

model:GPS-5000

GPS Trainer

Feature

- 1) GPS technology is widely being used for PDA, Smart phone, Navigation system., etc.
- 2) 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, Longitude, Speed, PDOP, HDOP, VDOP, TTFF Time, etc using GPS Platform and Protocol.
- 3) User can also have a Software training on GPS protocol, Analysis of GPS on Window based OS.

Functions

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

Components

1) Embedded system board with GPS module	1 ea
2) External GPS Antenna	1 ea
3) AC Adapter (5V, 4A)	1 ea
4) USB cable for external power	1 ea (equipped to hardware system)
5) Single wire serial cable	1 ea (equipped to hardware system)
6) Software CD	1 ea
7) Carriage Bag	1 ea
8) User's Manual	1 ea

Application Program

- 1) Embedded OS (Windows) on platform
- 2) GPS information viewer sample application
 - (1) GPS Viewer Software for analysis GPS signal.
 - (2) Data update every 1sec.
 - (3) Monitoring GPS status.
 - . NMEA 0183 Protocol Data Output (GGA, GSA, GSV, RMC)
 - . UBlox Chipset 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
- 3) Graphical user interface application and source code
 - (1) Serial communication with GPS module
 - (2) Comport / Baud rate Setting
 - (3) Simple GUI(Graphical User Interface) study
 - (4) Case study of graphical display method about GPS signal

Training contents

Chapter 1, GPS5000 Introduction

- 1 Focus
- 2 Theory
 - 2.1. GPS SYSTEM OVERVIEW
 - 2.2. GPS Program History
 - 2.3. GPS5000

Chapter 2, Basic Concept of GPS Positioning

- 1 Focus
- 2 Theory
 - 2.1 Basic Concept of GPS
 - 2.2. GPS Service
 - 2.3. GPS Theory of Operation

Chapter 3, GPS5000 Hardware Operation

- 1 Focus
- 2 Theory
 - 2.1 GPS5000 Development Environment
 - 2.2 GPS5000 System
- 3 Experiment
 - 3.1 GPS5000 Install
 - 3.2 GPS5000 Setting
 - 3.3 GPS5000 operate

Chapter 4, Establishing Link between GPS Satellite and GPS-5000

- 1 Focus
- 2 Theory
 - 2.1 GPS Receiver
 - 2.2 GPS Time
 - 2.3 Data Structure

- 3 Experiment
 - 3.1 Date
 - 3.2 Time

Chapter 5, DOP

- 1 Focus
- 2 Theory
 - 2.1. Position
 - 2.2. DOP
 - 2.3. Data Structure

- 3. Experiment
 - 3.1. Position
 - 3.2. DOP

Chapter 6, GPS Signal

- 1 Focus
- 2 Theory
 - 2.1. Error
 - 2.2. Satellite
 - 2.3. Error on Satellite
 - 2.4. DataStructure

- 3. Experiment
 - 3.1. SNR
 - 3.2. Elevation and Azimuth

Chapter 7, GPS Protocol: NMEA-0183

- 1 Focus
- 2 Theory
 - 2.1. Accuracy and Precision
 - 2.2. 2D/3D Position
 - 2.3. NMEA0183

- 3. Experiment
 - 3.1. Accuracy and Precision in 2D
 - 3.2. Accuracy and Precision in 2D/3D

Chapter 8, GPS Protocol: UBX

- 1 Focus
- 2 Theory
 - 2.1. UBX Binary Protocol

2.2. General Message

2.3. Additional Information

Chapter 9, Validating GPS Protocol

- 1 Focus
- 2 Theory
 - 2.1. Check Sum
 - 2.2. NMEA0183 Sentence
 - 2.3. Data Structure

3. Experiment

- 3.1. Check Sum
- 3.2. Handling

Chapter 10, Parsing GPS Protocol

- 1 Focus
- 2 Theory
 - 2.1. Parsing
 - 2.2. NMEA Talker Sentences
 - 2.3. Velocity

3. Experiment

- 3.1. Parsing GPGLA
- 3.2. Velocity

Chapter 11, GPS GUI Introduction

- 1 Focus
- 2 Theory
 - 2.1. Window Embedded
 - 2.2. GDI
 - 2.3. UI

Chapter 12, GPS GUI Base Programming

- 1 Focus
- 2 Theory
 - 2.1. Mapping
 - 2.2. MFC Configuration
 - 2.3. GDI Configuration
 - 2.2. UI Area of Time

3. Experiment

- 3.1. GUI Base
- 3.2. GUI Time

Chapter 13, GPS GUI Programming

- 1 Focus
- 2 Theory
 - 2.1. GPS5000
 - 2.2. UI Area of Mapping
 - 2.3. UI Area of Polar

3. Experiment

- 3.1. GUI Mapping
- 3.2. GUI Polar
- 3.3. GUI SNR

Chapter 14, GPS GUI Debug

- 1 Focus
- 2 Theory
 - 2.1. GPS5000 Debug Mode
 - 2.2. UI Area of SNR
 - 2.3. UI Area of Velocity

