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Good-Tech

'Educational Training System'

Globel Business Company.
Leading Laboratory Equipment Supplier.
Teacher & Professor's optimal solution for their classroom.
Broad portfolio of Information Technology Training Products.
Meaningful training products closely related with commercial products.

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Contents

model:GSM-5000

Cellular Mobile Trainer (GSM/GPRS Trainer)

Feature

GSM-5000 is the training system enabling users to study GSM/GPRS communication protocol and to experience the overall knowledges about mobile communication through GSM module control. To control the GSM module, there is advanced set of AT Commands according to GSM ETSI (European Telecommunications Standard Institutes).
GSM-5000 has full training contents of Command Level Study on AT Commands.

GSM-5000 is based upon GSM cellular phone and allows for connection to PC for operation and programming.

This trainer is designed to instruct the students System operation, Theory, Programming, Servicing, Problem diagnosis of GSM cellular mobile systems.
GSM-5000 is mainly used for students to learn fundmentals in mobile communication systems such as mobile station network entry, calling process, network signals, AT Commands, Audio communication, Short message services,,,etc.
The training covers the command level study with AT Commands, GPRS Intenet Connection, Multiplexer Protocol training and Hardware test experiments, Introduce of Embedded OS system and GUI programming on GSM-5000 through the provided source codes.

Functions

- Understanding of GSM technology & network, GSM capability & data services.
- Real Time Study of GSM 07.05 & 07.07 and ITU-T recommendation V.25ter with AT command
- Study of SIM card interface and SIM data control
- Study of GSM 07.10 Multiplexer Protocol
- GSM network by actually connecting to the GSM environment
- Development Windows CE based user application
- Debugging experience with serial port

Components

GSM Hardware platform with GSM module and Embedded system board (GSM Modem and Antenna was installed to Hardware board)	1 ea
AC Adapter	1 ea
RS232C Cable for debugging	1 ea
Ear Set (Ear Phone + Mic)	1 ea
GSM Mobile phone (user's mobile phone can be used)	0
Software installation CD	1 ea
User's Manual	1 ea
USIM Card	1 ea

System cinfiguration

1) GSM Hardware platform with GSM module and Embedded system board

2) System operating configuration

Training contents

Specification

1. Hardware Spec

1) OS : Microsoft Windows CE.NET 6.0
2) CPU : ARM11 500MHz Processor (ATLAS-IV)
3) Memory : 128MB SDRAM, 2G NAND Flash
4) Display interface : 7 inch TFT LCD / 800*480 Pixels / Touch screen
5) Audio : Stereo Audio CODEC, Built-in Speaker, MIC for GSM
6) Output : Data indication LED, Debug serial port / USB 2.0 Port
7) Power : 5V, 1.5A AC
8) SIM : Built-in SIM card slot / 1.8V, 3V SIM card support
9) GSM/GPRS features
(1) GSM Module : SIM900B
(2) Quad-band GSM/GPRS
· GSM 850MHz
· EGSM 900MHz
· DCS 1800MHz
· PCS 1900MHz
(3) GSM Class : Small MS
(4) Transmitting power:
· Class 4 (2W) at GSM 850 and EGSM 900
· Class 1 (1W) at DCS 18000 and PCS 1900
(5) GPRS connectivity
· GPRS multi-slot class 10 (Default)
· GPRS multi-sloc class 8 (Optional)
· GPRS mobile station class B
(6) DATA GPRS
· GPRS data downlink transfer: max. 85.6kbps
· GPRS data uplink transfer: max. 42.8kbps
· GPRS coding schemes: CS-1, CS-2, CS-3, CS-4
· Supports the protocols PAP (Password Authentication Protocol) usually used for PPP connections
· Integrates the TCP/IP protocol
· Support Packet Switched Broadcast Control Channel (PBCCH)
(7) SMS
· MT, MO, CB, Text and PDU mode
· SMS storage: SIM card
(8) Serial Port
· 1200bps to 115200bps
· Serial Port can be used for AT command or data stream
· Supports RTS/CTS hardware handshake and software ON/OFF flow control
· Multiplex ability according to GSM 07.10 Multiplexer Protocol.
· Autobauding supports baud rate from 1200 bps to 57600 bps

2. Software Spec

* C/C++ language
* User Interface on LCD
* GSM Driver

model:WCDMA-5000

Cellular Mobile Trainer (WCDMA Trainer)

Feature

W-CDMA (Wideband Code Division Multiple Access) is an air interface standard found in 3G mobile telecommunications networks.
3G is a generation of standards for mobile phones and mobile telecommunications services. Application services include wide-area wireless voice telephone, mobile Internet access, video calls and mobile TV, all in a mobile environment.
WCDMA-5000 gives the understanding for the air interface standard of 3GPP, and the training for the logic design of signal modulation and de-modulation as well as encoding.
Also, WCDMA-5000 gives an actual practice for Voice Call Processing, Video Telephony Processing, Hand-off Practice, Power Control Practice,,, etc.
Also, it teaches the design method of physical layer software which enables the result of logic design to operate normally.

Functions

1) WCDMA-5000 is the Training system having 3G Mobile Communication Standards.
2) WCDMA-5000 is the upgraded Mobile Communication system having Data, Voice and Video Call processing than the existing CDMA, GSM system.
3) As WCDMA-5000 equipped with MSM6245 WCDMA/EDGE/GPRS/GSM (WEDGE) Chipset which manufactured by Qualcomm for 3G Mobile Phone, Video Call and Voice Call is possible.
4) Mobile development training is available through Qualcomm BREW platform.
5) Through QVGA 2.4" (320x240) TFT color LCD, Video and Camera VOD can be received.
6) Through the USB/Serial interface, various communication module and Multi-media module can be mounted.
7) By providing Bluetooth headset, Speaker, Micro-phone, Earphone, user can easily do various & practictical practices.
8) Without a separate Base Station device, user can use their Mobile phone by changing USIM Chip from USIM Card.
9) Supports WCDMA (UMTS), EDGE and GSM/GPRS networks.
10) ARM926EJ-S™ microprocessor core with memory management unit (MMU)
11) QDSP4000™ high-performance digital signal processors.
12) ARM Jazelle™ Java hardware acceleration
13) Support for BREW and Java applications
14) Q camera™: Up to 2 megapixel digital images
15) Mobile video solutions: video streaming, playback, recording, and video telephony module can be mounted.
16) Digital audio support for MP3/AAC/aacPlus™/Enhanced aac Plus
17) CMX : Customized ringtone, screensaver and greeting card solution
18) Integrated Universal Serial Bus (USB) support
19) Bluetooth 1.1 connectivity
20) 2D/3D graphics

System Configuration

Training Contents

Chapter 1, WCDMA development environment
- 1.1 Introduction to Wireless Mobile Communication
- 1.2 Introduction to WCDMA development environment
  - 1.2.1 – Build environment
- 1.3 Practice
  - 1.3.1 – Making Build environment
  - 1.3.2 – Make build
  - 1.3.3 – Download
  - 1.3.4 – Debugging practice

Chapter 2, Firmware Programming
- 2.1 WCDMA -3G Platform introduction
  - 2.1.1 – WCDMA ? 3G Platform Hardware
  - 2.1.2 – WCDMA ? 3G Platform Software
- 2.2 Board Support Package
  - 2.2.1 – Boot method
  - 2.2.2 – Memory Interface
  - 2.2.3 – Booting process
- 2.3 LCD Drive implementation
  - 2.3.1 – General
  - 2.3.2 – Interface spec
  - 2.3.3 – Principles of Operation
  - 2.3.4 – Driver design
- 2.4 LCD Driver design practice
  - 2.4.1 – Booting image exchange practice
  - 2.4.2 – Image update practice
  - 2.4.3 – Font display practice

Chapter 3, WCDMA Physical Layer
- 3.1 WCDMA Technology introduction
- 3.2 WCDMA Channel structure
  - 3.2.1 – Downlink channel structure
  - 3.2.2 – Uplink channel structure
- 3.3 Practice
  - 3.3.1 – WCDMA Active Set PSC strength practice
  - 3.3.2 – Pilot Channel Scanner practice
  - 3.3.3 – Layer 1 status monitoring practice
  - 3.3.4 – Channel operation checking practice

Chapter 4, UMTS Network
- 4.1 UMTS Introduction
  - 4.1.1 – Non-Access Stratum
  - 4.1.2 – Access Stratum
- 4.2 Core Network
  - 4.2.1 – Core Service Domain
  - 4.2.2 – Packet service Domain
  - 4.2.3 – Registers Domain
- 4.3 UMTS Terrestrail Radio Access Network
- 4.4 UE (User Equipment)
  - 4.4.1 – ME (Mobile equipment)
  - 4.4.2 – UMTS Subscriber Identity Module

Chapter 5, MAC (Medium Access Control) Layer
- 5.1 MAC introduction
- 5.2 MAC-b entity
- 5.3 UE MAC Structure
  - 5.3.1 MAC – c/sh entities
  - 5.3.2 MAC – d entities
  - 5.3.3 MAC – hs entities
- 5.4 UTRAN Network MAC Structure
  - 5.4.1 – MAC – c/sh entities for UTRAN Network
  - 5.4.2 – MAC – d entities for UTRAN Network
  - 5.4.3 – MAC– hs entities for UTRAN Network
- 5.5 MAC PDU (Protocol Data Units)
  - 5.5.1 – MAC Header to Dedicated channel
- 5.6 Data Flow & Memory control between layers
- 5.7 Real Practice
  - 5.7.1 – Practice contents
  - 5.7.2 – BCH Header processing design
  - 5.7.3 – BCH Header processing implementation
  - 5.7.4 – Transport Block processing
  - 5.7.5 – Transport Block processing design

Chapter 6, RLC (Radio Link Control) Layer
- 6.1 RLC Introduction
- 6.2 RLC Entities
- 6.3 RLC Functionality
- 6.4 The Service which provided to higher Layer
- 6.5 RLC Layer design
- 6.6 Real RLC Practice

Chapter 7, RRC (Radio Resource Control) Layer
- 7.1 RRC Layer introduction
- 7.2 RRC Layer structure
- 7.3 RRC State
- 7.4 RRC Function
- 7.5 RRC Task
- 7.6 Real RRC Practice

Chapter 8, Call Processing Service for Voice
- 8.1 Call Processing Introduction
- 8.2 Call Processing for UE Voice sending
- 8.3 Call processing for UE Voice receiving
- 8.4 Call Release Procedures
  - 8.4.1 Call Release procedures by UE
  - 8.4.2 Call Release procedures by Network
- 8.5 Physical process for Voice information
- 8.6 Real Practice

Chapter 9, Call Processing Service for Video Telephony
- 9.1 Video Telephony Processing
- 9.2 UE Video Telephony Processing
- 9.3 Physical Transmitting Procedures for Video Information
- 9.4 Real Practice

Chapter 10, Hand Over
- 10.1 Hand Over Technology
- 10.2 CDMA Hand Over
  - 10.2.1 – Idle Hand Over
  - 10.2.2 – Hand Over in Traffic State
- 10.3 WCDMA Hand Over
- 10.4 Real Practice

Chapter 11, Power Control
- 11.1 Introduction of Power Control
- 11.2 CDMA Power Control Technology
  - 11.2.1 – Reverse Power Control
  - 11.2.2 – Forward Power Control
- 11.3 WCDMA Power Control
  - 11.3.1 – Open Loop Power Control
  - 11.3.2 – Inner Loop Power Control
- 11.4 Real Practice

Chapter 12, Download Implementation of 3G-WCDMA
- 12.1 Algorithm Overview of Downloading
  - 12.1.1 – J-TAG Downloading method
  - 12.1.2 – Downloading Program method
- 12.2 Asynchronous HDLC Protocol
- 12.3 AMSS Diagnosis Packet Service
- 12.4 Downloading Protocol
- 12.5 Real Practice

Chapter 13, Brew Programming
- 13.1 BREW (Binary, Runtime, Environment, Wireless)
- 13.2 BREW Structure
- 13.3 BREW Installation
- 13.4 BREW SDK
- 13.5 Real Practice

Components

Items	Num
Main Hardware platform	1 ea
Manual book	1 ea
USIM CARD (User's mobile phone USIM Card can be used to this system, so no need to provide new one)	Not provided
S/W CD	1 ea
Serial cable	1 ea
USB Cable	1 ea
Power Adaptor	1 ea

