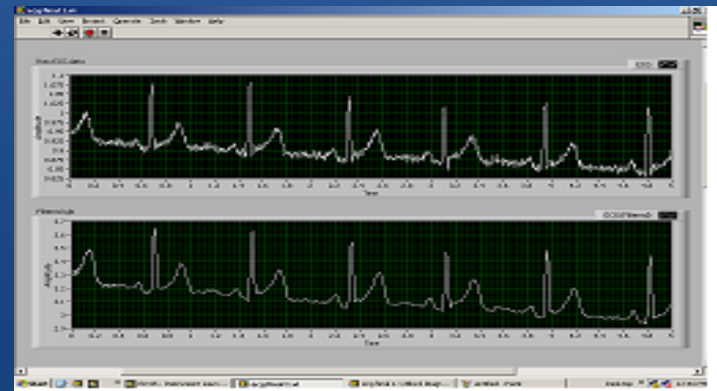




ibioSAQ

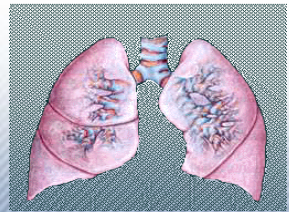
Biomedical
Signal Acquisition
& Analysis
System

**ibioSAQ - NI LabVIEW based ECG, EMG, EEG, EOG
signal acquisition & analysis product (works on NI ELVIS)**

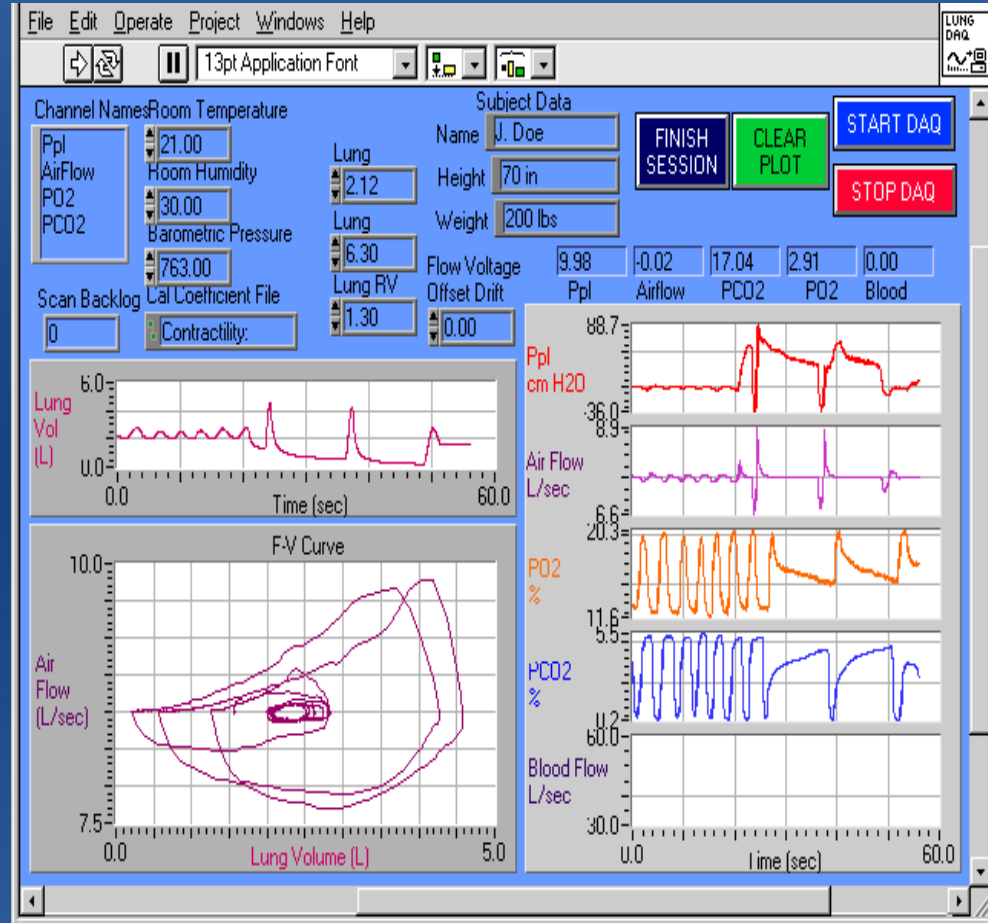




Pulmonary Data Acquisition (Others work)



