

PROJECT: ARRHYTHMIA AND SUDDEN DEATH SYNDROME DETECTION HYBRID NETWORK BASED TELEMEDICINE SYSTEM

It is our great pleasure to inform you that our high resolution, smart, net enabled ECG machine and associated tele-cardiac software with arrhythmia and sudden cardiac syndrome detection software are ready for serial production. The development of this state of the art ECG Machine and tele-cardiac software were the accomplished after more than 5 years of research and development efforts of collaborating institutions that include CASE, CARE, and NUST College of E&ME, National Institute of Heart Diseases (NIHD)/ AFIC and Shift International Hospital. All the prospective users who have seen and tested the system are very satisfied with the form factor, usability, and reliability of this machine and software. From technological perspective, we consider this machine at par, if not better than any such international product from European Union and North America. Besides this features the main advantage in using this machine is it's significantly low cost from its competitors. The associated tele-cardiac software enables connection of this machine in tele-medicine application, where remote cardiologist and specialists can be virtually connected with the patients. Further to this, the software stores all ECG taken with this machine in a repository for later retrieval and forming a national database. The repository can help the government in taking decision about the cardiac related care of general public in the country. In addition being indigenous product, after sales and support will be readily available to local users.

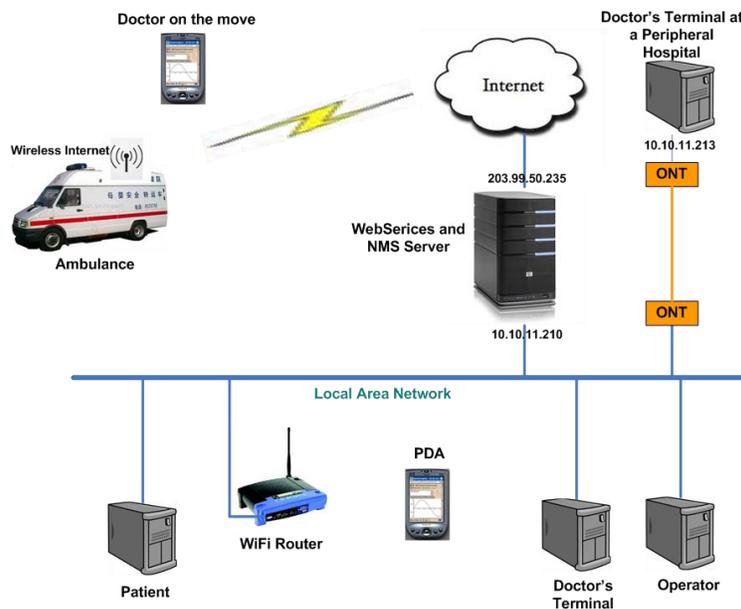
It is our proud privilege to acknowledge the financial support of National ICT R&D Fund in initiating this project. The associated tele-cardiac software is the outcome of the project funded by ICT R&D Fund. The projects funded by National ICT R&D Fund has acclaimed international recognition by winning Asia Pacific ICT Alliance Awards, that demonstrates that the technology developed are the best in the region and hold great promise of marketing the related projects not only in Pakistan but other countries around the globe. We firmly believe this project is the outcome of the initiative of National ICT R&D Fund and should be projected to display its affectivity. Beside that we also want to bring to the acquaintance of the