Hardware Spec

Item	Spec
Processor	Qualcomm MSM6245 Chipset (ARM926EJ-S 225MHZ)
	QDSP -100MHz
Memory	SDRAM 512MB, NAND 512Mb
Modem	WCDMA, GSM, GPRS, EDGE, DTM
RF	RTR6275, PAM, TCXO(19.2MHz)
PMU	PMIC6650-2
Frequency band	2100MHz (WCDMA Frequency)
Wireless Protocol	3GPP WCDMA R99, Release 5 compliance, Jun 2005 for WCDMA
LCD	260K colors QVGA 2.4"TFT LCD
Camera processor	Qualcomm Q camera TM
Video telephony	Qvideo phone, 15fps QCIF
Audio	1 loud Speaker, 1 Microphone, 1 stereo Ear Phone Jack
Vo-coder	AMR
Audio/video decoders	MP3, AAC, AAC+, ADPCM, MPEG-4, H263, H264
Bluetooth	Qualcomm Blue QTM?
USB	USB 1.1 slave and host (OTG)
UART1	RS-232 9-pin connector
UART2	USIM interface
Keypad	22 keys
LED Indicator	5 LEDs(Reset, PS hold, PA on, NAND CE, Camera power on)
RF connector	SMA external type connector
Antenna	Chip Antenna
USB connector	General USB Interface
JTAG connector	JTAG Compatible(ANSI/IEEE1149.1A-1993) 20pin
Input Power	9V DC Power Supply
Extension slot	GPIO[1-5], I2C, UART

Software Spec

Item	Spec
Wireless Protocol	1) 3GPP Release 99 and 5 compliance
	2) SMS : 3GPP TS 23.040 Technical realization of the Short Message Service (SMS)
	3) 3GPP TS 24.011 Point-to-Point (PP) Short Message Service (SMS) Support on Mobile Radio Interface.
	4) USIM : 3GPP TS 23.048 Security Mechanisms for the (U)SIM application toolkit
	5) Video Service : 3GPP Release 99 TS 26.110 Codec (s) for CS Multimedia Telephony Service: General Description
	6) 3GPP Release 99 TS 26.111 Codec (s) for CS Multimedia Telephony Service: Modifications to H.324
	7) ITU-T Recommendation H.324, Terminal for low bit-rate multimedia communication
	8) ITU-T Recommendation H.263, Video coding for low bit rate communication
	9) Voice Service 3GPP Release 99 TS 24.008 Technical Specification Group Core Network : Mobile Radio Interface Layer 3 Specification
	10) 3GPP Release 99 TS 26.071 Technical Specification Group Services and System Aspects
	11) AMR Speech Codec; General Description
Platform	Brew3.1
BT	BT 1.2 stack/ L2CAP profile, RFCOMM profile
GUI	GUI support
USB	USB 1.2 full speed

model:CMTS-G7000M

GSM / GPRS type, Cellular Mobile Netwotk Analyzing System(Multi DM + PC based)

Feature

This Cellular Mobile Network Analyzer supports various Specs like below which is covering 2G & 2.5G of mobile technologies in real time operation by connecting with eal Base Station. And thus, this system has below features.

1) Supports Asynchronous & Synchronous ;
   - Asynchronous [transmission] : GSM/GPRS ➜ WCDMA (UMTS)
     [Synchronous [transmission] : (IS-95A,B) ➜ CDMA ➜ EVDO]
2) Provides real time logging and display of Layer 1,2,3 messages, Packet messages (PPP, TCP/IP, UDP), and RF KPIs
3) Up to 2 mobile terminals and 2 scanners can be put on test simultaneously (2Voice, or 2 Data + 2 Voice/MOS)
4) Provides quality measurement function for Data Service (FTP, HTTP, Ping/TraceRT, E-Mail, UDP, SMS, WAP,…)
5) Voice Service (Voice MOS)
6) Easy Port setting and sophisticated Auto-call scenario setting.
7) Provides Bench marking test for business customers, mobile terminals and systems.
8) Provides Real Time Mapping (MapX or MIF) function by interfacing with GPS (NMEA format)
9) Saves and edits user-defined values
10) Provides the information about the condition of equipments
11) Provides convenience for users with GUI
12) Provides voice alarm function
13) In-building Mapping as default (BMP file)
14) Replay Function for simple analysis (easy to use)

Functions

< General Function >

1) Auto-Call Script
2) Create Script
3) Call Statistics Window
4) Message Decoding
5) KPIs Graph Display
6) Mapping
7) BTS Information and Serving Line
8) Draw Test Drive Route
9) Trace Function
10) Distance Measurement
11) Draw User defined mark
12) Various setting for the real time mapping window
13) User defined graph
14) User defined table
15) User defined summary info
16) Handoff status using Cell measurement info (for GSM)
17) 3G Handoff Events & 3G to 2G Handoff Events for GSM
18) Trace Back Function
19) GPS Status and GPS Satellite Status
20) Logging Info and Communication Statistics
21) Audible Alarms
22) Hot Key / User Event / Log file path setting
23) BTS Manager
24) Relay

< Applications >

1) Voice MOS (1/4, MOS call statistics and MOS value graph)
2) Voice MOS (2/4, PESQ MOS information)
3) Voice MOS (3/4, PESQ parameters description)
4) Voice MOS (4/4, MOS signal graph and wave format graph)
5) Ping and TraceRT status
6) UDP

[Additional costs for Applications]

* Additional costs for Voice MOS
* Additional costs for UDP

Components and System configuration

S/W CD	1 ea
Phone Interface Cable (for interface between a mobile terminal and multi DM H/W)	20 ea (1Slot -4 ea)
Multi DM H/W	1 ea
LAN Cable (Connection between H/W and a lap top)	1 ea
AC to DC Inverter	1 ea
GPS Receiver	1 ea
Mobile Phone	2 ea (GSM type)
Manual	1 book

Specification

1) Spec for Multi-DM

Div	Spec	Remarks
Size	255*375*145	W*D*H
Weight	5.5kg	
Installed Slot	5 EA	consisted of PIU-PE, 5ea
Interface Support	1USB, 1Serial 1PCMCIA	per each Slot
Supported O/S	Windows XP Professional	
Slot type PIU2	Pentium Mobile4 1.6GHz CPU	Main memory: 1GB HDD: 2GB*2 (4G option) 4 USB ports / 100 Mbps LAN speed Self O/S recovery function
Slot type PIU CE2	Coer 2 Duo 2.16 GHz CPU	Main memory: 1GB HDD: 2GB*2 (4G option) 4 USB ports 1 Gbps LAN speed Self O/S recovery function
Slot type PIU AE4	Atom 1.6GHz CPU	Main memory: 1GB HDD: 2GB*2 (4G option) 4 USB ports / 1 Gbps LAN speed Self O/S recovery function
Mobile Terminal Connector CPU	MOLEX 52629-2651 ETX-PM 16GHz	24 PIN * PIU Spec - Memory : 1G Byte - OS : Embedded XP
Operating Environment	Temp: -5 ~ 50`C Humidity : 0 ~ 80%RH Vibration : 2G (X-Y-Z each axis)	
External Interface	Gigabit Ethernet Front - 2 ports Rear - 1 port	10/100/1000 Mbps
GPS	External Serial smart GPS	
Safety Fuse	DC Current Fuse	10A break
Cooling Fan	2 EA	
Power consumption	7A@12V	
Input Voltage	DC 48V	
Input current	5A typical, 9.5A max	
Supported Technologies	GSM/GPRS/EDGE CDMA/EVDO WiMax LTE	
Support EWF mode	lock read/write	protect the system from virus infection
Max number of mobile supported at the same time	20	4 phones per

2) Spec for USB type GPS

- SiRFStarIIe GPS Chipset
  - L1 1575.42MHz, C/A CODE
  - 12 Channel Satellite Receiver
  - COLD START < 60s (Typical)
  - WARM START < 38s (Typical)
  - RTC/SRAM Back up Battery (Embedded)
- Protocol
  - 4800, NONE, 8, 1
  - NO FLOW CONTROL
  - NMEA-0183 (GGA,GSA,GSV,RMC)
- Accuracy (Position)
  - < 10 meter 2DRMS
- Interface
  - USB 1.1 compliant
- Operation Environment
  - Temperature: -20 to +70℃
  - Altitude: 18,000m below
  - Speed: 515m/s below
- Power
  - 5V USB Power (from PC)
  - 160mA
- Dimension
  - 55.7 x 45.4 x 16.00mm (W x D x H)

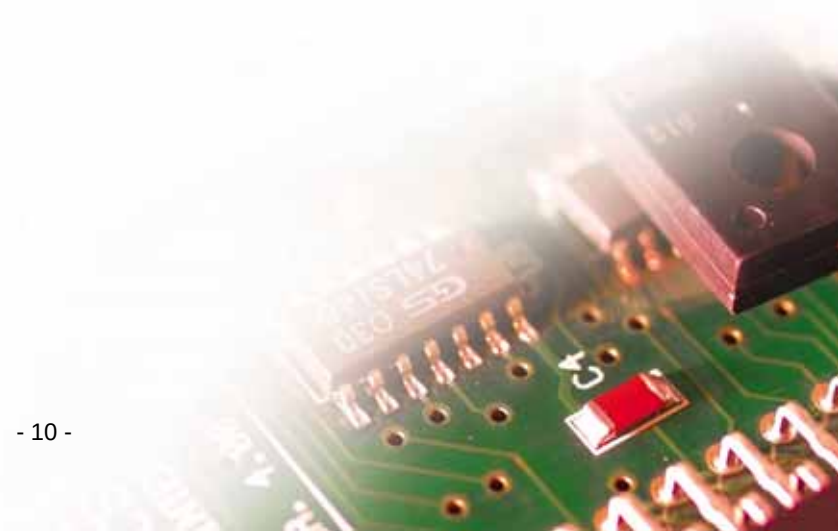
Textbook contents

1. Getting started
2. Components
3. Main Hardware
4. MCU (Main Control Unit)
5. PIU-SE (Phone Interface Unit)
6. Hardware
7. AC/DC Converter
8. LAN Cable
9. GPS Antenna
10. Phone Cable
11. Software
12. TCP/IP Setting
13. Disable Firewall
14. Run Main System
15. User Interface
16. Menu Bar
17. File
18. Logging On/Off
19. AutoCall Start / Pause / Stop
20. AutoCall Control
21. User Event
22. Manual Capture
23. Replay
24. Real Time Mapping
25. Capture Active Window
26. Capture Main Window
27. Export Log File
28. Exit
29. Seting
30. Port Setting
31. Mobile Alias Setting
32. AT Command / Response
33. Color Setting
34. Cellsite Color Setting
35. Key Setting
36. Alarm Setting
37. User Event Setting
38. Log File Setting
39. BTS Manager
40. Save All Settings
41. Load All Settings
42. Window
43. Help
44. About
45. Icon Bar
46. Status Bar
47. Worksheet
48. Port Setting
49. Start Port Setting
50. Port Setting
51. Mobile Setting
52. GPS setting
53. Enable DHCP
54. Network RegEdit
55. Mobile Alias Setting
56. Interface
57. Phone
58. Video Phone Option
59. Data Port
60. DUN
61. LogMask
62. AutoCall Setting
63. AutoCall Scenario Setting
64. AutoCall Setup
65. Scenario Name
66. Auto Call
67. Ignore a Sync Message in Drop (EVDO)
68. Multi RAB (CS+PS)
69. Dormant Mode
70. AutoCall Type
71. Voice
72. FTP
73. PPP
74. Ping
75. HTTP
76. Report
77. Real Time Mapping
78. Map Control Icon
79. Map Layer Property
80. Map (SmartMap)
81. Map (MIE)
82. MAP (MapX)
83. BTS
84. Repeater
85. Serving Line
86. Custom Draw
87. ETC
88. Coverage
89. Legend
90. Trace
91. Real Time Mapping mouse menu
92. Add Symbol / Polyline / Circle / Polygon
93. Mark List
94. Alias Setting
95. Message
96. Signaling Message
97. Mobile Message
98. Alarm Event Manager
99. Packet Message
100. Packet Capture Viewer
101. PPP Frame Message
102. Statistics / Status
103. Call Statistics (Current Scenario)
104. All Info
105. Voice
106. Data (FTP, PPP, Ping, HTTP)
107. Detailed Info
108. Call Statistics View
109. Call Result View
110. Call Event History View
111. Call Statistics (All Scenario)
112. EVDO Session Assignment Test)
113. Ping Status
114. TraceRT Status
115. Throughput Info
116. GPS Status
117. GPS Satellite Status
118. Logging Info
119. Communication Statistics
120. QPCH Statistics
121. User Define
122. Graph
123. Table
124. Summary Info
125. Cell Measurement

Programs which can be performed by CMTS-G7000M through Software CD.