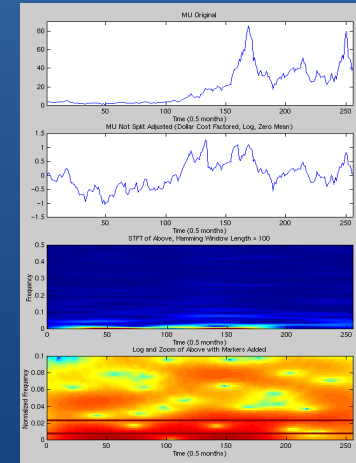
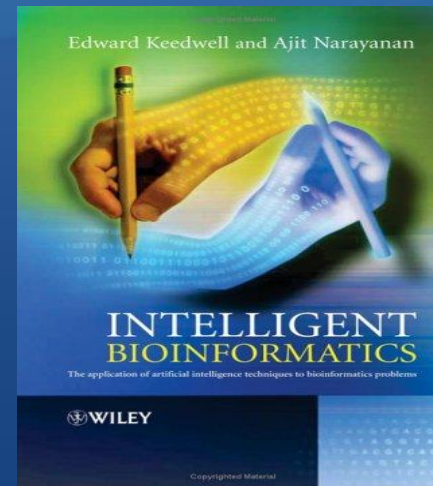
- Classical Pulmonary Function Testing



Further Applications

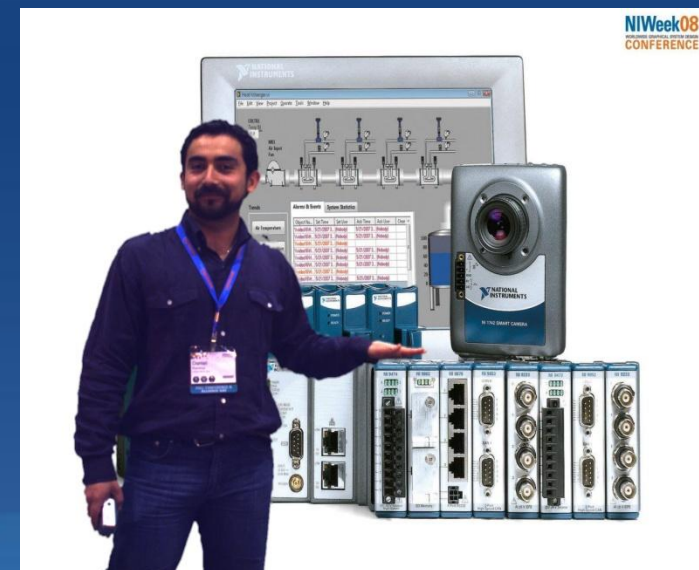


- **Artificial intelligence programming with LabVIEW: genetic algorithms for instrumentation control and optimization**
- **Comparison of STFT and wavelet transform methods in determining epileptic seizure activity in EEG signals for real-time application:**
- **Virtual instrumentation for human factors studies in surgery and anesthesia**
- **The Eye Tracker System – A System to Measure and Record Saccadic Eye Movements**



How are NI products being used in Biomedical field....

- Automating a Capillary Electrophoresis DNA Spectrometer with LabVIEW
- Lookout and FieldPoint Provide Around-the-Clock Monitoring of Biotech Experiment Storage Environments
- Celera Genomics Uses LabVIEW in Human Genome Sequencing
- Endothelial Evaluation of Corneal Transplants by Knowledge-Based Digital Image Processing
- Prototyping of a Digital Flow Cytometer the NI Way
- Development of a Virtual Instrument for Control and Data Acquisition of a Cardiovascular Pulse Duplicator System Using LabVIEW