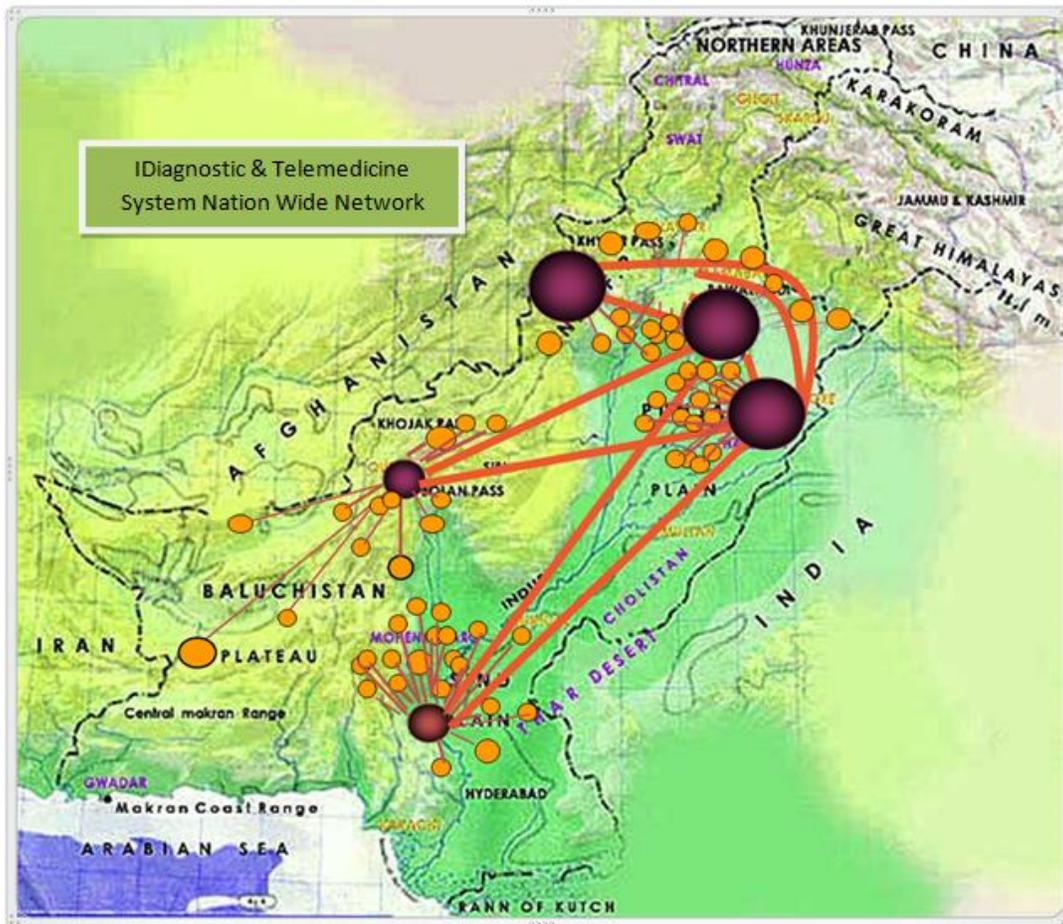
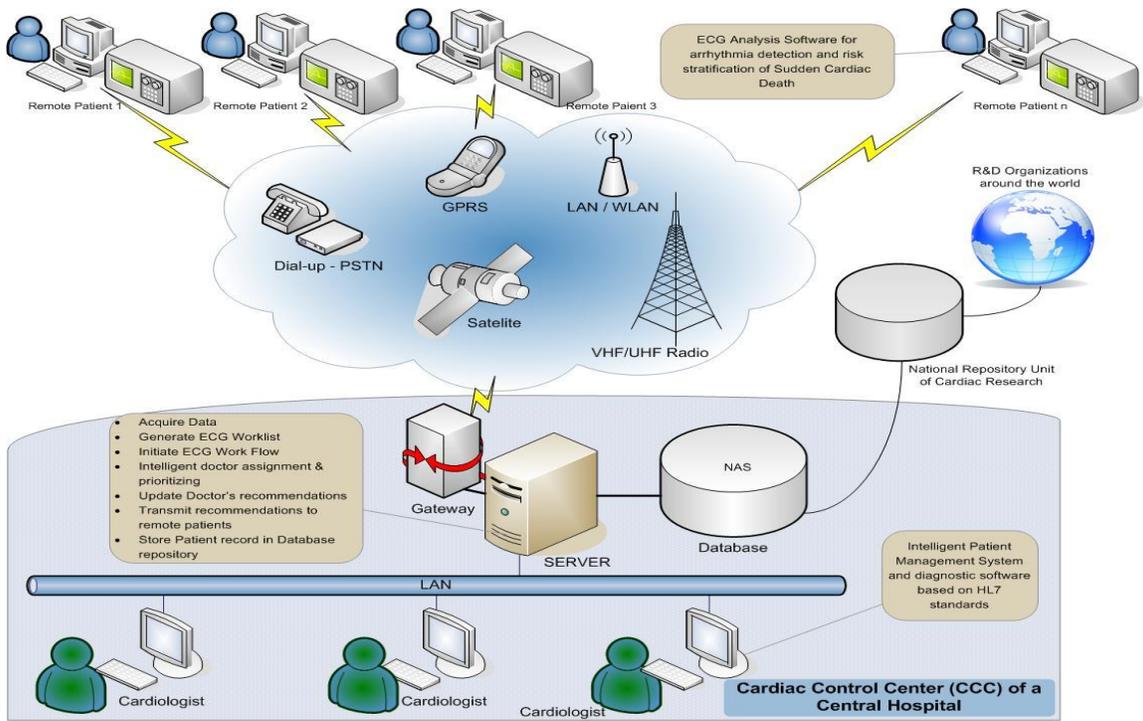
users all the great features this project is offering. This continuous support of National ICT R&D Fund & Ministry of IT & Telecom has enabled us to expand the concept of using ICT as an enabler and catalyst for improving the health care delivery in our country, making it more effective and expanding its reachability.