1. Extensive Advanced Logger
   1) mobile/modem interface control
   2) GPS interface control
   3) Digital Scanner interface control
   4) Real Time Mapping management
   5) RF KPI display and logging control
   6) Layer 2 & 3 message display and logging control
   7) Packet message display and logging control
   8) Autocall script management
   9) Alarm & Event management
   10) Statistics management
   11) Import/Export management

2. Extensive Advanced Post processing
   1) Data logging file converting
   2) Graph Analysis
   3) Spread sheet Analysis
   4) Map Analysis
   5) Layer 2 & 3 message analysis
   6) Packet message analysis
   7) Binning control
   8) Map display option control
   9) Analysis report management
   10) Import/Export file management
   11) Event analysis
   12) CDF/PDF & Statistics management



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   (PPP, TCP/IP, UDP), and RF KPIs
3) Up to 2 mobile terminals and 2 scanners can be put on test simultaneously
   (2Voice, or 2 Data + 2 Voice/MOS)
4) Provides quality measurement function for Data Service
   (FTP, HTTP, Ping/TraceRT, E-Mail, VOD-Video MOS, UDP, SMS, WAP,…)
5) Voice Service
   (Voice MOS, Video Telephony, …)
6) Easy Port setting and sophisticated Auto-call scenario setting.
7) Provides Bench marking test for business customers, mobile terminals and systems.
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2) Voice MOS (2/4, PESQ MOS information)
3) Voice MOS (3/4, PESQ parameters description)
4) Voice MOS (4/4, MOS signal graph and wave format graph)
5) Video Telephony 1/2
6) Video Telephony 2/2
7) Ping and TraceRT status
8) VOD (1/3, MQAS video MOS algorithm)
9) VOD (2/3, PEVQ video MOS algorithm)
10) VOD (3/3, PEVQ video MOS algorithm)
11) UDP

[Additional costs for Applications]
* Additional costs for Voice MOS :
* Additional costs for Video Telephony :
* Additional costs for VOD :
* Additional costs for UDP :

Components and System configuration

S/W CD	2 ea
Phone Interface Cable (for interface between a mobile terminal and multi DM H/W)	20 ea (1Slot -4 ea)
Multi DM H/W	1 ea
LAN Cable (Connection between H/W and a lap top)	1 ea
AC to DC Inverter	1 ea
GPS Receiver	1 ea
Mobile Phone	2 ea (WCDMA type)
Manual	2 books

Specification

1) Spec for Multi-DM

Div	Spec	Remarks
Size	236 x 133 x 256	W*H*D
Weight	5.5Kg	
Installed Slot	5 EA	
Interface Support	1 USB, 1 Serial 1 PCMCIA	per each Slot
Supported O/S	Windows XP Professional	
Slot type PIU2	Pentium Mobile4 1.6GHz CPU	Main memory: 1GB HDD: 2GB*2 (4G option) 4 USB ports 100 Mbps LAN speed Self O/S recovery function
Slot type PIU CE2	Coer 2 Duo 2.16 GHz CPU	Main memory: 1GB HDD: 2GB*2 (4G option) 4 USB ports 1 Gbps LAN speed Self O/S recovery function
Slot type PIU AE4	Atom 1.6GHz CPU	Main memory: 1GB HDD: 2GB*2 (4G option) 4 USB ports 1 Gbps LAN speed Self O/S recovery function
Mobile Terminal Connector CPU	MOLEX 52629-2651 ETX-PM 16GHz	24 PIN * PIU Spec - Memory : 1G Byte - OS : Embedded XP
Operating Environment	Temp: -5 ~ 50' C Humidity : 0 ~ 80%RH Vibration : 2G (X-Y-Z each axis)	
External Interface	Gigabit Ethernet Front - 2 ports Rear - 1 port	10/100/1000 Mbps
GPS	External Serial smart GPS	
Safety Fuse	DC Current Fuse	10A break
Cooling Fan	2 EA	
Power consumption	7A@12V	
Input Voltage	DC 48V	
Input current	5A typical, 9.5A max	
Supported Technologies	GSM/GPRS/EDGE CDMA/EVDO WiMax LTE	
Support EWF mode	lock read/write	protect the system from virus infection
Max number of mobile supported at the same time	20	4 phones per PIU Slot

2) Spec for USB type GPS

- SiRFStarIIe GPS Chipset
  - L1 1575.42MHz, C/A CODE
  - 12 Channel Satellite Receiver
  - COLD START < 60s (Typical)
  - WARM START < 38s (Typical)
  - RTC/SRAM Back up Battery (Embedded)
- Protocol
  - 4800, NONE, 8, 1
  - NO FLOW CONTROL
  - NMEA-0183 (GGA,GSA,GSV,RMC)
- Accuracy (Position)
  - < 10 meter 2DRMS
- Interface
  - USB 1.1 compliant
- Operation Environment
  - Temperature: -20 to +70℃
  - Altitude: 18,000m below
  - Speed: 515m/s below
- Power
  - 5V USB Power (from PC)
  - 160mA
- Dimension
  - 55.7 x 45.4 x 16.00mm (W x D x H)

Programs which can be performed by CMTS-G7000M through Software CD.

1. Extensive Advanced Logger

1) mobile/modem interface control
2) GPS interface control
3) Digital Scanner interface control
4) Real Time Mapping management
5) RF KPI display and logging control
6) Layer 2 & 3 message display and logging control
7) Packet message display and logging control
8) Autocall script management
9) Alarm & Event management
10) Statistics management
11) Import/Export management

2. Extensive Advanced Post processing

1) Data logging file converting
2) Graph Analysis
3) Spread sheet Analysis
4) Map Analysis
5) Layer 2 & 3 message analysis
6) Packet message analysis
7) Binning control
8) Map display option control
9) Analysis report management
10) Import/Export file management
11) Event analysis
12) CDF/PDF & Statistics management

Textbook contents

1) Training contents on GSM/GPRS

1. Getting started
2. Components
3. Main Hardware
4. MCU (Main Control Unit)
5. PIU-SE (Phone Interface Unit)
6. Hardware
7. AC/DC Converter
8. LAN Cable
9. GPS Antenna
10. Phone Cable
11. Software
12. TCP/IP Setting
13. Disable Firewall
14. Run Main System
15. User Interface
16. Menu Bar
17. File
18. Logging On/Off
19. AutoCall Start / Pause / Stop
20. AutoCall Control
21. User Event
22. Manual Capture
23. Replay
24. Real Time Mapping
25. Capture Active Window
26. Capture Main Window
27. Export Log File
28. Exit
29. Seting
30. Port Setting
31. Mobile Alias Setting
32. AT Command / Response
33. Color Setting
34. Cellsite Color Setting
35. Key Setting
36. Alarm Setting
37. User Event Setting
38. Log File Setting
39. BTS Manager
40. Save All Settings
41. Load All Settings
42. Window
43. Help
44. About
45. Icon Bar
46. Status Bar
47. Worksheet
48. Port Setting
49. Start Port Setting
50. Port Setting
51. Mobile Setting
52. GPS setting
53. Enable DHCP
54. Network RegEdit
55. Mobile Alias Setting
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57. Phone
58. Video Phone Option
59. Data Port
60. DUN
61. LogMask
62. AutoCall Setting
63. AutoCall Scenario Setting
64. AutoCall Setup
65. Scenario Name
66. Auto Call
67. Ignore a Sync Message in Drop (EVDO)
68. Multi RAB (CS+PS)
69. Dormant Mode
70. AutoCall Type
71. Voice
72. FTP
73. PPP
74. Ping
75. HTTP
76. Report
77. Real Time Mapping
78. Map Control Icon
79. Map Layer Property
80. Map (SmartMap)
81. Map (MIE)
82. MAP (MapX)
83. BTS
84. Repeater
85. Serving Line
86. Custom Draw
87. ETC
88. Coverage
89. Legend
90. Trace
91. Real Time Mapping mouse menu
92. Add Symbol/Polyline/Circle/Polygon

93. Mark List
94. Alias Setting
95. Message
96. Signaling Message
97. Mobile Message
98. Alarm Event Manager
99. Packet Message
100. Packet Capture Viewer
101. PPP Frame Message
102. Statistics / Status
103. Call Statistics (Current Scenario)
104. All Info
105. Voice
106. Data (FTP, PPP, Ping, HTTP)
107. Detailed Info
108. Call Statistics View
109. Call Result View
110. Call Event History View
111. Call Statistics (All Scenario)
112. EVDO Session Assignment Test)
113. Ping Status
114. TraceRT Status
115. Throughput Info
116. GPS Status
117. GPS Satellite Status
118. Logging Info
119. Communication Statistics
120. QPCH Statistics
121. User Define
122. Graph
123. Table
124. Summary Info
125. Cell Measurement

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- 1.1 WCDMA Graph
- 1.2 WCDMA Statistics
- 1.3 WCDMA Status
- 1.4 WCDMA Layer 3

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- 2.1 WQ Signal Graph Window
- 2.2 WQ Data Graph Window
- 2.3 WQ List Search Graph
- 2.4 WQ Step 1 Search Graph
- 2.5 WQ Step 2 Search Graph
- 2.6 WQ Step3 Search Graph
- 2.7 WQ Finger Graph
- 2.8 WQ Finger Information Ver2
- 2.9 WQ TA Search Graph / v WQ Finger TA Graph Ver2
- 2.10 WQ Delay Graph
- 2.11 WQ PSC Graph
- 2.12 WQ TPC History
- 2.13 WQ RACH Graph
- 2.14 WQ Cell Reselection Measurement
- 2.15 WQ CM Interfrequency Measurement
- 2.16 QC GSM All Signal Graph
- 2.17 QC GSM Layer1 Signal Searcher List
- 2.18 QC Compressed Mode GSM Measurement
- 2.19 QC GSM RR SACCH Measurement Report
- 2.20 QC GSM RR Cell Selection & Reselection Measurement
- 2.21 QC GSM Surrounding Cells
- 2.22 QC GPRS Power Control Graph
- 2.23 QC GPRS Neighboring Cell Information

Chapter 3. WCDMA Statistics Window
- 3.1 WQ Summary Statistics
- 3.2 WQ Vocoder Statistics
- 3.3 WQ RLC Statistics
- 3.4 QC GPRS RLC Statistics

Chapter 4. WCDMA Status Window
- 4.1 WQ Mobile Information
- 4.2 WQ Phone Status
- 4.3 WQ PRACH / RACH Information
- 4.4 WQ Handoff Information
- 4.5 WQ Pilot Sets Information
- 4.6 WQ BLER Information
- 4.7 WQ Physical Channel
- 4.8 WQ Transport Channel
- 4.9 WQ MAC Parameters
- 4.10 WQ Channel Mapping
- 4.11 WQ RLC Status
- 4.12 WQ RLC TM
- 4.13 WQ RLC UM
- 4.14 WQ RLC AM
- 4.15 WQ RLC Ciphering
- 4.16 QC GPRS Serving Cell Parameters
- 4.17 QC GPRS MAC State
- 4.18 QC GSM Information

Chapter 5. WCDMA Layer 3
- 5.1 WQ Cell Information
- 5.2 WQ RLC State
- 5.3 WQ RAB(SF) Information
- 5.4 System Information Block Pa
- 5.5 WQ NAS Mobility management
- 5.6 WQ NAS CS Connection management
- 5.7 WQ NAS PS Connection management
- 5.8 QC GPRS L1 Data Transfer Summary
- 5.9 QC GPRS L2 Data Transfer Summary
- 5.10 QC GSM State Window

model:GPS-5000

GPS Trainer

Feature

GPS technology is widely being used for PDA, Smart phone, Navigation system., etc.
GPS-5000 is the GPS training system enabling the user to acquire the skills of GPS technology through the practice of Satellite Position, GMT Time, Latitude, Longtitude, Speed, PDOP, HDOP, VDOP, TTFF Time,,etc using GPS Platform and Protocol.
User can also have a Software training bout GPS protocol, Analysis of GPS on Window CE Embedded OS.

