書いてる途中です

ADK互換モジュールで遊ぶAndroid

第4回名古屋Android勉強会
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このコースの目的と内容

目的

Androidアプリケーションデベロッパが Android Open Accessory を理解する。同時にHWを理解する事が広げる世界を体感する。

内容

1. 互換モジュールの組み立て
2. Androidとの接続と動作確認
3. 互換モジュールの仕組み
4. Android側の仕組み

PART0
事前準備

最新リソース

- このドキュメントを含む、最新のリソースは以下で管理しています
  - https://github.com/magoroku15/OpenAccessoryDemo
    - App Source CodeAndroid　アプリのソースコード
    - Doc　ドキュメント類
    - Firmware　マイコンのソース・バイナリ
- 紹介するMicrochip Technology Inc作成のアンドロイドアプリをAndroid Marketからインストールしておいてください
  - Microchipで検索
    - 基本的なアクセサリデモ3.x
    - 基本的なアクセサリデモ2.3.x以降

レベルごとの準備

- レベル１　手ぶらコース
  - 特に準備は不要です
- レベル２　実機に接続して動かす
  - ADKに対応したAndroid実機とACアダプタを用意
- レベル３　マイコン実行イメージのビルドまで
  - MPLABXをインストールしたPCを用意
- レベル４　Androidアプリのビルドまで
  - Android SDKをインストールしたPCを用意

ソースコード・ドキュメント

- Githubで管理

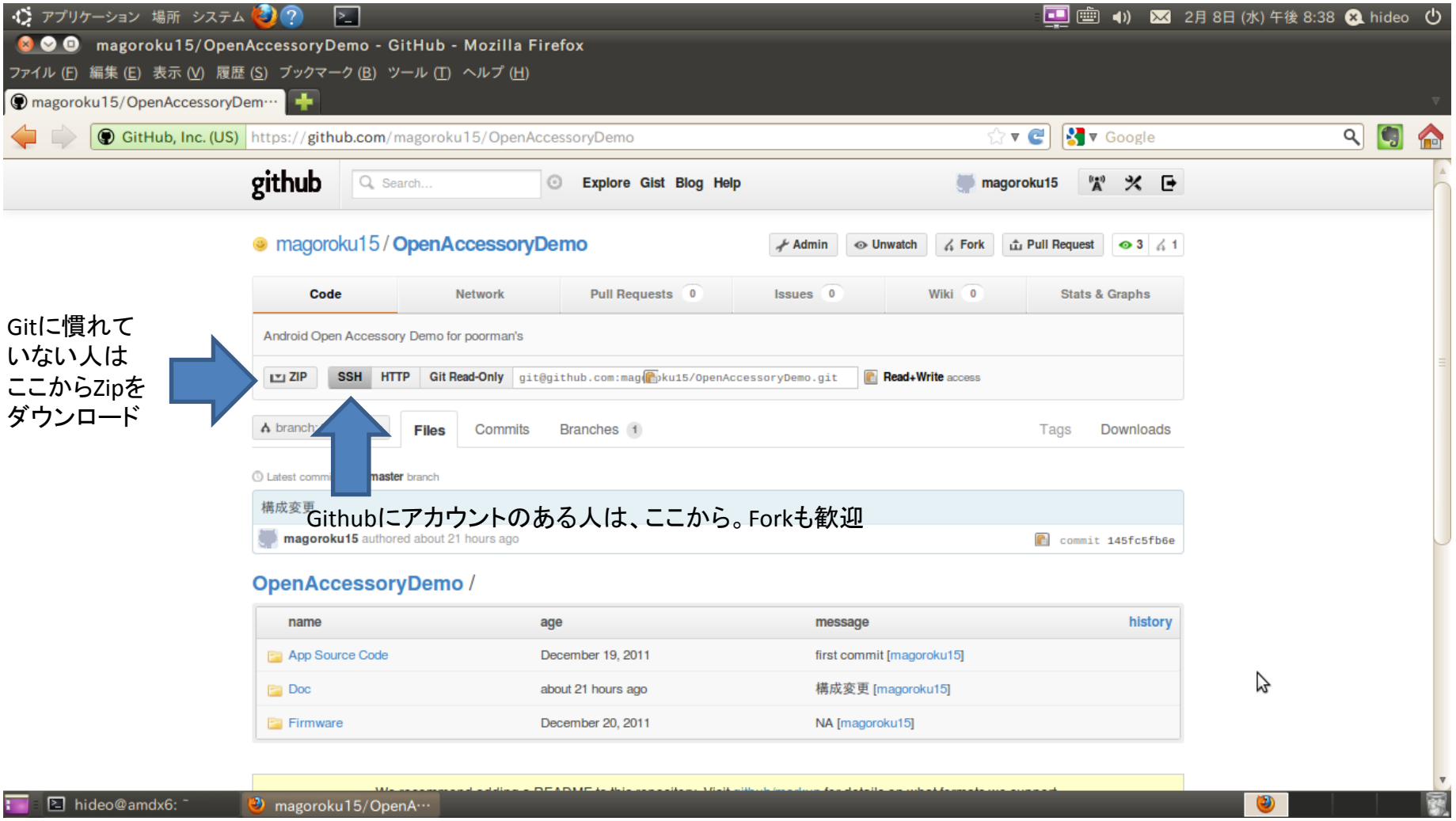
  https://github.com/magoroku15/OpenAccessoryDemo

- ２つの方法

  A) Githubにアカウントを作ってfork
    - Linux/Macで開発する人にお勧め
    - 改変してcommit & push

  B) ZIPアーカイブをダウンロード
    - Windowsで開発する人向け

https://github.com/magoroku15/OpenAccessoryDemo



Gitに慣れていない人はここからZipをダウンロード

Githubにアカウントのある人は、ここから。Forkも歓迎

OpenAccessoryDemoの内容

- App Source Code
  - Androidアプリのソース
- Doc
  - ドキュメント
- Firmware
  - PIC24Fのソース
  - コンパイルは専用のIDE MPLABXで行う