Tele-cardiac systems is introduce to facilitate patients that use to live in shallow areas and are unable to visit specialists on regular basis that resides in one of the main cities. Patient's data and readings are recorded, maintained and sent to a dedicated repository that categorizes entries accordingly.

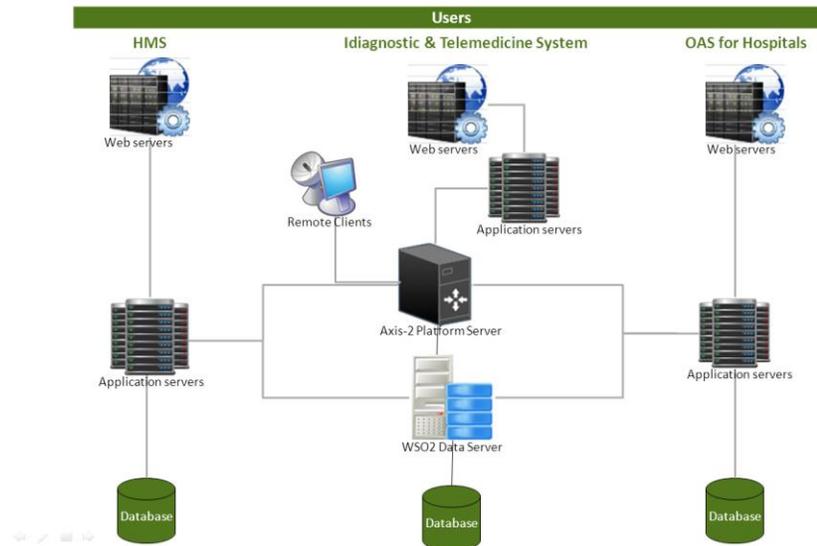
Doctor/Specialist on other hand logs in and can do a detailed analysis of data by applying special helping tools to recognize arrhythmias in a single click of mouse. He then updates the prescription area associated with that patient. Patient's consultant thus receives the doctor's review and can suggest a much professional and authentic diagnosis. So the patient despite of being living in an area that deprives of basic medical facility can be treated soundly following the prescription of specialists.

At the doctor's end; interface can vary from personal PC, laptop, mobile device and even handheld PDAs. She/he can access her/his portal effectively from any possible interface.