Functions

- Understanding concept of GPS
- Measurement of Latitude & Longitude
- Analysis of NMEA-0183 protocol
- Study of DOP (PDOP, HDOP, VDOP)
- Development Windows CE based user application
- Debugging experience with serial port

Application Program

＊Embedded OS (Windows CE) on platform

＊GPS imformation viewer sample application
- GPS Viewer Software for analysis GPS signal.
- Data update every 1sec
- Monitoring GPS status.
  NMEA 0183 Protocol Data Output
  (GGA, GSA, GSV, RMC)
  SiRF Binary Protocol Output
  Data Reception
  Satellite Position
  GMT Time
  Latitude, Longitude
  Speed
  PDOP, HDOP, VDOP
  The Number of Fixed Satellite
  Average Time for Fix
  GPS Module Firmware Version

＊Grapical user interface application and source code
- Serial communication with GPS module
- Comport / Baud rate Setting
- Fast, Warm and Clod Start, Factory for GPS
- Simple GUI(Graphical User Interface) study
- Case study of graphical display method about GPS signal

Training contents

Part1, Introduce and GPS overview
1. Understanding GPS
2. Position calculation

Part2, Establishing GPS
1. Establishing link between GPS Satellite and GPS Trainer
2. Study of DOP
3. Measurement of Latitude and Longitude

Part3, GPS protocol study
1. NMEA-0183 Protocol
2. SiRF Binary

Part4, Analisys GPS releated protocol with software
1. Data analysis
2. Parsing NMEA data format

Part5, Introduce of Embedded OS system
1. Windows CE
2. Configuration study

Part6, Windows CE application
1. Build application
2. Debugging application

System cinfiguration


Platform board


Carring bag and Manual

Specification

∗CPU	ARM920T 400MHz Processor	
∗Memory	64MB SDRAM, 64MB NAND Flash	
∗Audio	Stereo Audio CODEC, Built-in Speaker	
∗Video	4.3 TFT LCD/480*272 Pixels/ 16.7M Colors	
∗Input device	Touch Screen, 4-Button	
∗Output	Data indication LED, Debug serial port	
∗Power	Input Voltage	DC +5V

∗GPS features		
- General	Channel	20
	Frequency	L1, 1575.42MHz
	CA Code	1.023MHz Chip Rate
- Accuracy	Position	10meters CEP without SA
	Velocity	0.1meters/second without SA
	Time	1microsecond synchronized to GPS time
- Sensitivity	Tracking	-157dBm
	Accquisition	-154dBm
- TTFF(Time to Fix)	Hot Start	1sec.
	Warm Start	38sec.
	Cold Start	42sec.
- Dynamic Condition	Altitude	1,800meters
	Velocity	<515meters/sec.
	Acceleration	4g
	Jerk	20meters/sec3
- Serial Communication	Interface	USB to Serial full duplex
	Baud rate	38400bps
	Protocol Message	NMEA-0183(default) or SiRF Binary

Software Specification

∗Operating System	Microsoft Windows CE 5.0
∗Application compiler	Microsoft Embedded Visual C++ 4.0
∗Development Language	C / C++

Others

∗PDOP : Percent Dilution of Position.	∗GPGGA : Global Positioning System Fix Data
∗TTFF : Time to First Fix.	∗GPGSV : GPS Satellites in View
∗HDOP : Horizonal Dilution of Precision	∗GPRMC : Recommended Minimmum data
∗VDOP : Vertical Dilution of Precision	∗GPGSA : GNSS DOP and Active Satellite
∗NMEA : The National Marine Elecrtronics Association	∗GNSS : Global Navigation Satellite Systems

Components

• Embedded system board with GPS module)	1 ea
• Carrage Bag	1 ea
• AC Adapter	1 ea
• Data Cable for debugging	1 ea
• External GPS Antenna (Optional)	1 ea
• Software CD	1 ea
• User's Manual	1 ea

model:MGT-1000

Mobile Game Trainer

Feature

This trainer enables user to learn about J2ME Programming, how to develop J2ME Mobile Games and J2ME Network Server/Client. Also the user can learn the porting and testing to J2ME Mobile games by connecting to real Cellular Mobile (GSM type).

Functions

1) A student can learn how to develop mobile games based on J2ME (Java2 Mobile Edition) Platform.
   Since this toolkit provide j2me tutorial, example code and Mobile Phone Emulator software.
2) A student can get advanced skill for developing mobile games with example code and
   Mobile Game Toolkit Server.
3) A student can get advanced skill for porting and testing mobile games to real cellular phone
   with example code and Mobile Game Toolkit Server.
4) Mobile Game Toolkit Server can be used Network Game Server when student develop
   mobile network game with using mobile phone Emulator.

Components

MGT Toolkit Server H/W	1 EA	Data cable	1 EA
Cellular phone	1 EA	Textbook	1book
Power cable	1 EA	Example programming CD	1 EA

System cinfiguration

<Platform board>

<Textbook>

<Software>

Hardware Specification

Processor Specification

CPU	INTEL ® Dual-Core Processor
Memory	1GB
HDD	SATA II 80GB
VGA	Integrated on the system board
Display	12.1" LCD Touch Screen Panel
Input	Touch Screen
Output	4 digit LED Display
Phone	GSM Phone

CD Provides

▶J2ME SDK
▶J2ME API sample source code
▶WAP Server Source code
▶Mobile Game sample source code

Training contents

Part1. J2ME Introduction
Chapter1. J2ME Introduction

Part2. J2ME API
Chapter2. J2ME MIDP Programming: SCREEN
Chapter3. J2ME MIDP Programming: ITEM
Chapter4. J2ME MIDP Programming: EVENT
Chapter5. J2ME MIDP Programming: GRAPHICS
Chapter6. J2ME MIDP Programming: Thread / Timer

Part3. J2ME Application
Chapter7. J2ME MIDP Programming: RMS
Chapter8. J2ME MIDP Programming: NETWORK

Part4. Mobile Game Programming
Chapter9. J2ME MIDP Game Programming
Chapter10. J2ME MIDP Programming: Graphic API
Chapter11. J2ME MIDP Programming: Audio API
Chapter12. J2ME MIDP Programming: Porting

Appendix1. Game practice - Honeybee

model:MGT-3000

Mobile Game Trainer

Feature

This trainer enables user to learn about J2ME Programming, how to develop J2ME Mobile Games and J2ME Network Server/Client. Also the user can learn the porting and testing to J2ME Mobile games by connecting to real Cellular Mobile (GSM type).

Functions

1) A student can learn how to develop mobile games based on J2ME (Java2 Mobile Edition) Platform.
   Since this toolkit provide j2me tutorial, example code and Mobile Phone Emulator software.
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   Mobile Game Toolkit Server.
3) A student can get advanced skill for porting and testing mobile games to real cellular phone
   with example code and Mobile Game Toolkit Server.
4) Mobile Game Toolkit Server can be used Network Game Server when student develop
   mobile network game with using mobile phone Emulator.

Components

MGT Toolkit Server H/W	1 EA	Data cable	1 EA
Cellular phone	1 EA	Textbook	1book
Power cable	1 EA	Example programming CD	1 EA

System cinfiguration

<Platform board>

<Textbook>

<Software>

Hardware Specification

Processor Specification

CPU	INTEL ® Dual-Core Processor
Memory	1GB
HDD	SATA II 80GB
VGA	Integrated on the system board
Display	17" LCD Touch Screen Panel
Input	Touch Screen
Output	4 digit LED Display
Phone	GSM Phone

CD Provides

▶J2ME SDK
▶J2ME API sample source code
▶WAP Server Source code
▶Mobile Game sample source code

Training contents

Part1. J2ME Introduction
Chapter1. J2ME Introduction

Part2. J2ME API
Chapter2. J2ME MIDP Programming: SCREEN
Chapter3. J2ME MIDP Programming: ITEM
Chapter4. J2ME MIDP Programming: EVENT
Chapter5. J2ME MIDP Programming: GRAPHICS
Chapter6. J2ME MIDP Programming: Thread / Timer

Part3. J2ME Application
Chapter7. J2ME MIDP Programming: RMS
Chapter8. J2ME MIDP Programming: NETWORK

Part4. Mobile Game Programming
Chapter9. J2ME MIDP Game Programming
Chapter10. J2ME MIDP Programming: Graphic API
Chapter11. J2ME MIDP Programming: Audio API
Chapter12. J2ME MIDP Programming: Porting

Appendix1. Game practice - Honeybee

model:Android -5000

Smart Phone Trainer

Overview

Smartphone is a mobile phone that offers more advanced computing ability and connectivity. Smartphones may be thought of as handheld computers integrated within a mobile telephone. a smartphone allows the user to install and run more advanced applications based on a specific platform.
Smartphones run complete operating system software providing a platform for application developers. So nowadays we can consider a smartphone as a Personal Pocket Computer (PPC) with mobile phone functions because these devices are mainly computers, although smaller ones than a desktop computer.
Growth in demand for advanced mobile devices boasting powerful processors, abundant memory, larger screens and open operating systems has outpaced the rest of the mobile phone market for several years.

1) SMART PHONE TRAINER has two Hardware system. One is Smart HD (high definition) Main board and the other is Smart ACA-100, which is Android development board based on ARM Cortex-A8. (Samsung S5PC100application processor)

2) S5PC100 Overview
S5PC100 is a 32-bit RISC cost-effective, low power, high performance micro-processor solution for mobile phones and general applications, and integrates CortexA8 which implements the ARM architecture V7-A with numerous peripherals to support.

To provide optimized H/W performance for the 3G & 3.5G communication services, S5PC100 adopts a 64-bit internal bus architecture and includes many powerful hardware accelerators for tasks such as motion video processing, display control and scaling.

Integrated Multi Format Codec (MFC) supports encoding and decoding of MPEG4, H.263, H.264 and decoding of MPEG2, VC1, Xvid. This H/W Encoder/Decoder supports real-time video conferencing and Analog TV out for NTSC and PAL mode, HDMI output for HDTV.

The S5PC100 has an optimized interface to external memory capable of sustaining the demanding memory bandwidth required in high-end communication services.

The memory system has Flash/ROM external memory ports for parallel access and DRAM port for high bandwidth. DRAM port can be configured to support mobile DDR, LPDDR2, and DDR2. Flash/ROM Port supports SLC/MLC NAND Flash, NOR Flash, OneNAND and ROM type external memory.

To reduce total system cost and enhance overall functionality, S5PC100 includes many hardware peripherals TFT 24-bit true color LCD controller, Camera Interface, MIPI DSI and CSI-2, System Manager for power management, CF+/ATA I/F, 4-channel UART, 24-channel DMA, 4- channel Timers, configurable General I/O Ports, 3-ch IIS, 2-ch S/PDIF, IIC bus interface, 3-ch HS-SPI, USB Host 1.1 operating at full speed(12Mbps), USB OTG 2.0 operating at high speed (480Mbps), 3-ch SD Host & High Speed Multi-Media Card Interface and PLLS for clock generation.

3) Android-5000 is useful for developing embedded system, MID, Navigation, PMP etc..
4) Android-5000 is consisted of Smart HD Main board and Smart ACA-100 Development board.
5) Smart HD Main board is based on Linux 2.6.29 kernel/BSP(Board Support Package) and Android eclair 2.1 are installed.
(1) Smart HD Main board includs 5" WVGA (800x480) TFT LCD, touch, Wifi, CIS Camera (3M pixel), USB2.0 Client, 1024x768 HDMI 720p, Audio Codec, MIC, Acceleration sensor, Grade sensor.
(2) Smart ACA-100 Development board includs 100M Ethernet, MultiICE, UART.
6) Software developer can use Smart HD Main board through Amart ACA-100 during development. After development, Software developer can use Smart HD Main board for own product or demo. Software developer can design application software, navigation, camera application, MP3, PMP(Portable Media Player), Game, DiVX player etc.
7) Smart HD Main board is a development platform for Android, middleware, API. It supplies Linux, Kernel Code, BSP, Android middleware, application software.

Feature

1) ARM Cortex A8 Samsung S5CPC100 Processor (833Mhz)
2) Smart HD Main board & ACA-100 Development board, Two System Architecture
3) Android 2.1 Eclair / Linux2.6.29 kernel/BSP included
4) Development Guide Manual for Linux/Android
5) Mobile DDR2 SDRAM 512MB, SD 2G/8G
6) Smart HD Main board : Wifi, USB2.0 Client, 1280x720 HDMI, 3M pixel Camera, 5"TFT LCD
7) Smart ACA-100 Development board : Ethernet 10/100Mbps, USB2.0 Client, FF-UART, ST-UART
8) 5" TFT LCD : HD WVGA (800x480) for Google Map and Video play
9) High Definition Multi Format Codec
   (1) Encoding of MPEG-4/H.263/H.264up to 30fps@HD(720p)
   (2) Decoding of MPEG-2/VC1/Xvid video up to 30fps@HD(720p)
10) Application Processor based on ARM Cortex A8 833MHz
   (1) S5PC100 is a low power ARM Cortex A8 processor
   (2) 2KB Instruction, 32KB data cache, 256KB L2 cache
   (3) MMU for Virtual Memory
   (4) VFP(vector floating point) coprocessor
11) Support peripherals :
   (1) 5" TFT 24-bit Color WVGA HD LCD (800x480), HDMI, AD Converter, 32-channel DMA, FIR, AC-97 Audio Codec, MIC, high speed USB 2.0 Client, SD, Touch screen(TSP), ADC, Acceleration sensor, Grade sensor

12) Smart HD Main board

Linux / Android	Linux 2.6.29 kernel, Google Android Eclair 2.1
Android Development	JNI, NDK, ADB Debugging
Internet	100Mbps Ethernet, Wifi ,Web Browsing
Music	MP3, MP4
Video port	HDMI port 1080p
TFT LCD	5" WVGA (800x480) HD TFT LCD
Communication Port	100M Ethernet, Wifi, USB2.0 Client