Android SDKのインストール

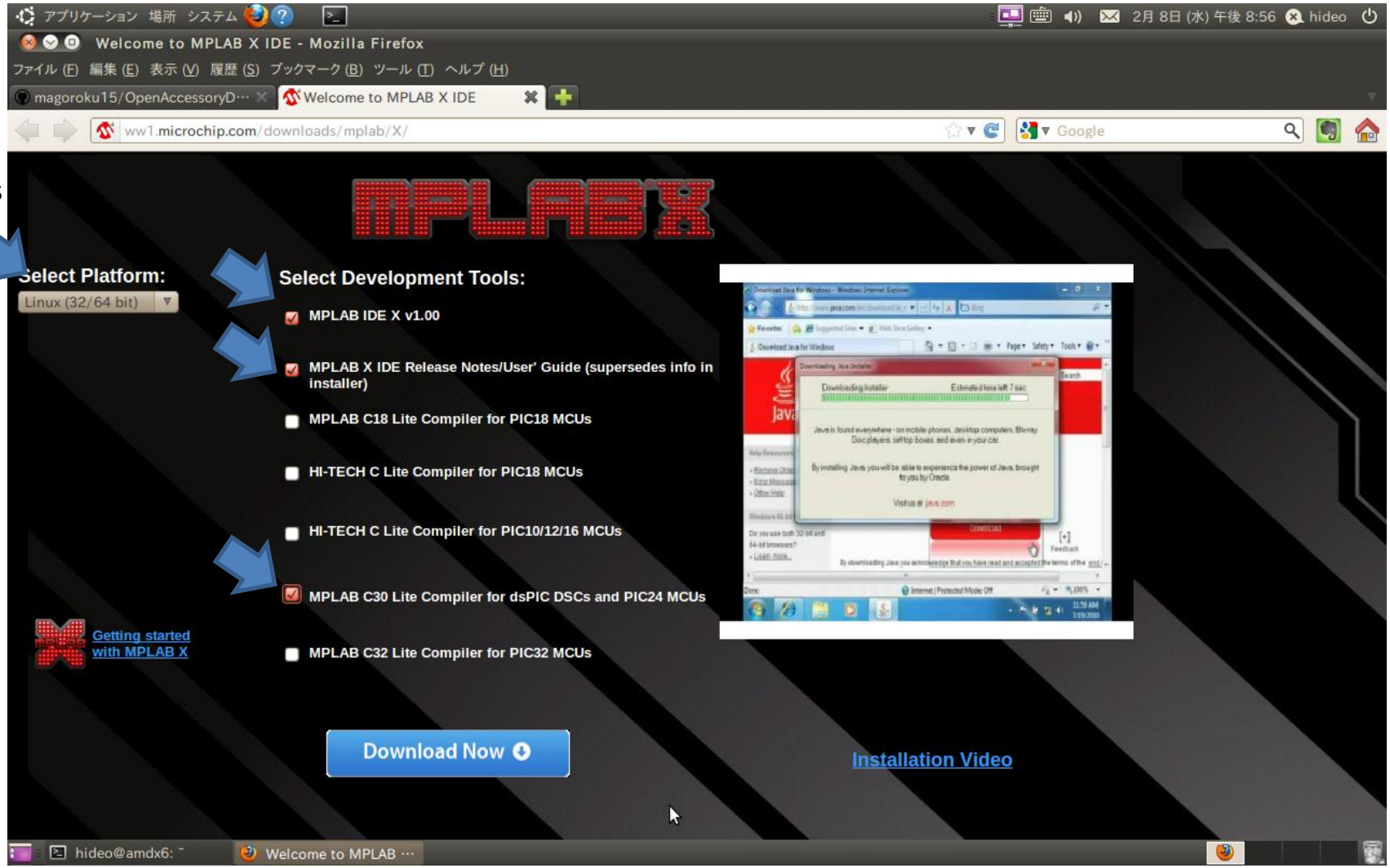
- ハンズオンでAndroidのサンプルプログラムの解説を行い、その中でAppの作成に軽く触れます
- 動作確認はマーケットからダウンロードしたアプリで行います
- サンプルソースのバージョンに合わせて各自で事前にインストールを済ませておいてください

MPLABXのインストール

- PIC用のIDE
  - 従来のMPLABはWindows専用だった
  - MPLABXはNetBeansベースでマルチプラットフォーム
  - PIC24シリーズ向けはコンパイラも無償/最適化に制限
- http://ww1.microchip.com/downloads/mplab/X/から
  1. Platformを選択
  2. 以下をチェックして[Download Now]
     - MPLAB IDE X v1.00
     - **MPLAB X IDE Release Notes/User' Guide (supersedes info in installer)**
     - **MPLAB C30 Lite Compiler for dsPIC DSCs and PIC24 MCUs**
  3. [Download Now]

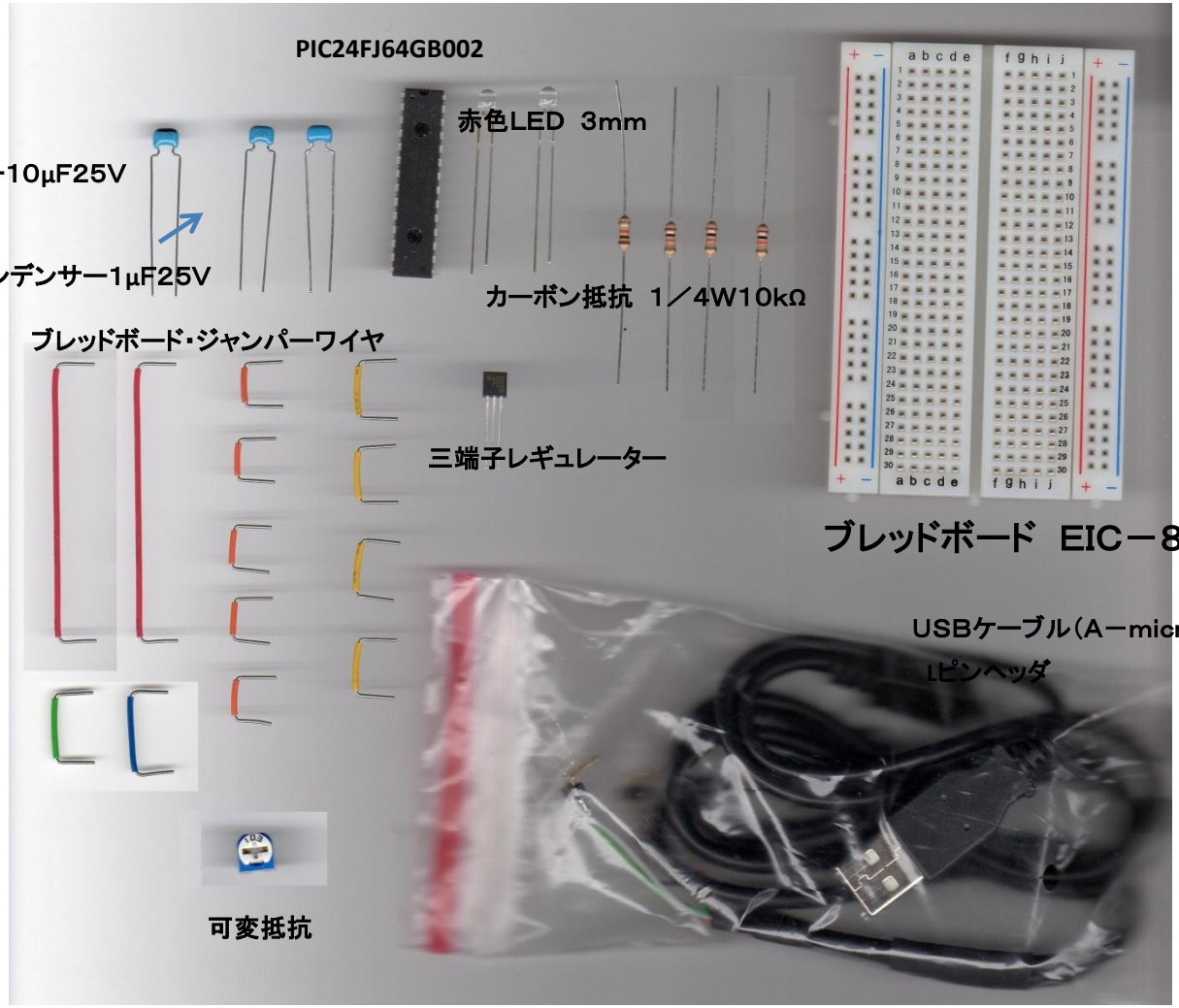
MPLABXのインストール

Mac
Linux
Windows



PART1
互換モジュールの組み立て

配布部品


PIC24FJ64GB002
赤色LED　3mm
積層セラミックコンデンサー10μF25V
積層セラミックコンデンサー1μF25V
カーボン抵抗　1／4W10kΩ
ブレッドボード・ジャンパーワイヤ
三端子レギュレーター
ブレッドボード　EIC－801
USBケーブル（A－microB）
Lピンヘッダ
可変抵抗