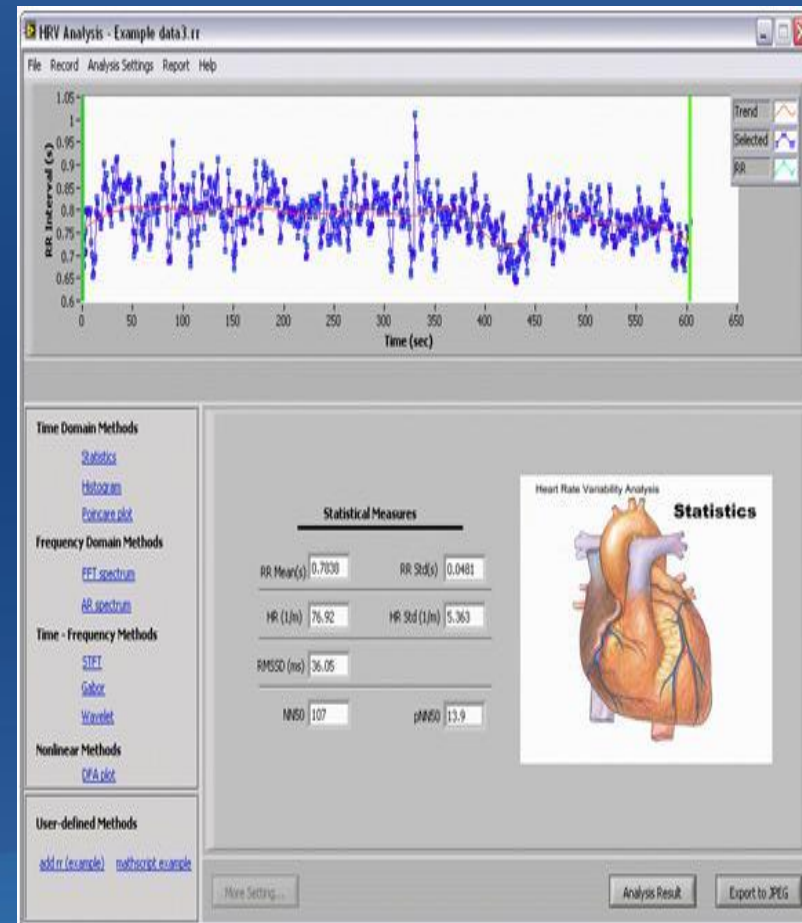
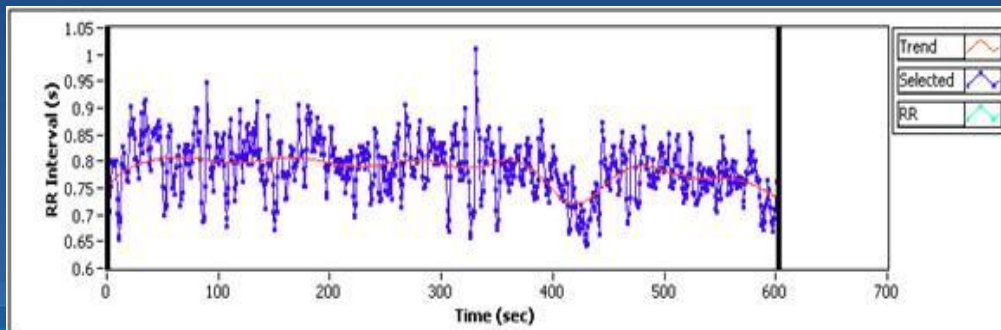
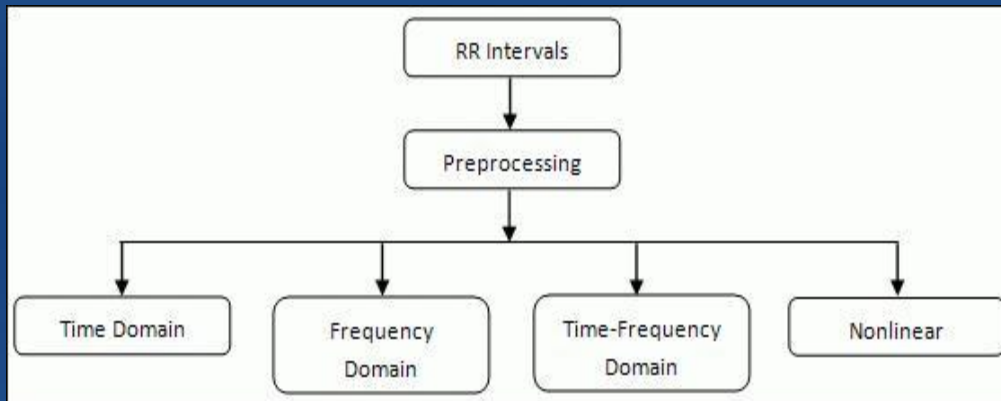
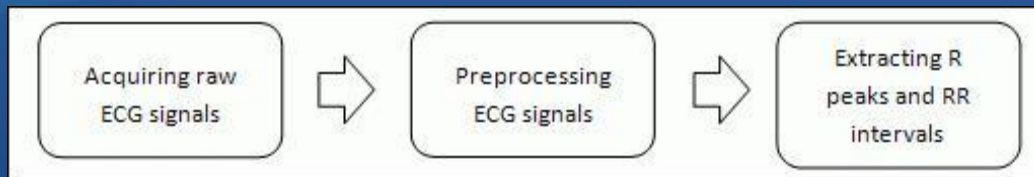




Using LabVIEW for Heart Rate Variability Analysis



- HRV analysis a quantitative marker of the **autonomic nervous system (ANS)**





Thank You

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www.itie.in