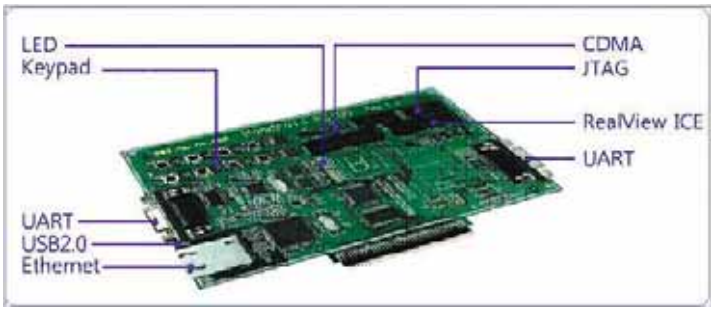
13) External port
14) Battery : Smart HD Main board has a Battery with 2600mAh.
15) Android v2.1 Software Features
   (1) Hardware control by C/C++, Application software program by JAVA
   (2) Application Framework : reuse, can be replaced components
   (3) Dalvik virtual machine for mobile
   (4) Integrated browser: Open Source WebKit engine
   (5) Optimized graphics : custorm 2D graphics library, 3D graphics by OpenGL ES 1.0
   (6) SQLite
   (7) Support audio, video, image format (MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, GIF)
   (8) Supports Wifi, Camera, Accelerometer

System Cinfiguration

1) Hardware Platform

2) Smart HD Main board

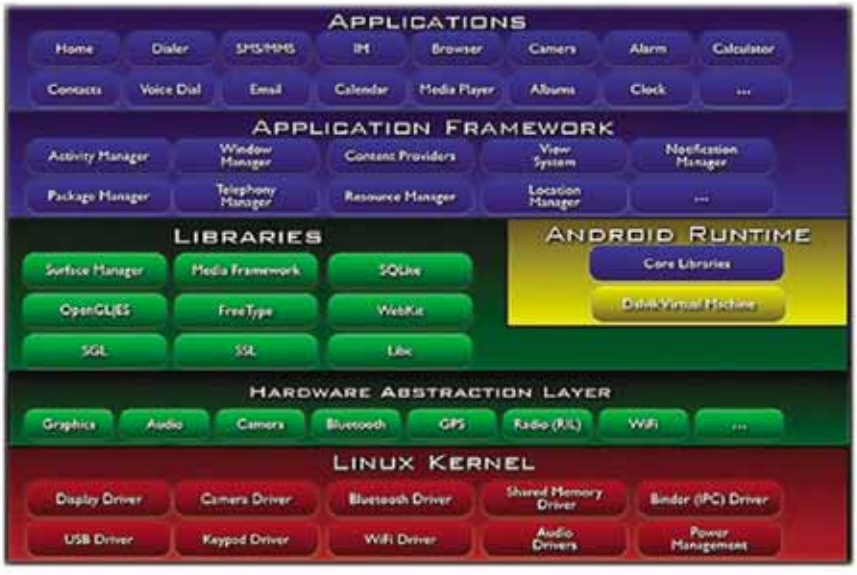
3) Smart ACA-100 Development board



4. Components

1) Smart HD Main board	1 ea
2) Smart ACA-100 Development board	1 ea
3) CD (Windows Embedded CE6.0 BSP, Data sheet, Circuit Diagram)	1 ea
Android S/W Program	1 ea
4) Cables [Serial(UART)/USB]	3 ea
5) AC Adapter	1 ea
6) Manual book	1 ea

5. Android Architecture



6. Android Applications [Android Application]

7. Android Development Environment [Android Application]

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   - 1.1. Mobile OS
   - 1.2. Smart Phone
   - 1.3. OHA
   - 1.4. Android
   - 1.5. Android Platform
   - 1.6. Android 5000 Overview
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   - 2.1. Install JDK
   - 2.2. Install Android SDK
   - 2.3. Install Android NDK
   - 2.4. Download Android Application
3. Item
   - 3.1. Text
   - 3.2. EditText
   - 3.3. Button
   - 3.4. Image
4. Layout
   - 4.1. LinearLayout
   - 4.2. RelativeLayout
   - 4.3. AbsoluteLayout
   - 4.4. FrameLayout
   - 4.5. TableLayout
5. Graphic
   - 5.1. Canvas
   - 5.2. Paint
   - 5.3. Bitmap
   - 5.4. Text
6. Input
   - 6.1. Event
   - 6.2. Touch
   - 6.3. Widget
7. Widget
   - 7.1. Dialog
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8. Android Application
   - 8.1. Application Component
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   - 8.3. DDMS
9. Basic practice of Application
   - 9.1. Basic practice of Application
   - 9.2. Construct Application
10. Application: Photo Viewer
    - 10.1. Application: Photo Viewer
    - 10.2. Construct Application
11. Application: PushPush Game
    - 11.1. Application: PushPush
    - 11.1. Construct Application
12. Application: Snake Game
    - 12.1. Application: Snake
    - 12.2. Construct Application
13. Application: Multimedia Player
    - 13.1. Application: Nultimedia Player
    - 13.2. Construct Application
14. Application: Google Web Viewer
    - 14.1. Application: Google Web Wiewer
    - 14.2. Construct Application

Specification

1) Hardware

CPU	S5PC100	ARM-CORTEX A8
Memory	DDR2(128MByte)X4	1. 128Mx8 DDR2 SDRAM 2. 32bit Data Bus with 333bps/pin double data rate (DDR)
SD Memory	T-Flash(Micro SD)x2	1. 2GByte T-Flash : System 2. 8GByte- Flash : Data
LCD	5.0Inch/ 380[cd]	800 x 480 24bit
Wi-Fi	Wireless Internet	1. High speed IEEE802.11b/g, 54Mbps data rate 2. SDIO interface 3. 2.4Ghz ISM band
Key Pad	Three Key Button	Home/Escape/Manu
Battery	Li Polymer=2600[mAh]	1. Full Operation: 6Hours
Smart ACA-100 Development Board		Ethemet UART Debug CPU Debugging JTAG
USB OTG 2.0	Console	Bettery Charging USB Client (USB Mini B type)
SPEAKER/MIC	1[W]	Internal Speaker/Microphone
EARPHONE_JACK	size 3.5Pie	General Phone Jack
Acceleration Sensor		Menu Scrolling/ Gaming/ Pedometer/ Display Profile switching, Game Applicarion
HDMI	1280x720(720p)	High definition display output
Power	AC/DC 5[v]3[A]	Power Charging
Power Management IC	GPIO/12C Controlling	Voltage Level Control 1.33[V] for 833Mhz Core Speed control

2) Android

Item	Specification
Bootloader	u-boot-1.1.6 u-boot-1.3.2
Operation System	Linux Kemel Source Linux-2.6.29
Filesystem	Application Framework, Dalvik virtual machine, Integrate browser, Optimized graphics, SQLite, Media, Blutooht, EDGE, 3G, WiFi, Camera, GPS, Accelerometer **Ver1.5(cupcake)** On-screen soft kdyboard, Home screen, Camera & Gallery, Bluetooth, Browser, Contacts, System, Google applications **Ver1.6(Donut)** Expanded Search Framework, Text-to-speech engine, Gestures, Accessiblility, Expanded support for screesn densities and resolutions **Ver2.1(Eclair)** Media Framework, Android virtual keyboard, Contacts and accounts, Messaging
SDK	ver:2.1 Eclair, Eclips ADT http://developer.android.com

model:PIC-16F874

PIC Trainer (PIC16F874)

Feature

The PIC Microcontroller System PIC- 16F874 is a training system for students to easily understand and access PIC microcontroller applications in the industry.
PIC-16F874 enables students to learn about the hardware theory and software programming methodology for each application as well as the basic theory of PIC and to understand the PIC theory and technology through examples and practices that can be implemented by students themselves.
The purpose of PIC-16F874 is to present various practices of clock, thermo/humidity meter, velocity-controlled motor, lock-key, etc. for students to understand technologies applicable to the industry and to provide a motive for development of enhanced embedded systems.
PIC-16F874 is designed to make it easy to learn software programming methodology as well as hardware theory of applications and to allow students to practice the whole training course of the embedded system.
It is expected that PIC-16F874 will help students understand the embedded system and will encourage interest in practices and increase utilization of applications.

Functions

- Applicable to on-site Embedded exercise per module
- Module by hardware and software, Training.
- Easy Embedded software Training.
- Hardware exercise is possible.
- Using a computer can be monitoring and control all function.
- Provides CD for exercise programming.

Application Program

- UART Communication control practice
- FND Display control practice
- RTC control practice
- Sensor control practice
- Motor control practice
- Encoder control practice
- LCD control practice
- Key Matrix control practice
- EEPROM control practice

System Configuration

<PC Application>

<Hardware board of PIC 16F874>

<PIC Compiler>

Training Contents

Hardware Specification

Controller Specification	
Chipset	PIC16F874
Operating speed	20MHz
Flash program memory	4K x 14bit words
Data memory	192 byte
EEPROM data memory	128 byte
Interface	USB to UART
Function	GPIO, External Interrupt, Timer, RTC, ADC, I2C, PWM
Device Specification	
FND	4 Array Digit 7-segment x 2ea
RTC	Leap year compensation valid up to 2100
SMD type Temp. Sensor	-55°C to +125°C
IC type Temp. Sensor	-55°C to +125°C, I2C
IC type Humidity Sensor	0-100% RH, I2C
DC Motor	mini DC motor

Component

Hardware Board	1EA	Clock sub-board	1EA	Temperature and Humidity sub-board	1EA
Motor control sub-board for	1EA	Lock-Key sub-board	1EA	Demo MCU Board	1EA
Practice MCU Board	1EA	Power cable	1EA	Data cable	1EA
Communication cable	1EA	Textbook	1 Book	Example programming CD	1EA
Installation guide manual	1 EA				

model:Microprocessor - 8051

Microprocessor Trainer

Feature

This is Microprocessor Trainer which is very useful for the students who want to learn about 8-bit micro-processor.
The detailed features can be described as below ;

1) Training system of 8-bit Microprocessor.
2) One module of 8051 Processor mounted.
3) 8051's Architecture, Assembler and Firmware practice.
4) Provide the manual book for Assembler and C language based 8051 module practice.
5) Provide various peripheral devices such as I/O Port, Dot Matrix, LCD, FND, Audio, Keypad, ADC/DAC, etc)

Functions

1) This trainer is designed one module of 8051.
2) Users can do the following pracices ;
   (1) Peripheral device control by using assembler language to one module.
   (2) Software and Hardware debugging practice.
3) The manual book is provided to manage Instruction and Program Status to be used as STEP Function.
4) The source program is provided for remote control and mutal communication & control through RS-232 cable by equipping 8051 module to Hardware platform.
5) C source code is provided which used for KEIL uVision 8051 Compiler by connecting 8051 (AT89C52) processor module.
6) Various peripheral devices like I/O Port, Dot Matriz is provided, and thus various experimental practice is available such as Step Motor speed, angle, LCD, FND, Audio, KEY, A / D, sensors, D / A test lab.
7) Lab test assembler, C source code and schematics are provided.