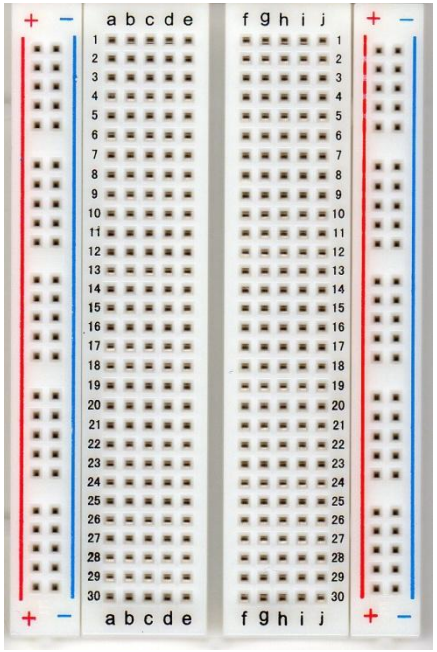
BOM/購入元

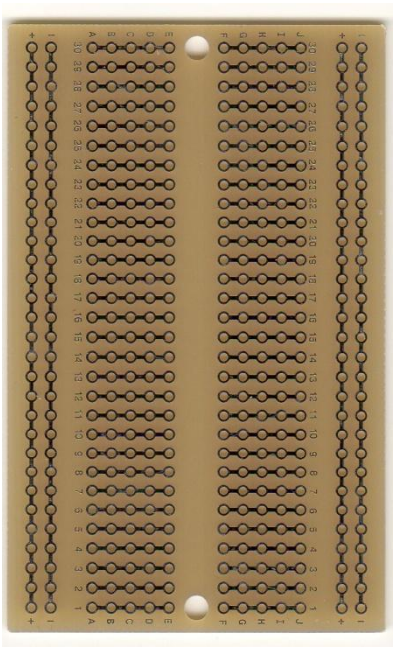
poorman's ADK 30台分の発注部品

			購入単位			1台単位		
購入先	通販型番	発注量	個数	価格	単価	個数	小計	
秋月	C-05223	30	1	130	130	1	130	USBケーブル（A－microB）
秋月	P-02315	30	1	250	250	1	250	ブレッドボード・ジャンパーワイヤ
秋月	P-00315	30	1	250	250	1	250	ブレッドボード　EIC－801
秋月	I-03421	15	2	100	50	1	50	三端子レギュレーター[3．3V] XC6202P332TB
秋月	P-05105	60	1	15	15	2	30	積層セラミックコンデンサー1μ F50V
秋月	P-05103	30	1	30	30	1	30	積層セラミックコンデンサー10μ F25V
秋月	I-00562	1	100	350	3.5	2	7	赤色LED　3mm
秋月	R-25103	2	100	100	1	4	4	カーボン抵抗　1／4W10kΩ
秋月	C-01627	10	5	20	4	1	4	Lピンヘッダ1x20
秋月	P-02470	4	10	200	20	1	20	半固定抵抗10kΩ
秋月	P-04089	1	100	500	5	1	5	チャック袋
秋月	送料2回分	1	30	1000	33	2	67	送料500円x2回
digikey	703-7602	1	30	9821	327	1	327	PIC24FJ64GB002

合計　1174

ブレッドボード

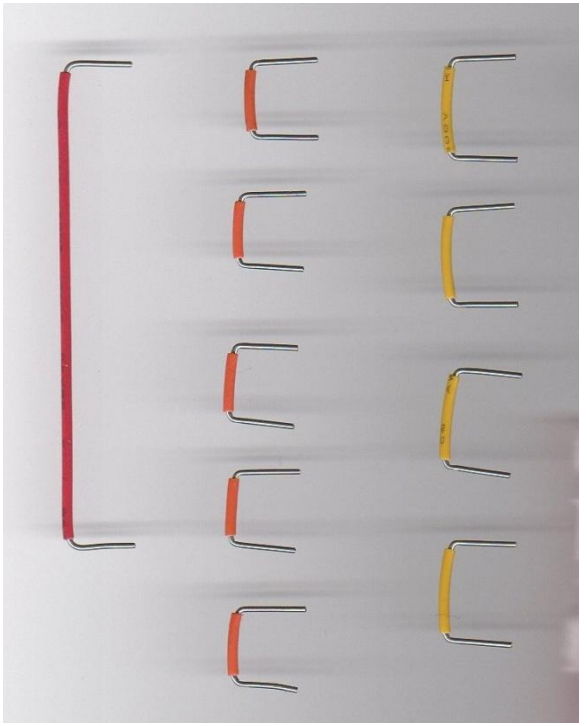




内部の配線

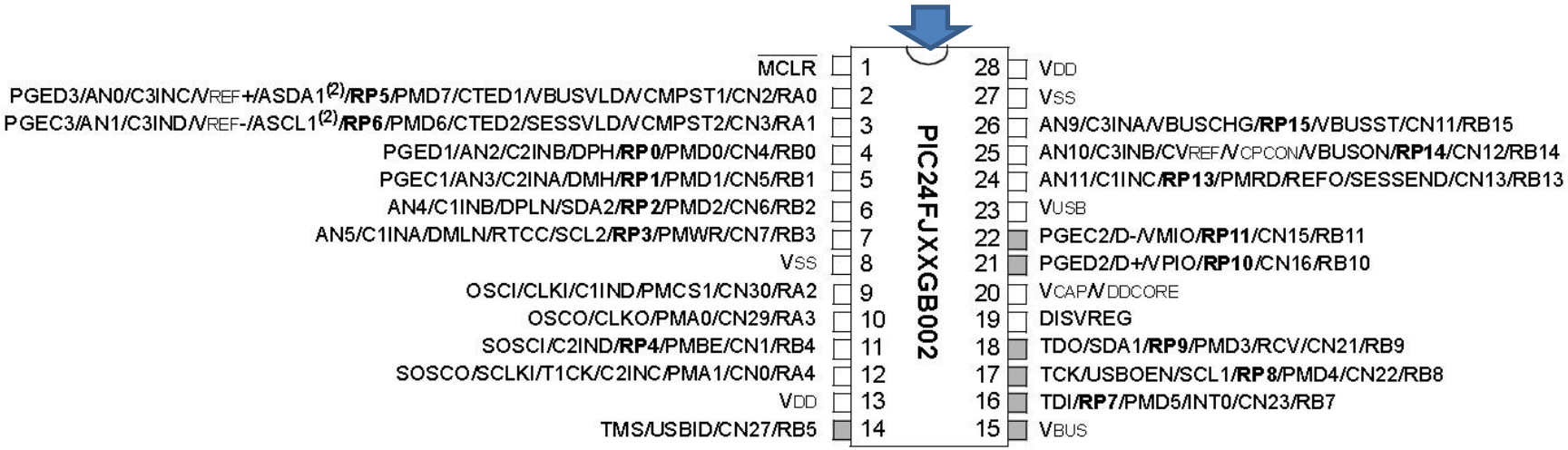
ジャンパ

- ブレッドボードに刺して回路を構成する線



マイコン PIC24FJ64GB002

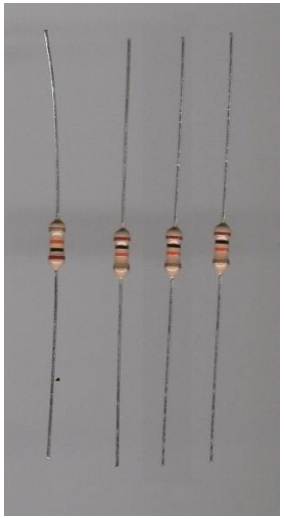
- Microchip社の16bitマイコン max 32MHz
  - 64Kbyte Program Memory (Flash)、64Kbyte RAM
  - I²C, IrDA, SPI, UART/USART, USB OTG
- プログラムは書き込み済