Integration with HMS and OAS for Hospitals



A hospital Management System has also been imbedded in the Tele-cardiac System developed by CARE. Operators are able to smartly assign ECGs to the concerned doctors by sending them to their ECG accounts. Doctors can access their accounts remotely through the web and hence assess ECGs from any remote device with web connectivity.

Screen shots of Tele-Cardiac System

Patient Registration Portal

iDiagnostic & TeleCardiac System

Patient Registration

Registration Check | Registration | All Pending Prescriptions

General | ECG History

Registration Check

CNIC:
 MR NO:

Database Information

Name:
 Father's Name:
 Gender:
 Age:
 Blood Group:
 Phones:
 Email:

ECGs Pending Dispatch

| S.No | ECG ID | CNIC | Name | Status |
|------|--------|------|------|--------|
| | | | | |

ECGs Pending Prescription

| S.No | ECG ID | CNIC | Name | Status |
|------|--------|-----------|-------------|---------------|
| 1 | 31 | 352010938 | Imran Ahmad | Pending_Pr... |

Patient Portal for Telecardiac System developed by CARE.

Operator's Portal

Cardiac Management System - Windows Internet Explorer

http://10.10.11.118:8079/ADSA/pages/login.jsf

Summary | Help | Logoff

iDiagnostic & TeleCardiac System
Operator's Portal

RECEIVED ECGs

| S.No | ECG ID | CNIC | Name | Location | Time | Priority | Cardiologist | Send |
|------|--------|---------------|----------|-----------|--------------|----------|--------------|------|
| 1 | 4 | 1730147990399 | Jamal | Islamabad | Dec 28, 2010 | | | Send |
| 2 | 17 | 3520109382441 | Atif | Islamabad | Feb 10, 2011 | | | Send |
| 3 | 18 | 3520109382441 | Atif | Islamabad | Feb 10, 2011 | | | Send |
| 4 | 23 | 3520109382441 | Atif | Islamabad | Feb 10, 2011 | | | Send |
| 5 | 24 | 3520109382441 | Atif | Islamabad | Feb 10, 2011 | | | Send |
| 6 | 25 | 1234512345604 | Fakhar | Islamabad | Feb 10, 2011 | | | Send |
| 7 | 26 | 1234512345605 | Fatih | Islamabad | Feb 10, 2011 | | | Send |
| 8 | 27 | 1234512345606 | Fiaz | Islamabad | Feb 10, 2011 | | | Send |
| 9 | 28 | 1234512345607 | Fiaz | Islamabad | Feb 10, 2011 | | | Send |
| 10 | 32 | 1234512345612 | Rashid | Islamabad | Feb 10, 2011 | | | Send |
| 11 | 33 | 1234512345611 | Mohammad | Islamabad | Feb 10, 2011 | | | Send |
| 12 | 34 | 1234512345613 | Asmat | Islamabad | Feb 10, 2011 | | | Send |
| 13 | 35 | 1234512345614 | Balqees | Islamabad | Feb 10, 2011 | | | Send |
| 14 | 36 | 1234512345615 | Mushtaq | Islamabad | Feb 10, 2011 | | | Send |

Internet | Protected Mode On | 95%

Operator's Portal for the Tele-cardiac System. Operator Receives ECGs from remote Stations here and forwards them to the appropriate doctor.