System configuration

1) Hardware Platform

2) Configuration

Components

Items	Num
Hardware platform	1 ea
8051 Processor module	1 ea
Parallel cable (for ISP)	1 ea
Serial cable	1 ea
USB cable	1 ea
Power cable	1 ea
Program CD	1 ea
Manual book for 8051 using Assembler and C language	1 book

Spec

1) H/W : Processor Module

Items	Specification
	8051
Processor	AT89S52
Flash memory	8KB
SRAM	256Byte
A/D Converter	8 CH ADC
Debug port	ISP port
Extension port	50Pin Connector

2) H/W : Base Board

Item	Specification
RS-232C Port	2EA
RS-422 Port	1EA
Digital I/O	DIP Switch – 8EA, Tack Switch – 1EA, LED – 8EA
7 Segment	2EA
Key Matrix	16EA(4 x 4)
Stepping Motor	1EA
A/D Converter	ADC0809 (8bit,8CH) – 1EA
RTC,EEPROM	RTC – 1EA, EEPROM – 1EA
D/A Converter	AD 9708 (8bit) – 1EA
DOT Matrix	3 Colors(8 x8) –1EA
Character	16 x 2 Line – 1EA
Graphic LCD	128 X 64 Graphic – 1EA
Sensor	Temp. Sensor –1 EA, Light Sensor – 1EA
Extension I/O Port	1EA (82C55-IO extension)
BUZZER	1EA
Speaker	1EA

3) S/W

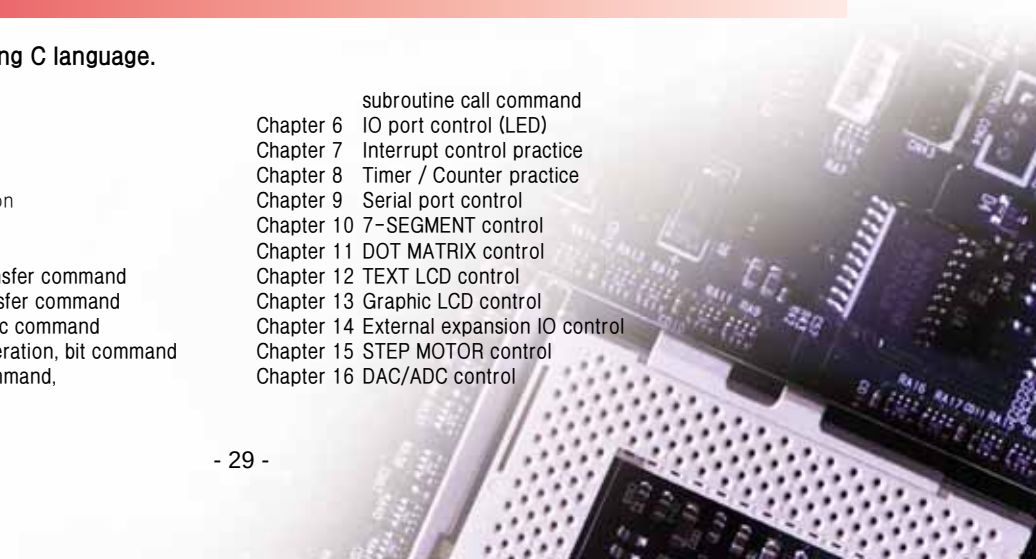
Item	Specification
8051	KEIL uVision 8051 related Assembler practice example

Training contents

*** 8051 design and application using C language.**

8051 overview and tools
- Basic understanding of 8051
- Description to Circuit
- Compiler, ISP DOWNLOADER
- Address decoder (CPLD) configuration
- Basic practice using KEIL UVISION
- Usage of KEIL UVISION DEBUG tool

Chapter 1 Assembly language, data transfer command
Chapter 2 Assembly language, data transfer command
Chapter 3 Assembly language, arithmetic command
Chapter 4 Assembly language, logic operation, bit command
Chapter 5 Assembly language jump command, subroutine call command
Chapter 6 IO port control (LED)
Chapter 7 Interrupt control practice
Chapter 8 Timer / Counter practice
Chapter 9 Serial port control
Chapter 10 7-SEGMENT control
Chapter 11 DOT MATRIX control
Chapter 12 TEXT LCD control
Chapter 13 Graphic LCD control
Chapter 14 External expansion IO control
Chapter 15 STEP MOTOR control
Chapter 16 DAC/ADC control



model:Microprocessor-AVR

Microprocessor Trainer

Feature

This is Microprocessor Trainer which is very useful for the students who want to learn about 8-bit micro-processor. This trainer has processor-module like AVR (Atmega 128).
The detailed features can be described as below ;

1) Training system of 8-bit Microprocessor.
2) One module like AVR (Atmega 128) Processor mounted.
3) AVR Architecture, Assembler and Firmware practice.
4) Practice of the initialized code analysis using Keil MDK-ARM, WinAVR compiler.
5) Provide the manual book for Assembler and C language based AVR module practice.
6) Provide various peripheral devices such as I/O Port, Dot Matrix, LCD, FND, Audio, Keypad, ADC/DAC, etc)

Functions

1) This trainer is designed one module of AVR to be easily replaced from Hardware platform.
2) Users can do the following pracices ;
   (1) Peripheral device control by using assembler language to three modules.
   (2) Booting the board through Keil MDK-ARM, WinAVR compiler.
   (3) Software and Hardware debugging practice.
3) The manual book is provided to manage Instruction and Program Status to be used as STEP Function.
4) The source program is provided for remote control and mutal communication & control through RS-232 cable by equipping AVR module to Hardware platform.
5) C source code is provided which used for Keil MDK-arm Compiler by connecting AVR (ATmega128) processor module.
6) Various peripheral devices like I/O Port, Dot Matriz is provided, and thus various experimental practice is available such as Step Motor speed, angle, LCD, FND, Audio, KEY, A / D, sensors, D / A test lab.
7) Lab test assembler, C source code and schematics are provided.

System configuration

1) Hardware Platform

2) Configuration

Components

Items	Num
Hardware platform	1 ea
AVR Processor module	1 ea
Parallel cable (for ISP)	1 ea
Serial cable	1 ea
USB cable	1 ea
Power cable	1 ea
Program CD	1 ea
Manual book for AVR using Assembler and C language	1 book

Spec

1) H/W : Processor Module

Items	Specification
	AVR
Processor	ATmega128
Flash memory	128KB
SRAM	4KB
A/D Converter	8 CH ADC
Debug port	ISP port
Extension port	50Pin Connector

2) H/W : Base Board

Item	Specification
RS-232C Port	2EA
RS-422 Port	1EA
Digital I/O	DIP Switch - 8EA, Tack Switch - 1EA, LED - 8EA
7 Segment	2EA
Key Matrix	16EA(4 x 4)
Stepping Motor	1EA
A/D Converter	ADC0809 (8bit,8CH) - 1EA
RTC,EEPROM	RTC - 1EA, EEPROM - 1EA
D/A Converter	AD 9708 (8bit) - 1EA
DOT Matrix	3 Colors(8 x8) -1EA
Character	16 x 2 Line - 1EA
Graphic LCD	128 X 64 Graphic - 1EA
Sensor	Temp. Sensor -1 EA, Light Sensor - 1EA
Extension I/O Port	1EA (82C55-IO extension)
BUZZER	1EA
Speaker	1EA
Case Dimension	530(W) x 350(D) x 215(H)mm

3) S/W

Item	Specification
AVR	WinAVR related C language practice example

Training contents

*** 8051 AVR design and application using C language**

AVR overview and tools
- Basic understanding of AVR
- CPU Core, Single Level Pipelining
- General Purpose Register File
- X-register, Y-register, and Z-register
- Stack Pointer, RAM Page Z Select Register-RAMPZ
- Command execution timing. Reset and Interrupt handling
- Interrupt response time, Memory
- Compiler (WinAVR) install and tool usage

Chapter 1 Debugger example practice I
Chapter 2 Debugger example practice II
Chapter 3 Debugger example practice III
Chapter 4 GPIO LED control
Chapter 5 Interrupt
Chapter 6 types of Interrupt
Chapter 7 External LED control
Chapter 8 FND control
Chapter 9 Character LCD control
Chapter 10 Dot Matrix control
Chapter 11 Graphic LCD control
Chapter 12 Dip Switch control
Chapter 13 Key Pad control
Chapter 14 Step Moter control
Chapter 15 Buzzer control
Chapter 16 USART control

model:Microprocessor-Cortex-M3

Microprocessor Trainer

Feature

This is Microprocessor Trainer which is very useful for the students who want to learn about32-bit micro-processor. This trainer has one processor-module like Cortex-M3.
The detailed features can be described as below ;

1) Training system of 32-bit Microprocessor.
2) One module like Cortex-M3 Processor mounted.
3) Cortex-M3 Architecture, Assembler and Firmware practice.
4) Practice of the initialized code analysis using Keil MDK-ARM, WinAVR compiler.
5) Provide the manual book for Assembler and C language based Cortex-M3 module practice.6) Provide various peripheral devices such as I/O Port, Dot Matrix, LCD, FND, Audio, Keypad, ADC/DAC, etc)

Functions

1) This trainer is designed one module of Cortex-M3 to be easily replaced from Hardware platform.
2) Users can do the following pracices ;
   (1) Peripheral device control by using assembler language to three modules.
   (2) Booting the board through Keil MDK-ARM, WinAVR compiler.
   (3) Software and Hardware debugging practice.
3) The manual book is provided to manage Instruction and Program Status to be used as STEP Function.
4) The source program is provided for remote control and mutal communication & control through RS-232 cable by equipping Cortex-M3 module to Hardware platform.
5) C source code is provided which used for Keil MDK-arm Compiler by connecting Cortex-M3 (STM32) processor module.
6) Various peripheral devices like I/O Port, Dot Matriz is provided, and thus various experimental practice is available such as Step Motor speed, angle, LCD, FND, Audio, KEY, A / D, sensors, D / A test lab.
7) Lab test assembler, C source code and schematics are provided.

System configuration

1) Hardware Platform

2) Configuration

Components

Items	Num
Hardware platform	1 ea
Cortex-M3 Processor module	1 ea
Parallel cable (for ISP)	1 ea
Serial cable	1 ea
USB cable	1 ea
Power cable	1 ea
Program CD	1 ea
Manual book for Cortex-M3 using Assembler and C language	1 book

Spec

1) H/W : Processor Module

Items	Specification
	Cortex-M3
Processor	STM32F103
Flash memory	32KB
SRAM	6KB
DMA	7CH DMA
A/D Converter	16CHADC
USB	USB2.0 Client
Debug port	JTAG port
SD Card	SD Card *1 port
Ethernet	SPI Ethernet controller
Extension port	50Pin Connector

2) H/W : Base Board

Item	Specification
RS-232C Port	2EA
RS-422 Port	1EA
Digital I/O	DIP Switch - 8EA, Tack Switch - 1EA, LED - 8EA
7 Segment	2EA
Key Matrix	16EA(4 x 4)
Stepping Motor	1EA
A/D Converter	ADC0809 (8bit,8CH) - 1EA
RTC,EEPROM	RTC - 1EA, EEPROM - 1EA
D/A Converter	AD 9708 (8bit) - 1EA
DOT Matrix	3 Colors(8 x8) -1EA
Character	16 x 2 Line - 1EA
Graphic LCD	128 X 64 Graphic - 1EA
Sensor	Temp. Sensor -1 EA, Light Sensor - 1EA
Extension I/O Port	1EA (82C55-IO extension)
BUZZER	1EA
Speaker	1EA
Case Dimension	530(W) x 350(D) x 215(H)mm

3) S/W

Item	Specification
Cortex-M3	KEIL MDK- ARM related C language practice example

Training contents

*** Cortex-M3 design and application using C language**

Cortex-M3 overview and tools
- Introduction of Cortex-M3
- Structure of Cortex-M3
- CortexM3 Pin configuration
- Programming tool
- Compiler (KEIL MDK ARM) installation
- How to use the development tool.

Chapter 1 GPIO LED control
Chapter 2 LED control
Chapter 3 Interrupt
Chapter 4 External LED control
Chapter 5 FND control
Chapter 6 Character LCD control
Chapter 7 Dot Matrix control
Chapter 8 Graphic LCD control
Chapter 9 Dip Switch control
Chapter 10 Key Pad control
Chapter 11 Step Moter control
Chapter 12 Buzzer control
Chapter 13 USART control

model:Microprocessor - 8051.AVR.Cortex-M3

Microprocessor Trainer

Feature

This is Microprocessor Trainer which is very useful for the students who want to learn about 32-bit / 8-bit micro-processor. This trainer has three processor-modules like 8051, AVR, Cortex-M3.
The detailed features can be described as below ;

1) Training system of 32-bit, 8-bit Microprocessor.
2) Three modules like Cortex-M3, AVR, 8051 Processor mounted.
3) Cortex-M3, AVR, 8051's Architecture, Assembler and Firmware practice.
4) Practice of the initialized code analysis using Keil MDK-ARM, WinAVR compiler.
5) Provide the manual book for Assembler and C language based Cortex-M3, AVR, 8051 module practice.
6) Provide various peripheral devices such as I/O Port, Dot Matrix, LCD, FND, Audio, Keypad, ADC/DAC, etc)

Functions

1) This trainer is designed three modules of Cortex-M3, AVR, 8051 to be easily replaced from Hardware platform.
2) Users can do the following pracices ;
   (1) Peripheral device control by using assembler language to three modules.
   (2) Booting the board through Keil MDK-ARM, WinAVR compiler.
   (3) Software and Hardware debugging practice.
3) The manual book is provided to manage Instruction and Program Status to be used as STEP Function.
4) The source program is provided for remote control and mutal communication & control through RS-232 cable by equipping Cortex-M3, AVR, 8051 modules to Hardware platform.
5) C source code is provided which used for Keil MDK-arm Compiler by connecting Cortex-M3 (STM32) processor module.
6) C source code is provided which used for Keil MDK-arm Compiler by connecting AVR (ATmega128) processor module.
7) C source code is provided which used for Keil MDK-arm Compiler by connecting 8051 (AT89C52) processor module.
8) Various peripheral devices like I/O Port, Dot Matriz is provided, and thus various experimental practice is available such as Step Motor speed, angle, LCD, FND, Audio, KEY, A / D, sensors, D / A test lab.
9) Lab test assembler, C source code and schematics are provided.