ピン配置

抵抗

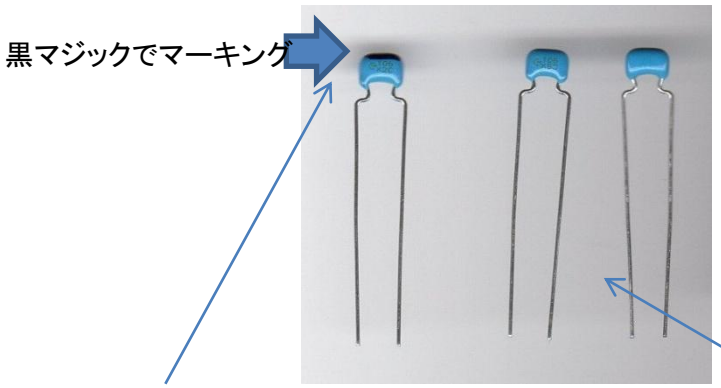
- 電流の流れを抑止する
  - 抵抗の値が小さいと導体
  - 抵抗の値が大きいと絶縁体に近づく
- 極性なし



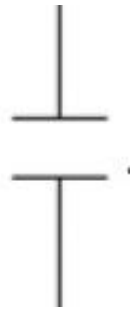
回路図

コンデンサ

- Capacitor(キャパシタ)とも言う
- 微量の電気を蓄える
  - 直流は流れない
  - 交流は流れやすい
- 極性の有無に注意
  - 今回の積層セラミックコンデンサは極性なし



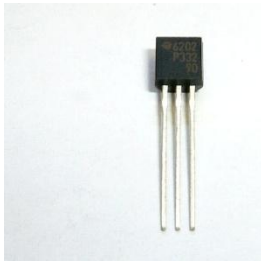
積層セラミックコンデンサー10μF25V　　積層セラミックコンデンサー1μF25V

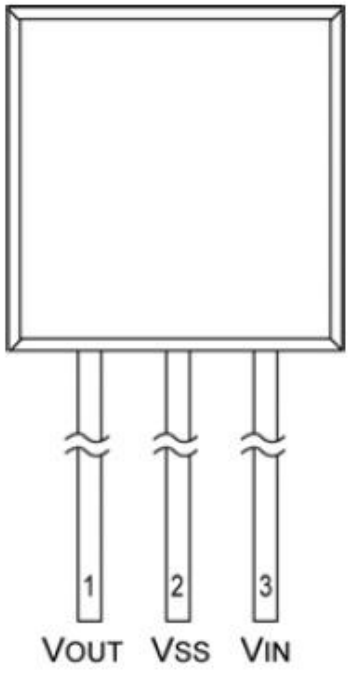


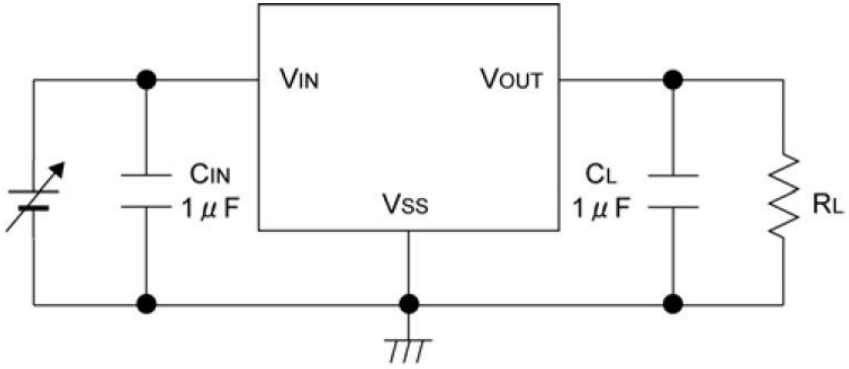
回路図

3端子レギュレータ

- 電圧を一定に保つ機能を備えたIC
- 5V(充電用ACアダプタ)から3.3Vを生成



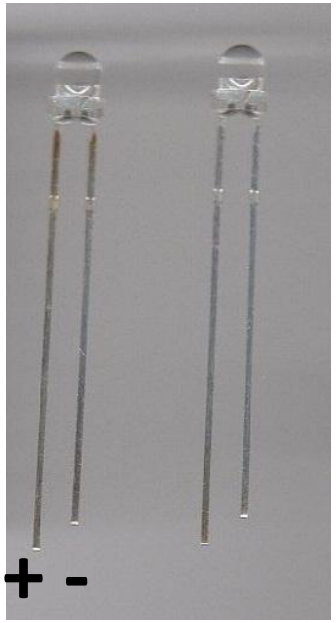


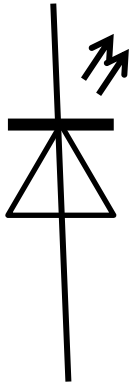


回路図(周辺込み)