Doctor's Workload View

| S.No | DESIGNATION | NAME | Location | LOAD |
|------|---------------------|----------------|-----------|------|
| 1 | Snr Medical Officer | Mudassir Javed | Islamabad | 0 |
| 2 | Specialist | Haseeb Zahoor | Islamabad | 0 |
| 3 | Senior Cardiologist | Israr Niazi | Islamabad | 0 |
| 4 | Senior Cardiologist | Kamran Khan | Islamabad | 0 |
| 5 | Specialist | Adnan | Islamabad | 1 |

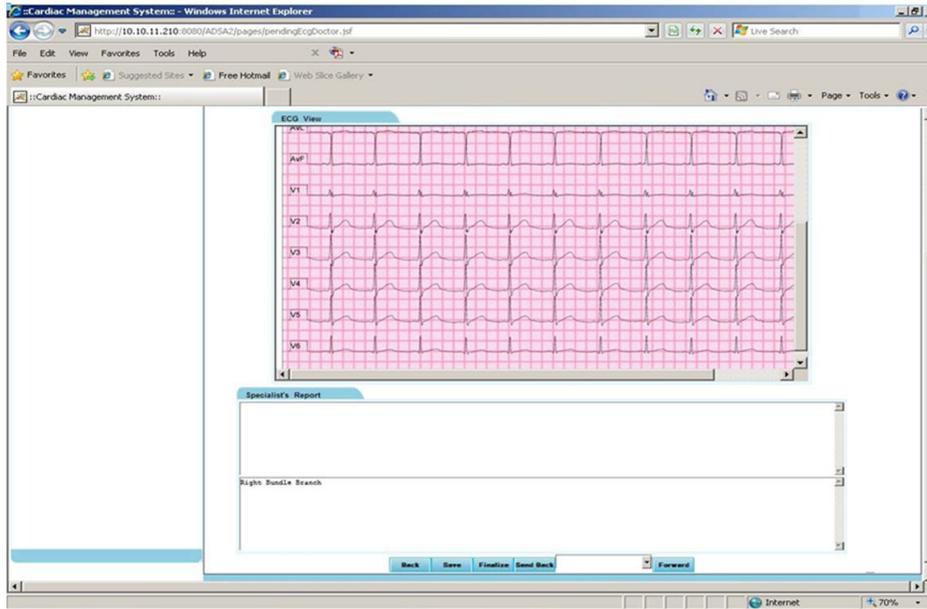
The Operator can take into consideration the doctors current worklod before assigning any new ECGs to him.

Doctor's Portal

| S.No | ECG ID | CNIC | Name | Location | Time | Priority | View | Cardiologist | Send |
|------|--------|---------------|---------|----------|--------------|----------|------|---------------|------|
| 1 | 1 | 1730147990399 | Jamal | | Dec 28, 2010 | | View | Haseeb Zahoor | Send |
| 2 | 2 | 1730147990399 | Jamal | | Dec 28, 2010 | | View | Haseeb Zahoor | Send |
| 3 | 3 | 1730147990399 | Jamal | | Dec 28, 2010 | | View | Haseeb Zahoor | Send |
| 4 | 7 | 1730147990399 | Jamal | | Feb 8, 2011 | | View | Haseeb Zahoor | Send |
| 5 | 21 | 3520109282441 | Atif | | Feb 10, 2011 | | View | Haseeb Zahoor | Send |
| 6 | 31 | 1234512345610 | Muqadar | | Feb 10, 2011 | | View | Haseeb Zahoor | Send |
| 7 | 41 | 1234512345620 | Beenish | | Feb 10, 2011 | | View | Haseeb Zahoor | Send |
| 8 | 74 | 1234512345644 | Shazia | | Feb 10, 2011 | | View | Haseeb Zahoor | Send |