System configuration

1) Hardware Platform

2) Configuration

Components

Items	Num
Hardware platform	1 ea
8051 Processor module	1 ea
AVR Processor module	1 ea
Cortex-M3 Processor module	1 ea
Parallel cable (for ISP)	1 ea
Serial cable	1 ea
USB cable	1 ea
Power cable	1 ea
Program CD	1 ea
Manual book for 8051 using Assembler and C language	1 book
Manual book for AVR using Assembler and C language	1 book
Manual book for Cortex-M3 using Assembler and C language	1 book

Spec

1) H/W : Processor Module

Items	Specification		
	Cortex-M3	AVR	8051
Processor	STM32F103	ATmega128	AT89S52
Flash memory	32KB	128KB	8KB
SRAM	6KB	4KB	256Byte
DMA	7CH DMA		
A/D Converter	16CHADC	8 CH ADC	
USB	USB2.0 Client		
Debug port	JTAG port	ISP port	ISP port
SD Card	SD Card *1 port		
Ethernet	SPI Ethernet controller		
Extension port	50Pin Connector	50Pin Connector	50Pin Connector

2) H/W : Base Board

Item	Specification
RS-232C Port	2EA
RS-422 Port	1EA
Digital I/O	DIP Switch - 8EA, Tack Switch - 1EA, LED - 8EA
7 Segment	2EA
Key Matrix	16EA(4 x 4)
Stepping Motor	1EA
A/D Converter	ADC0809 (8bit,8CH) - 1EA
RTC,EEPROM	RTC - 1EA, EEPROM - 1EA
D/A Converter	AD 9708 (8bit) - 1EA
DOT Matrix	3 Colors(8 x8) -1EA
Character	16 x 2 Line - 1EA
Graphic LCD	128 X 64 Graphic - 1EA
Sensor	Temp. Sensor -1 EA, Light Sensor - 1EA
Extension I/O Port	1EA (82C55-IO extension)
BUZZER	1EA
Speaker	1EA
Case Dimension	530(W) x 350(D) x 215(H)mm

3) S/W

Item	Specification
Cortex-M3	KEIL MDK- ARM related C language practice example
AVR	WinAVR related C language practice example
8051	KEIL uVision 8051 related Assembler practice example

Training contents

1) 8051 design and application using C language.

8051 overview and tools

- Basic understanding of 8051
- Description to Circuit
- Compiler, ISP DOWNLOADER
- Address decoder (CPLD) configuration
- Basic practice using KEIL UVISION
- Usage of KEIL UVISION DEBUG tool

Chapter 1 Assembly language, data transfer command (1)
Chapter 2 Assembly language, data transfer command (2)
Chapter 3 Assembly language, arithmetic command
Chapter 4 Assembly language, logic operation, bit command
Chapter 5 Assembly language jump command, subroutine call command
Chapter 6 IO port control (LED)
Chapter 7 Interrupt control practice
Chapter 8 Timer / Counter practice
Chapter 9 Serial port control
Chapter 10 7-SEGMENT control
Chapter 11 DOT MATRIX control
Chapter 12 TEXT LCD control
Chapter 13 Graphic LCD control
Chapter 14 External expansion IO control
Chapter 15 STEP MOTOR control
Chapter 16 DAC/ADC control

2) AVR design and application using C language

AVR overview and tools

- Basic understanding of AVR
- CPU Core, Single Level Pipelining
- General Purpose Register File
- X-register, Y-register, and Z-register
- Stack Pointer, RAM Page Z Select Register-RAMPZ
- Command execution timing. Reset and Interrupt handling
- Interrupt response time, Memory
- Compiler (WinAVR) install and tool usage

Chapter 1 Debugger example practice I
Chapter 2 Debugger example practice II
Chapter 3 Debugger example practice III
Chapter 4 GPIO LED control
Chapter 5 Interrupt
Chapter 6 types of Interrupt
Chapter 7 External LED control
Chapter 8 FND control
Chapter 9 Character LCD control
Chapter 10 Dot Matrix control
Chapter 11 Graphic LCD control
Chapter 12 Dip Switch control
Chapter 13 Key Pad control
Chapter 14 Step Moter control
Chapter 15 Buzzer control
Chapter 16 USART control

3) Cortex-M3 design and application using C language

Cortex-M3 overview and tools

- Introduction of Cortex-M3
- Structure of Cortex-M3
- CortexM3 Pin configuration
- Programming tool
- Compiler (KEIL MDK ARM) installation
- How to use the development tool.

Chapter 1 GPIO LED control
Chapter 2 LED control
Chapter 3 Interrupt
Chapter 4 External LED control
Chapter 5 FND control
Chapter 6 Character LCD control
Chapter 7 Dot Matrix control
Chapter 8 Graphic LCD control
Chapter 9 Dip Switch control
Chapter 10 Key Pad control
Chapter 11 Step Moter control
Chapter 12 Buzzer control
Chapter 13 USART control

model:FPGA / SoC-5000

FPGA / SoC Trainer

Feature

This SoC training system use FPGA and ARM926 for SoC design.
In addition to the experience of digital design from FPGA using VHDL/Verilog, this SoC trainer provides the implementation method as well as the practice metrials how to apply to SoC using ARM

1) Understanding the ARM926 Processor usage and H/W & S/W Co-Design education
2) Implementation education using FPGA and ARM926 core for SoC design
3) Hardware Verification : ARM Debugger and ICE equipment
4) Software Verification : ARM Debugger/Firmware/Compiler
5) FPGA and ARM design theme, embedded systems (Linux)
6) Very Easy SoC education using EasyIP v1.0

Functions

1) A design theme consists of FPGA and ARM926 core based example.
2) Verilog HDL/VHDL implement for FPGA operation, and then able to control of ARM using the same design
3) SoC development environment is designed to provide an easy to use and allows users to quickly implement FPGA logics.
   (1) Altera Quartus II software design environment
   (2) 1M gates Altera Cyclone II FPGA and rapid processing speed (XilinX Gate count = 2M Gates)
   (3) Verilog HDL/ VHDL Easy IP v1.0 make graphic library and then easy to make user design.
   (4) Able to understand the IP reuse and AMBA bus interconnect.
   (5) ARM926EJ Core.
   (6) ARM926(Max speed 226MHz) SoC Processor, AHB2.0 Bus, Available the RTOS porting.
   (7) Provides an wrapper and register for development.
   (8) Hardware verification with ARM Debugger
   (9) Able to implement new firmware or application code with ARM IDE environments
4) We provide EasyIP v1.0 for AMBA bus design and support many peripheral for a number of design theme.

Multimedia in	Multimedia out	Memory	Comm. and interfaces	Control
TV Decoder	TV Encoder	DPRAM(48KB)	ADC / DAC	Step Motor
CIS / DMB	VGA / TFT	SRAM(1MB)	UART, USB	Dot Matrix, FND
Line In	Line Out / Speaker		PS2,IrDA	S/W, Text-LCD

Components

Items		Num
Main Hardware Platform (including carrying bag)		1 ea
Cable and Power	1) Serial 9P extension cable	1 ea
	2) Parallel 25P extension cable	1 ea
	3) Ethernet Cross cable	1 ea
	4) Adaptor (5V/4A)	1 ea
Download Dongle (Byte Blaster II Parallel type)		1 ea
Program CD		1 ea
Others - Camera module (CIS-200M)		1 ea
Manual book		1 book

Specification

1) Hardware spec

Item	Specifications
CPU	ARM926EJ-S Core / AMBA 2.0 Compliant
CPU Clock	Core MAX. 266MHz
Bus	AMBA 2.0 AHB, APB, ASB
DDRAM	64MB DDRAM (16BIT, 133) MAX 128MB
FLASH	16MB (Serial Flash) MAX 64MB
USB Host	Two USB 2.0 Host
USB CLIENT	One USB 2.0 Client Interface
Ethernet	One 10M/100Mbps Controller
UART	Three CPU UART / One FPGA UART
Audio Codec	WM8711 Stereo Codec, Mic Port, Headphone Port, Speaker Connector
I^2C	I^2C Port Connector
Debugging Port	20-Pin Header for Multi-ICE(ARM Debugger)
FPGA	Cyclone II 100M Gates FBGA672-8
Debugging Port	FPGA JTAG : 10-Pin JTAG(AS Mode / JTAG Mode) USB(PC) to GPIO(FPGA) Interface
SRAM	1MB (512KB × 2EA)
User I/O	CPU : 6 GPIO
	FPGA : 9 Push Switch , 8LEDs, 1 DIP Switch, PS2 I/F Dot-Matrix,
	7-Segment, TEXT-LCD, IrDA External Clock 2EA.
	Switch able 60PIN
Motor	STEP Motor
VGA	16Million Colors
CIS2M Connector	2M Color CIS Sensor Module(Option)
AD/DA(FPGA)	12-BIT, 20MHz MSPS A/D Converter
	12-BIT, 125 MSPS D/A Converter
TV Input/Output	CVBS Encoder/Decoder (ITU-601, 656 Format)
Display	4.3" Color TFT LCD (480x272)
Audio	1W Speaker / Line In / Out
Power Supply	AC220V(Input) DC5V 4A(Output) Adaptor

2) Software spec

Item	Specifications
Compiler	ARM ADS/RVDS C Compiler, Debugger, Assembler
	Multi ICE/RV-ICE ARM Emulator (Option)
Easy IP - AMBA	EIP-Matrix
	EIP-AHB2AHB Bridge
	EIP-AHB2APB Bridge
Easy IP - APB	EIP-User I/O Controller (LED, 7-Segment, TEXT-LCD Dot-Matrix)
	EIP- Step Motor Controller
	EIP- PS2 Controller
	EIP-UART Controller
	EIP-IrDA Controller
	EIP-Interrupt Controller
	EIP-Timer Controller
Easy IP - AHB ·	EIP-Audio Controller
	EIP-A/D Controller
	EIP-CIS Controller
	EIP-CVBS Decoder Controller
	EIP-CVBS Encoder Controller
	EIP-D/A Controller
	EIP-DMA Controller
	EIP-DMB Controller
	EIP-SRAM Controller
	EIP-TFT-LCD Controller
	EIP-VGA Controller

System cinfiguration

• Hardware Platform

Training contents

Chapter 1 Introduce to SoC and design methodology
- 1.1 – Introduction
- 1.2 – SoC concept and
- 1.3 – SoC design method
- 1.4 – SoC design process
- 1.5 – SoC training system for SoC design
- 1.6 – Software for SoC design

Chapter 2 Understanding the SoC architecture using ARM processor
- 2.1 – Pocessor design theory
- 2.2 – Processor Block Diagram
- 2.3 – Memory Map

Chapter 3 AMBA 2.0 Specification (Advanced MicroController Bus Aritecture)
- 3.1 – Key to timing diagram conventions
- 3.2 – Introduction to AMBA
- 3.3 – amba Signals
- 3.4 – AMBA AHB
- 3.5 – AMBA APB

Chapter 4 Introduce to development tools : ALTERA and ARM tools
- 4.1 – Altera Quartus– II / ModelSim, ADS / Multi–ICE installation and run
- 4.2 – ARM Developer Suit (ADS) / Multi – ICE installation and run

Chapter 5 EasySoC Specification
- 5.1 – Introduction
- 5.2 – Part Names of Hardware platform
- 5.3 – Block diagram
- 5.4 – Features of the training system
- 5.5 – Components of training system
- 5.6 – Specification of training system
- 5.7 – Switch and mode
- 5.8 – FPGA Pin number

Chapter 6 Implement of LED,7-Segment Controller using FPGA
- 6.1 – Introduction
- 6.2 – Explanation of LED and 7–Segment configuration and operating.
- 6.3 – Operating of LED and 7–Segment
- 6.4 – Creating project to design the Watch using LED and 7–Segment
- 6.5 – Watch design using LED and 7–Segement
- 6.6 – Source code making
- 6.7 – Project Compling
- 6.8 – Verification using ModelSim–Altera Simulator
- 6.9 – Verification using SoC

Chapter 7 Implement of LED,7-Segment Controller using ARM [926EJ-S(APB)]
- 7.1 – Introduction
- 7.2 – Understanding of EasySoC system structure using LED and 7–Segment EasyIP
- 7.3 – Creating LED and 7–Segment Control IP AMBA connection project.
- 7.4 – Contol of LED, 7–Segment using Multi–ICE and AXD
- 7.5 – Analysis of LED and 7–Segment EasyIP design source file