LED

- 発光ダイオード
  - **LED**（エルイーディー: **Light Emitting Diode**）
  - 極性あり、一方向にしか電流を流さない

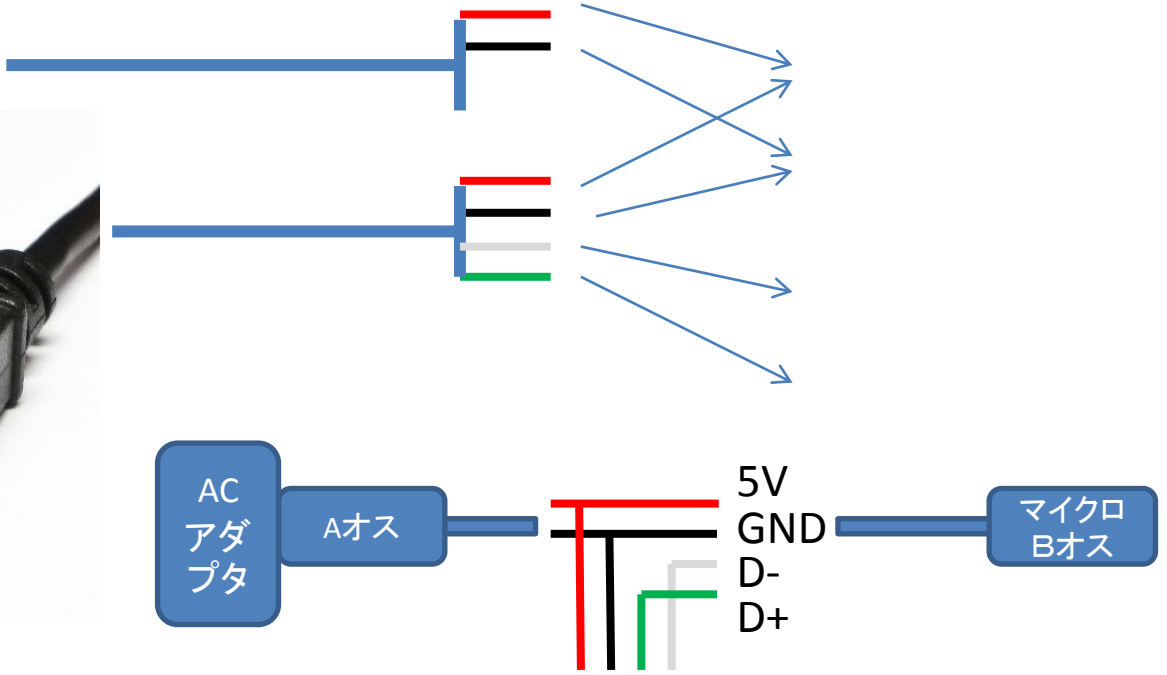




USBケーブル

- Aオスマイクロ Bオスを改造（改造済で配布）
  - ACアダプタから5Vを取り、マイクロBオスに回す
  - マイクロBのデータ線を取りだす

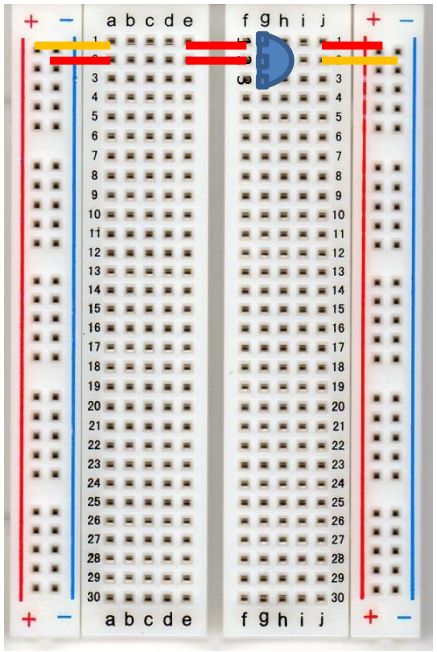
Aオス－マイクロBオス



互換モジュールの組み立て

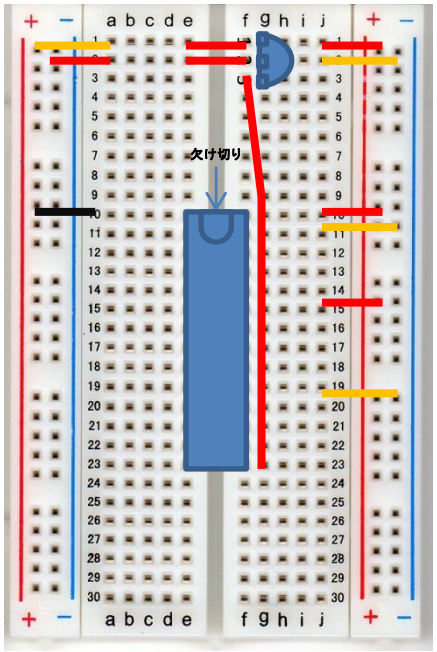
- 利用する資料
  - 回路図（別紙）
  - 実体配線図（別紙）
  - 組み立て手順（本資料）
- 配布部品

Step1　電源



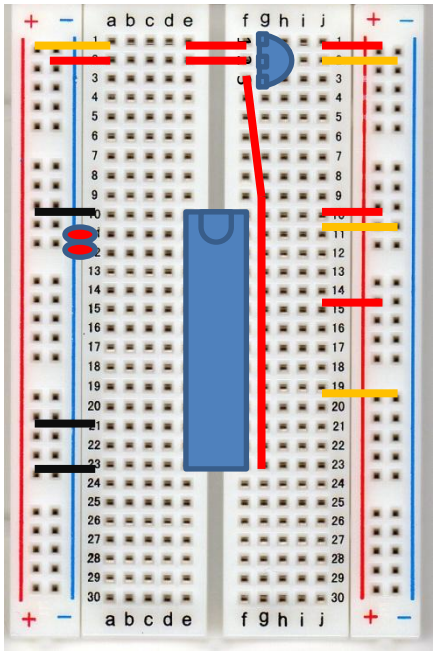
1. g1にレギュレータの１
2. g2にレギュレータの２
3. g3にレギュレータの３
4. ―を４か所
5. ―を２か所
6. 積層セラミックコンデンサー１μF25V2個
   - h1-h2
   - h2-h3

Step2　マイコン



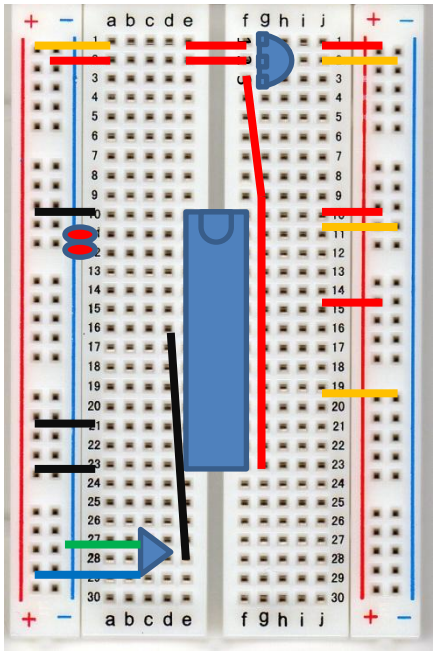
1. e10-e23-f10-f23’にマイコン
2. ー をf3-g23へ
3. ー をj10-ー へ
4. ー をj11-＋へ
5. ー をj15-ー へ
6. ー をj19-＋へ
7. 積層セラミックコンデンサー10μF25をj18-ー へ
8. 抵抗10kΩをa10- ＋へ

Step2　LED/SW



- LED、足の長い方をa11,短い方を－へ
- LED、足の長い方をa12,短い方を－へ
- 抵抗10kΩ、a21-＋へ
- 抵抗10kΩ、a23-＋へ

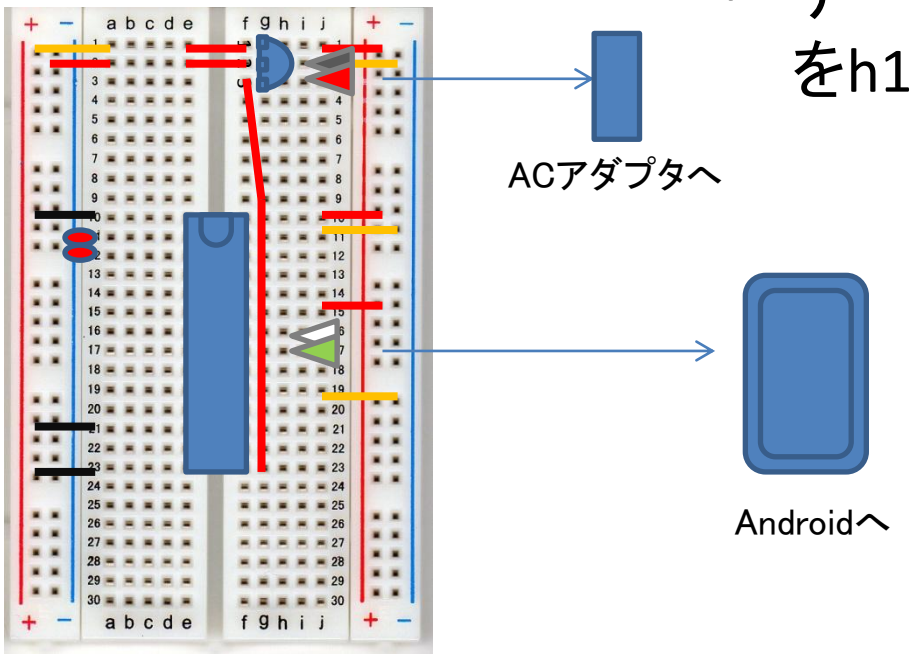
Step3　可変抵抗



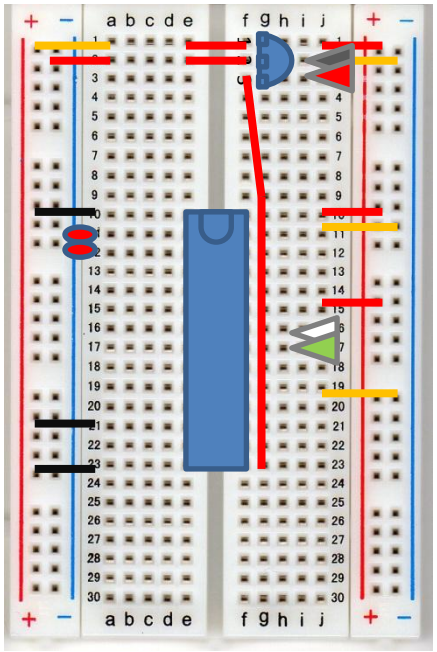
- 組み付け順注意
- d16-e28に抵抗を
- ―をc27-―に
- ―をc29-＋に
- 可変抵抗をc27-c29-e28へ