3. Experiment

- 3.3. GUI SNR
- 3.1. GUI Velocity

Appendix 1, GPS 5000 Hardware

- 1 Focus
- 2 Theory
 - 2.1. GPS5000 Embedded System
 - 2.2. Specification of GPS5000
 - 2.3. Core and External Interface
 - 2.4. Specification of GPS5000 Connector

Appendix 2, GPS Position Mapping

- 1 Focus
- 2 Theory
 - 2.1. Mapping
 - 2.2. Map
 - 2.3. Mapping GPS Position
 - 2.4. Draw Image
3. Experiment
 - 3.1. Map
 - 3.2. Mapping

Appendix 3, Measure Distance

- 1 Focus
- 2 Theory
 - 2.1. Measure Distance Application
 - 2.2. Space and Coordinate
 - 2.3. Measure Distance
- 3 Experiments
 - 3.1. Measure Distance

Appendix 4, Location Based Service

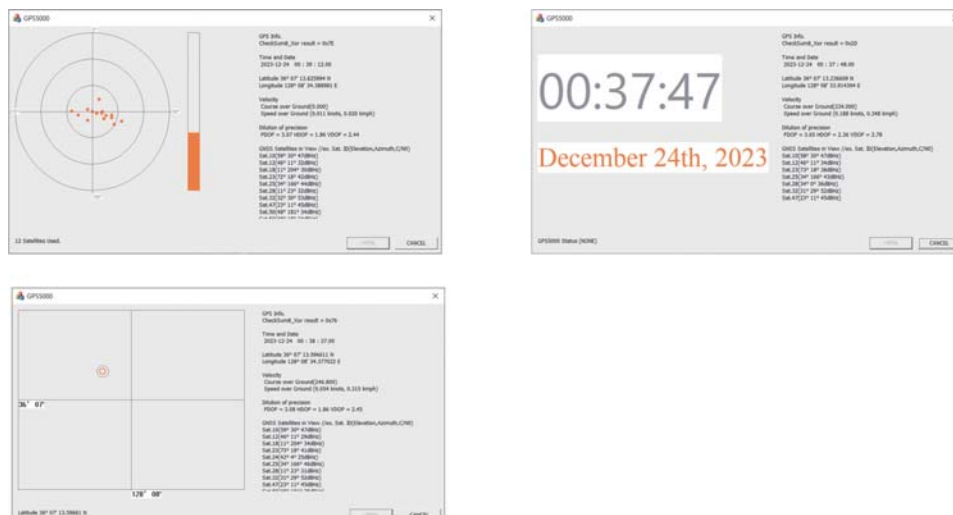
- 1 Focus
- 2 Theory
 - 2.1. Location Based Service
 - 2.2. Location Application Program
- 3 Experiments
 - 3.1. Measure Distance

System configuration

1) Platform board



2) Software Screen shot



Specification

1) CPU	X-Z8350 core	
2) Memory	2GB RAM, 32GB Emmc	
3) Video	7 inch IPS LCD Display / 1024*600 Pixels	
4) Audio	Built-in Speaker	
5) Input device	Touch Screen, 4-Button	
6) Output	Data indication LED, Debug serial port	
7) Power	Input Voltage	DC +5V3A (15W)
8) GPS features		
(1) General	Channel	20
	Frequency	L1, 1575.42MHz
	CA Code	1.023MHz Chip Rate
(2) Accuracy	Position	10meters CEP without SA
	Velocity	0.1meters/second without SA
	Time	1microsecond synchronized to GPS time
(3) Sensitivity	Tracking	-157dBm
	Acquisition	-154dBm
(4) TTFF(Time to Fix)	Hot Start	1sec.
	Warm Start	38sec.
	Cold Start	42sec.
(5) Dynamic Condition	Altitude	1,800meters
	Velocity	<515meters/sec.
	Acceleration	4g
	Jerk	20meters/sec3
(6) Serial Communication Interface	USB to Serial full duplex	
	Baud rate	9600bps
	Protocol Message	NMEA-0183(default) or UBX(Chipset) Protocol
(7) Embedded OS (Windows) on platform		
(8) GPS information 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)	
	. UBlox Chipset Protocol Output	
	. Data Reception	
	. Satellite Position	
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	. Speed	
	. PDOP, HDOP, VDOP	
	. The Number of Fixed Satellite	
	. Average Time for Fix	
	. GPS Module Firmware Version	
(9) Graphical user interface application and source code		
	Serial communication with GPS module	
	Comport / Baud rate Setting	
	Simple GUI(Graphical User Interface) study	
	Case study of graphical display method about GPS signal	

Software Specification

• Operating System	Microsoft Windows 10
• Application compiler	Microsoft Visual C++ MSVC v143 with MFC
• Development Language	C / C++
* PDOP : Percent Dilution of Position.	
* HDOP : Horizontal Dilution of Precision	
* VDOP : Vertical Dilution of Precision	
* NMEA : The National Marine Electronics Association	
* GPGGA : Global Positioning System Fix Data	
* GPGSV : GPS Satellites in View	
* GPRMC : Recommended Minimum data	
* GPGSA : GNSS DOP and Active Satellite	
* GNSS : Global Navigation Satellite Systems	