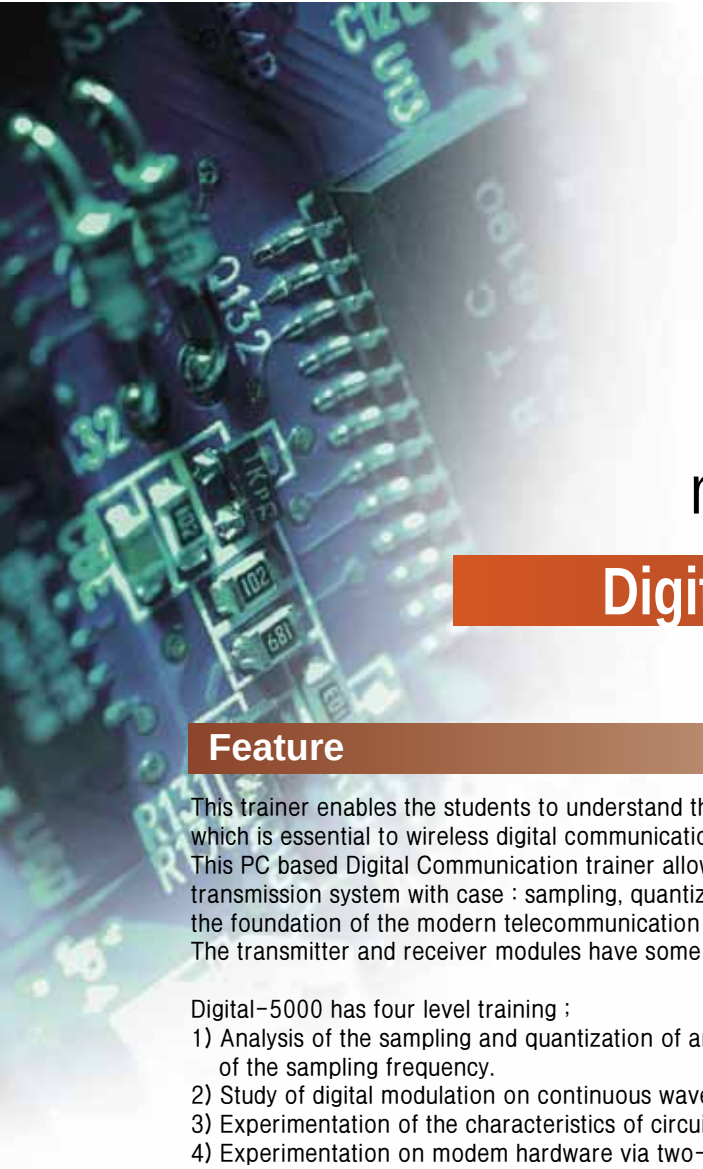
Chapter 8 Implement of Text-LCD Controller using FPGA
- 8.1 – Introduction
- 8.2 – Explanation of Text–LCD configuration and operating.
- 8.3 – Operation of Text–LCD
- 8.4 – Creating the Text–LCD Controller design project.
- 8.5 – Text–LCD Controller design.
- 8.6 – Source code making
- 8.7 – Verification using ModelSim–Altera Simulator
- 8.8 – Verification using SoC

Chapter 9 Implement of Text-LCD Controller using ARM (926EJ-S)
- 9.1 – Introduction
- 9.2 – Understanding of SoC system structure using Text–LCD EasyIP.
- 9.3 – Creating the Text–LCD Control IP AMBA connection project.
- 9.4 – Text–LCD control using Multi–ICE and AXD.
- 9.5 – Analysis of Text–LCD EasyIP design file.

Chapter 10 Implement of Dot Matrix Controller using FPGA
- 10.1 – Introduction
- 10.2 – Explanation of Dot Matrix configuration and operating
- 10.3 – Operation of Dot Matrix
- 10.4 – Creating the Dot Matrix Controller design project
- 10.5 – Dot Matrix Controller design
- 10.6 – Source code making
- 10.7 – Project compiling
- 10.8 – Verification using ModelSim–Altera Simulator
- 10.9 – Verification using SoC

Chapter 11 Implement of Dot Matrix Controller using ARM926EJ-S
- 11.1 – Introduction
- 11.2 – Understanding of SoC system structure using Dot Matrix EasyIP.
- 11.3 – Creating the Dot Matrix IP AMBA connection project.
- 11.4 – Control of Dot Matrix using Multi–ICE and AXD.
- 11.5 – Analysis of Dot Matrix EasyIP design source file.

Chapter 12 Implement of UART Controller using FPGA
- 12.1 – Introduction
- 12.2 – Explanation of UART Configuration and operating
- 12.3 – Operation of UART
- 12.4 – Creating the UART Controller design project.
- 12.5 – Design of UART Controller
- 12.6 – Source code making



model:Digital-5000

Digital Communication Trainer

Feature

This trainer enables the students to understand the basic concept of sampling and Modulation & Demodulation which is essential to wireless digital communication system.
This PC based Digital Communication trainer allows to cover the theory and the practice of the different stages of transmission system with case : sampling, quantization, modulation and demodulation which are essential to lay the foundation of the modern telecommunication network.
The transmitter and receiver modules have some test points prepared for the monitoring of the signals.

Digital-5000 has four level training ;
1) Analysis of the sampling and quantization of analogical signals, with graphical experiments of the effect of the sampling frequency.
2) Study of digital modulation on continuous wave in amplitude, frequency and phase.
3) Experimentation of the characteristics of circuit alternatives on graphics by computer simulation.
4) Experimentation on modem hardware via two-wire coaxial cable.

This trainer is very easy to set up, designed both for graphic demonstrations of the theory explained in class, and for the student to carry out very attractive practices with basic instrumentation.

Functions

- Understanding concept of Digital Communication
- Modulation / Demodulation
- Analog-to-Digital Converter, Digital-to-Analog Converter
- Text tranceiving (using symbol synchronization) is shown on GUI
- Time Domain Analysis (Modulated waveform display on GUI)
- Frequency Domain Analysis (Spectrum display on GUI)
- Constellation Display
- Signal capturing for display on PC screen
- Signal Probing on board with custom test equipment

Components

Items	Num
Transmitter board	1 ea
Receiver board	1 ea
UART Cable with RS232 Connector	2 ea
SMA Cable for digital communication	2 ea
AC Adapter (DC 5V-IN)	2 ea
Software installation CD	1 ea
User's Manual	1 ea

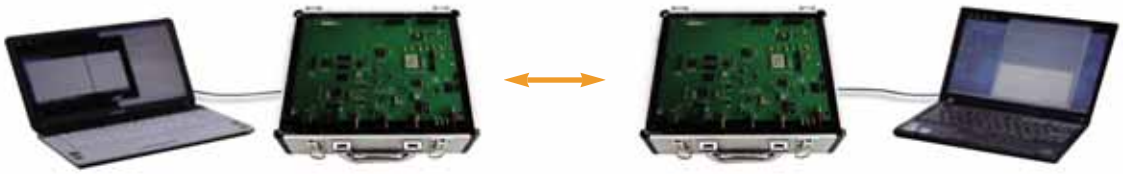
Application Program

* Grapical user interface application
- Time Domain Analysis
- Frequency Spectrum Analysis
- Constellation
- Received Message
- Ether-Net communication with PC

Training contents

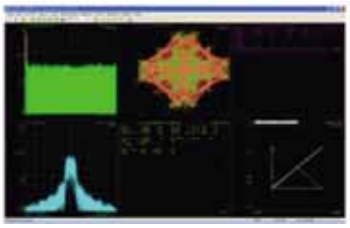
Chapter1. Digital Communication Introduction
Chapter2. Sine Waveform Generation
Chapter3. ASK (Amplitude Shift Keying)
Chapter4. FSK (Frequency Shift Keying)
Chapter5. PSK (Phase Shift Keying)
Chapter6. DPSK (Differential PSK)
Chapter7. QPSK (Quadrature Phase Shift Keying)
Chapter8. OQPSK (Offset QPSK)
Chapter9. 8-PSK (8 Phase Shift Keying)
Chapter10. MSK (MInumum Shift Keying)
Chapter11. WCDMA (3GPP Uplink)

System cinfiguration



(Transmitter) (Receiver)

Platform board



Software screen shot

Specification

Div	Spec
Modem for Digital Communication	Xilinx FPGA
ADC (Analog-to-Digital Converter)	AD9248
DAC (Digital-to-Analog Converter)	AD9767
Main Clock	OSC (40MHz)
CPU	ATMEGA128L
UART Connector	Interface : RS232
Power	Input Voltage : DC +5V

model:DSP-5000

DSP Trainer

Feature

The DSP System [Digital Signal Processing System] DSP-5000 is a training system for students to easily understand and access DSP applications in multimedia (audio, video) industries.
DSP-5000 enables students to learn about the basic DSP theory and software programming method associated with audio and video processing and to understand the DSP theory and technology for audio/video signal processing through examples and practices that can be implemented by students themselves.
The purpose of DSP-5000 is to present various practices of Audio Spectrum Analyzer, Graphic Equalizer, Brightness conversion and Edge detect for students to understand the basic technologies of audio/video processing and to provide a motive for development of enhanced audio/video signal processing systems.
It is expected that DSP-5000 will help students understand DSP by learning the theory and software programming method for audio/video applications and encourage interest in DSP and utilization of applications.

Functions

- High-speed DSP system design is enabled, by using TMS320C6457-1GHz DSP Processor.
- Applicable to on-site DSP exercise
- Module by theory and software, Training.
- Provide Example DSP software source.
- Received signal using a CCD camera
- Using a computer can be monitoring and control all function.
- Provides CD for exercise programming.

Application Program

- Audio Spectrum analyzer.
- 2-Channel Graphic Equalizer.
- Frequency Amp
- n-point Running Average Filter
- Histogram Graph
- Contrast conversion
- Brightness conversion
- Threshold process
- Negative color
- Edge Detect

System Configuration

<PC Application>

<DSP Trainer>

<DSP Compiler>

Training Contents

Part1. Introduction of Digital Signal Processing Processor Trainer (DSP-5000)
- Chapter1. Introduction of Digital Signal Processing Processor Trainer (DSP-5000)
- Chapter2. Sound Processing DSP
- Chapter3. Image Processing DSP
- Chapter4. Understanding to DSP processor

Part2. Sampling and Aliasing theory and practice
- Chapter5. C-to-D and Aliasing practice
- Chapter6. Strobe practice
- Chapter7. D-to-C practice

Part3. FIR Filters theory and practice
- Chapter8. Running average filter practice
- Chapter9. M-th order FIR filter practice
- Chapter10. LTI System practice
- Chapter11. FIR Filter Frequency Response practice

Part4. Z-Transforms theory and practice
- Chapter12. z-Transform practice
- Chapter13. Null-ing Filter, L-Point Running Sum Filter practice
- Chapter14. Band pass Filter practice

Part5. IIR Filters theory and practice
- Chapter15. First-order IIR filter practice
- Chapter16. Three Domains theory and practice
- Chapter17. Second-order IIR filter practice

Part6. Audio Spectrum Analyzer Software practice
- Chapter18. Periodic signal spectrum analyzing practice using FFT
- Chapter19. Non-periodic signal spectrum analyzing practice using FFT
- Chapter20. Spectrogram practice

Part7. Graphic Equalizer Software practice
- Chapter21. 1-Channel Graphic Equalizer practice using Frequency Amp
- Chapter22. 2-Channel Graphic Equalizer practice using Frequency Amp
- Chapter23. 2-Channel Graphic Equalizer practice using n-point Running Average Filter

Part8. Brightness conversion Software practice
- Chapter24. Contrast adjustment using Histogram (Histogram Smoothing)
- Chapter25. Brightness adjustment using Histogram

Part9. Edge Detection Software practice
- Chapter26. Color Reversal using Segmentation
- Chapter27. Edge Detection using Segmentation

Hardware Specification

Processor Specification	
Chipset	TMS320C6457-1000Mhz
Frequency (MHz)	1000
On-Chip L1/SRAM	64 KB
On-Chip L2/SRAM	2048 KB
Device Specification	Differentiation
DDR2 DRAM	128 M Byte
NAND Flash	64 M Byte
NOR Flash	16 M Byte
FIFO	IDT72V831
Video Decoder	SAA7111AH
Audio Codec	AIC33
CCD Camera	30mm
USB, UART	FTDI Chipset
JTAG	JTAG

Component

DSP-5000 Mother Board	1EA	Demo DSP Sub Board	1EA	Practice DSP Sub Board	1EA
Power cable	1EA	Data cable	1EA	Textbook	1book
Example programming CD	1EA	Installation guide manual	1 book		

company history

2005
Establishment of Good-Tech Corporation

2006 ~ 2011
Developed GSM/GPRS, Cellular mobile trainer

Developed WCDMA, Cellular mobile trainer

Developed GSM/GPRS, Cellular mobile network analyzing solution

Developed GSM/GPRS & WCDMA, Cellular mobile network analyzing solution

Developed GPS Trainer

Developed Mobile game trainer

Developed SMART phone trainer

Developed Microprocessor Trainer

Developed FPGA/SoC Trainer

Developed PIC Trainer

Developed Digital Communication Trainer

Developed DSP Trainer

good·Tech

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