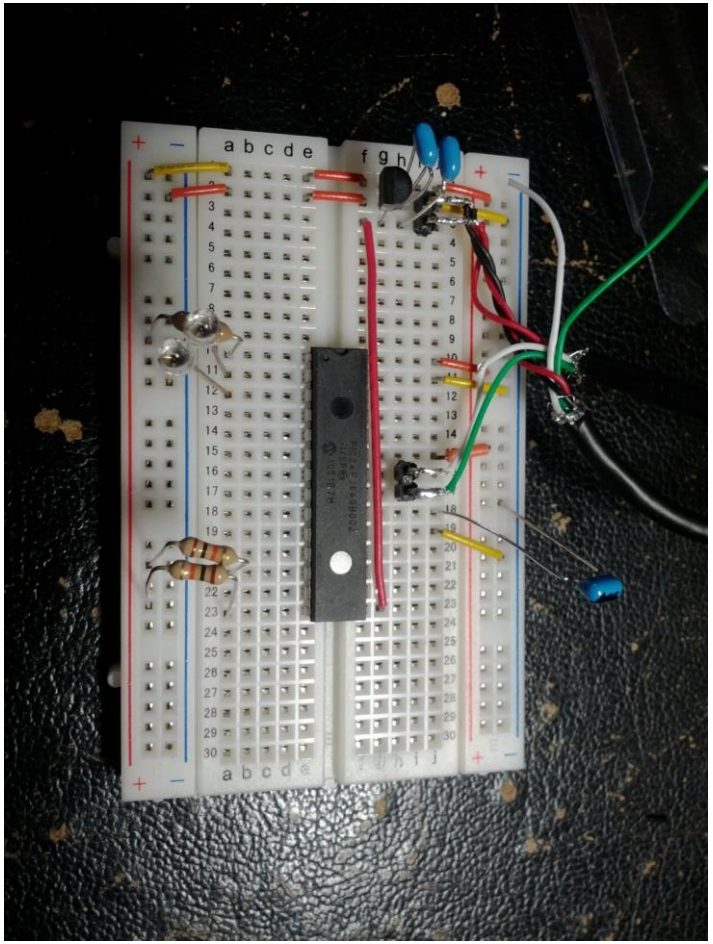
Step2　USBケーブル

- 電源、黒をj2,赤をj3
- データ 白(D-)をh16, 緑(D+)をh17

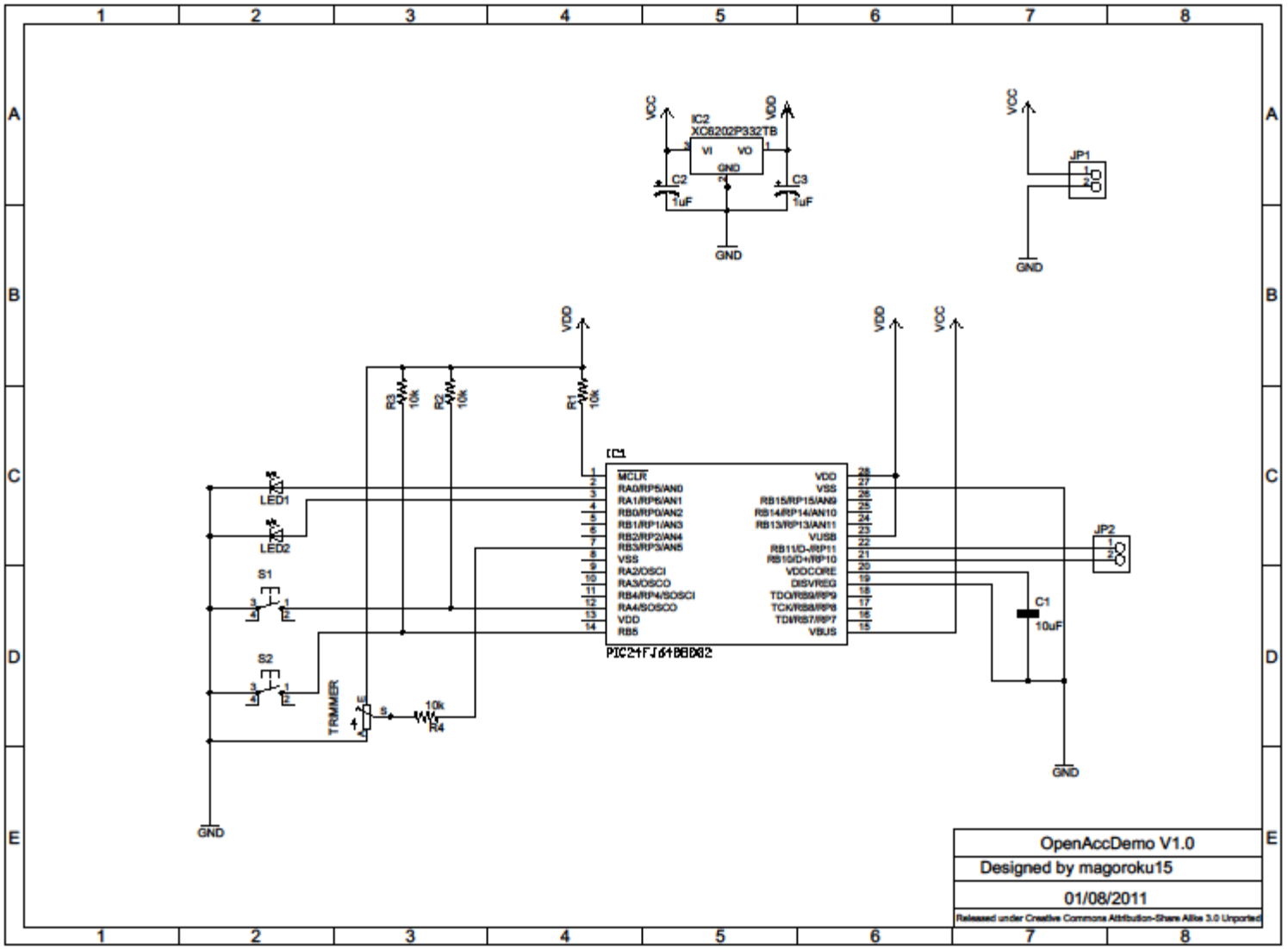


完成写真





回路図


IC2
XC6202P332TB
VI
VO
GND
C2
1uF
C3
1uF
VCC
VDD
JP1
R3
10k
R2
10k
R1
10k
LED1
LED2
S1
S2
TRIMMER
10k
R4
IC1
PIC24FJ64GB002
MCLR
RA0/RP5/AN0
RA1/RP6/AN1
RB0/RP0/AN2
RB1/RP1/AN3
RB2/RP2/AN4
RB3/RP3/AN5
VSS
RA2/OSCI
RA3/OSCO
RB4/RP4/SOSCI
RA4/SOSCO
VDD
RB5
VDD
VSS
RB15/RP15/AN9
RB14/RP14/AN10
RB13/RP13/AN11
VUSB
RB11/D-/RP11
RB10/D+/RP10
VDDCORE
DISVREG
TDO/RB9/RP9
TCK/RB8/RP8
TDI/RB7/RP7
VBUS
JP2
C1
10uF
OpenAccDemo V1.0
Designed by magoroku15
01/08/2011
Released under Creative Commons Attribution-Share Alike 3.0 Unported