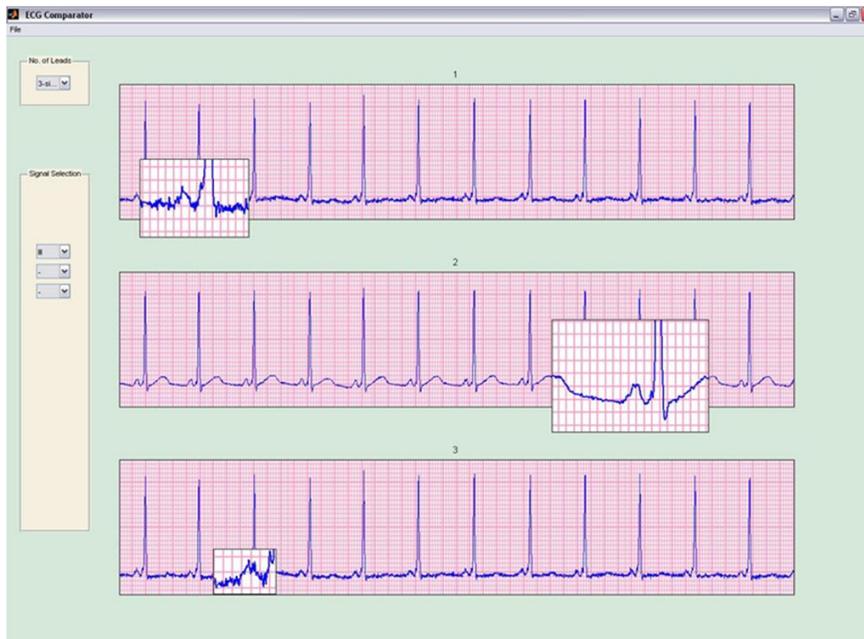
The Doctors portal shows all current ECGs awaiting diagnosis by the doctor. He can access this page from the web and therefore can open it from any net connected device.

ECG View



The Doctor gets the above view from his Account Portal. He may add his comments in the text box that follows the ECG graph.