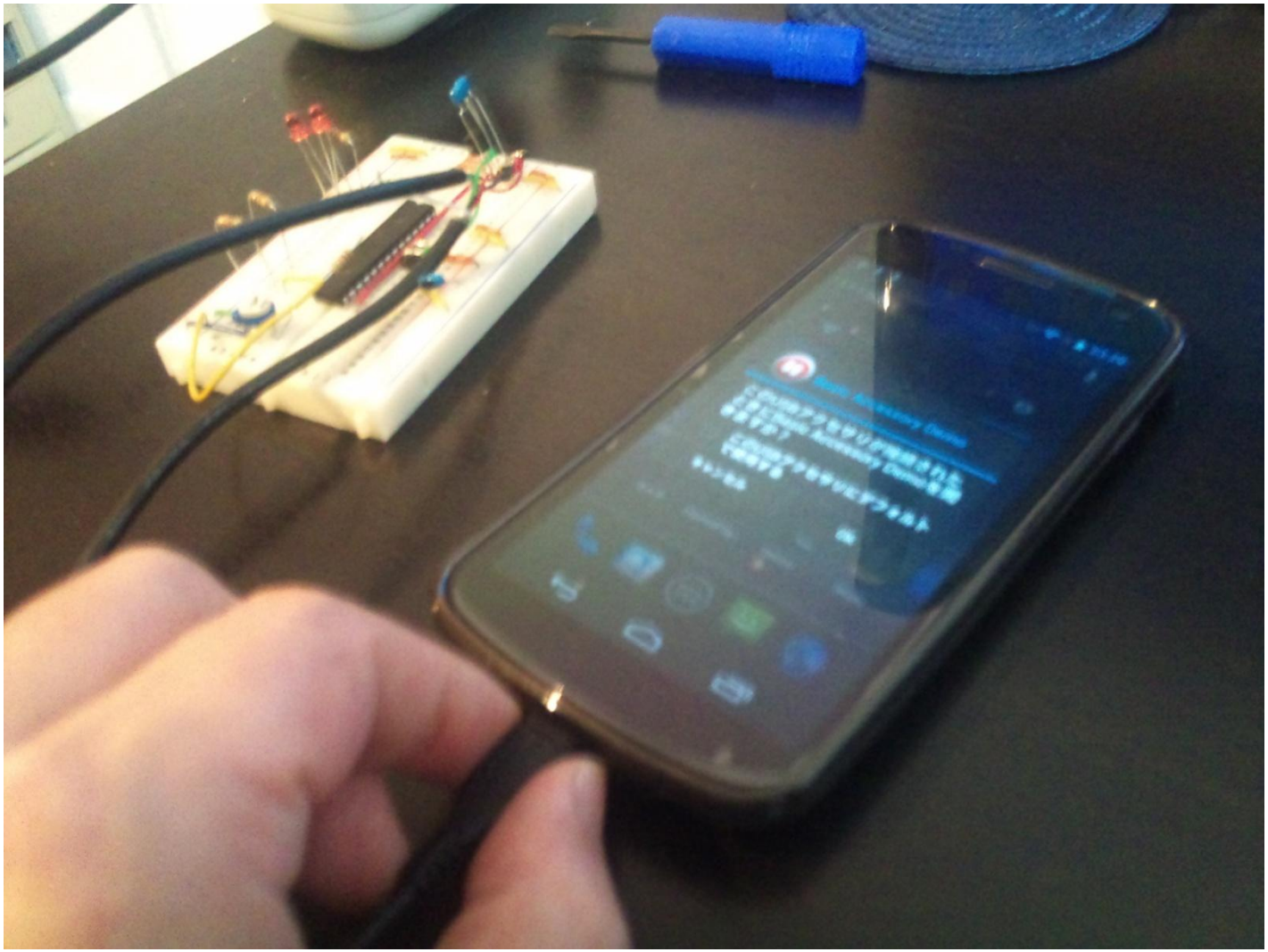
PART2
ANDROIDとの接続と動作確認

Step1 アプリのインストール

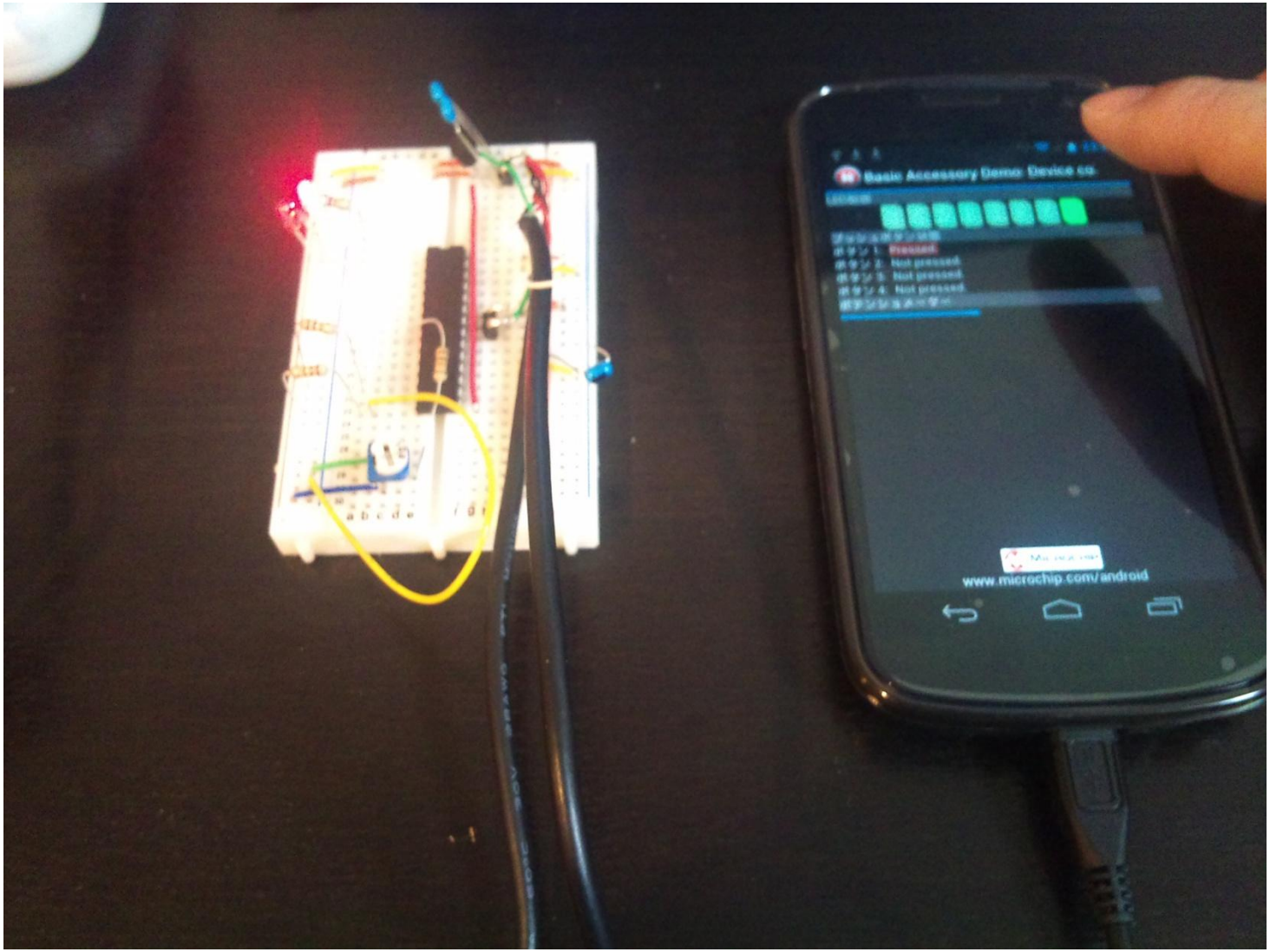
- Android Marketからインストール
  - Microchipで検索
    - 基本的なアクセサリデモ3.x
    - 基本的なアクセサリデモ2.3.x以降