Advanced ECG View

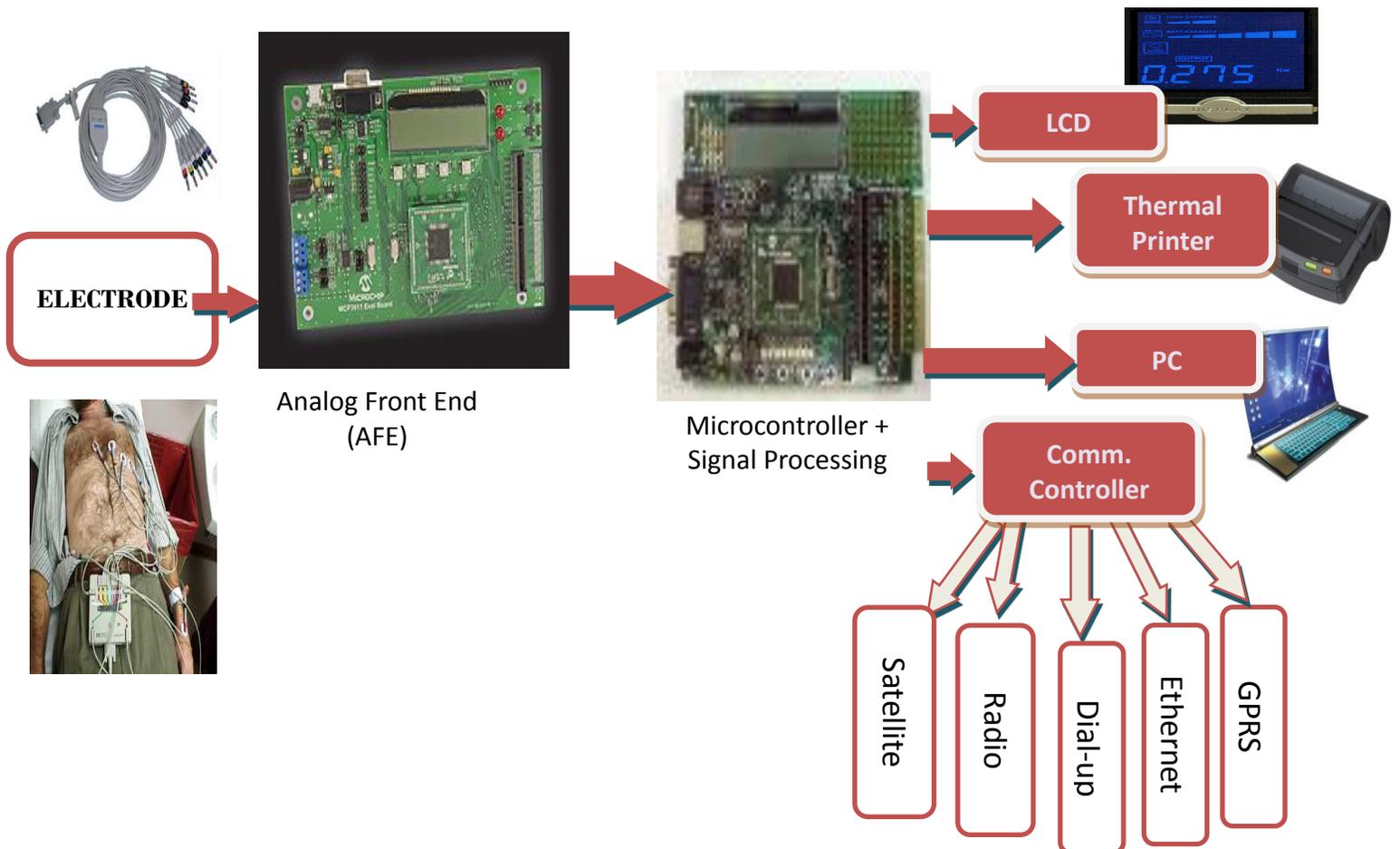


The doctor has Advanced View facility in the Diagnosis Software developed by CARE. He has the ability to magnify specific details which are not visible to the naked eye.

Smart ECG machine

The Smart High Resolution ECG Machine Developed at CARE is the first of its kind with direct connectivity to a proprietary Tele-cardiac System, Automated Parameter calculation with Diagnostic Capability. All available at an economical price. The Machine is not only obvious selection for local buyers but will also compete on the international forum because of its competitive price and high end capability.

The mentioned Tele-cardiac System can be directly coupled with the machine and data, after acquisition, can be directly sent to the local server located at the national server. The Interface for the tele-cardiac system has incorporated in it automatic diagnostic algorithms for ECGs, imbedded in the doctors user interface. It also has an enhanced viewer that shows the doctor 12 leads of the data as soon as they are sent from the remote ECG acquisition station.



The CARE Smart ECG machine uses an Analog Front End capable of measuring signals of only a few millivolts with a 24 bit resolution. The data for twelve leads is acquired and sent to a microprocessor which performs the necessary noise removal and pre-processing before sending the data to the available interfaces mentioned in the above diagram.

The printing and PC display are real-time meaning there is no lag between data acquisition and data processing and display. There is a continuous stream of data flow from the acquisition card to the output mediums.

Features

- High resolution, with maximum sampling frequency of 1 KHz
- Operating mode of 12 leads
- Network enabled, can be interfaced directly to Proprietary Tele-cardiac System developed by CARE.
- Rugged battery operated, Can take and print over 50 ECGs on single battery charge.
- Integrates with the work flow of a national level tele-Cardiac Care System
- Quick Printing mechanism.
- Thermal Printer with extensive life installed for easy management and operation of the machine.
- HD Color Display.
- A4 Thermal Printer.
- Leakage Current < 5uA
- Paper Speed: 25mm/x
- Printing Format: 3x4+1
- Paper Gain: 2.5,5,10,20 mm/mV

- Military Grade Keyboard.



The associated software is the outcome of the project funded by National ICT R&D Fund. CASE/CARE intends to hold an inauguration ceremony for its formal launch. Prominent health industry individuals along with policy makers of health ministry will be invited to attend the launching ceremony. In addition to a formal launching ceremony, CASE/CARE also intend to hold road shows all across Pakistan whereby this product will be presented to health industry individuals at leading cardiac facilities. Launching ceremony and road shows will help in promotion of the developed health care system as an outcome of the project funded by National ICT R&D Fund.