Step2 ACアダプタに接続

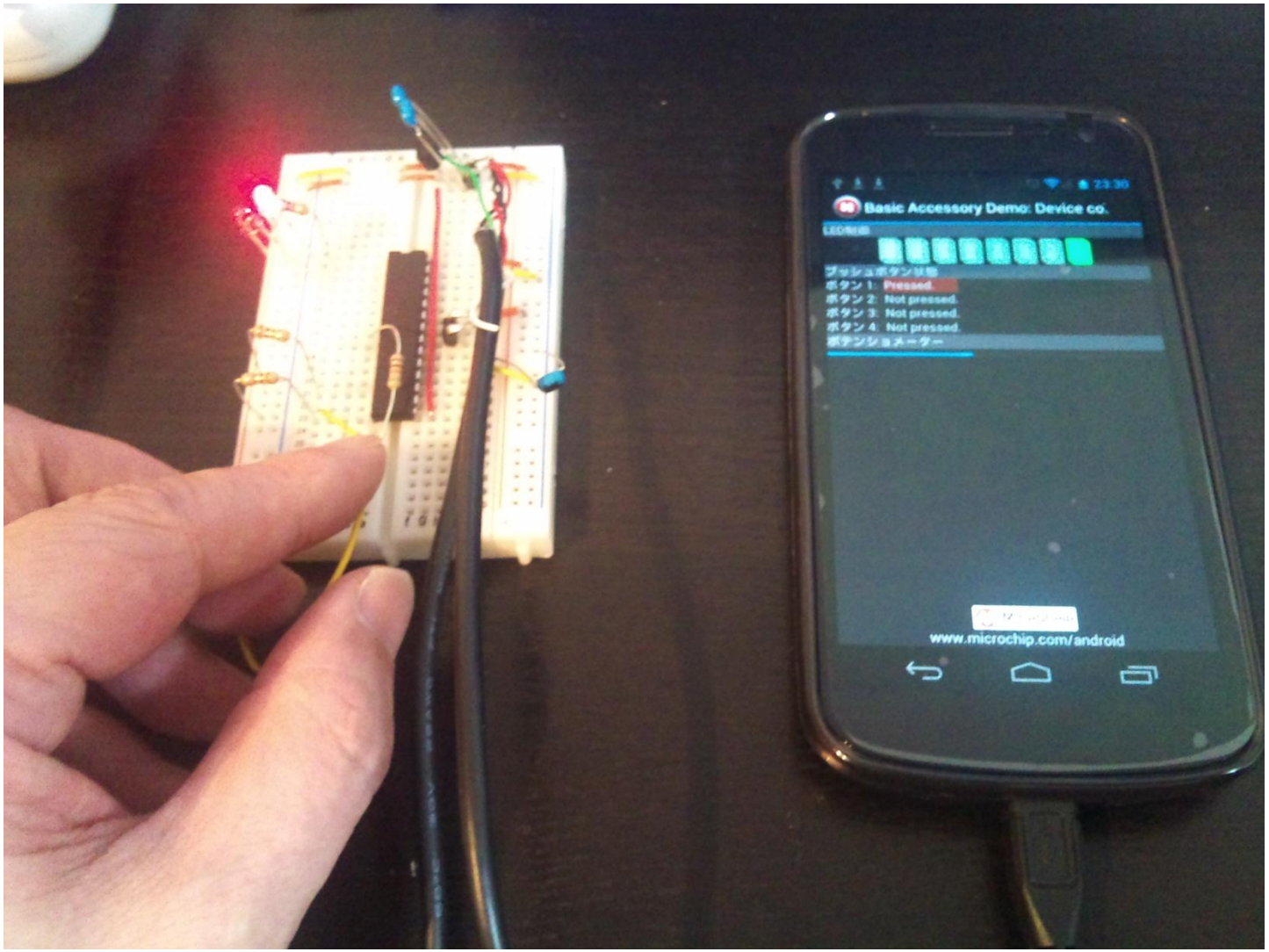
Step3 Androidに接続



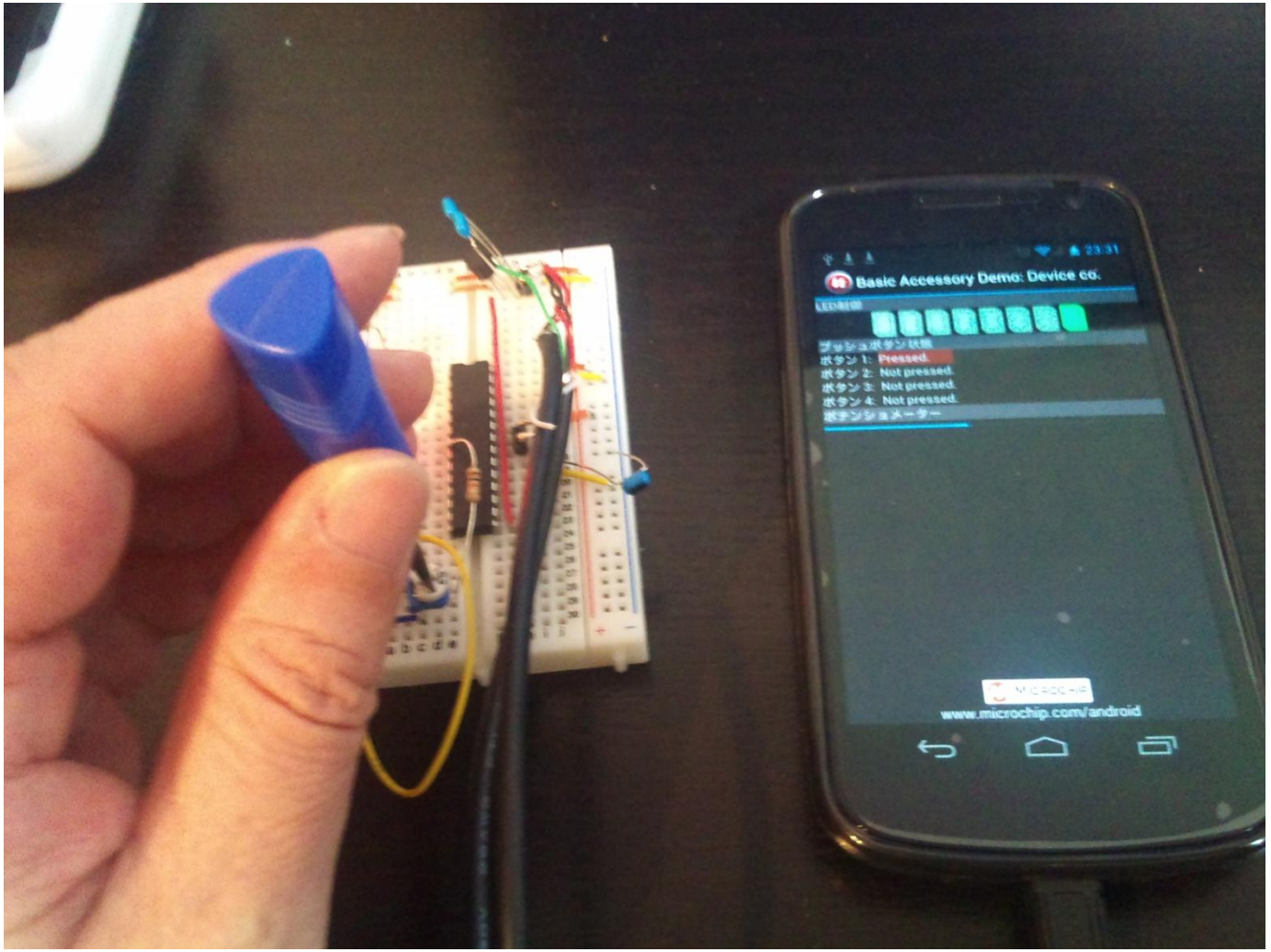
LEDを点灯



スイッチを操作


Basic Accessory Demo: Device co.
ボタン 1: Pressed.
ボタン 2: Not pressed.
ボタン 3: Not pressed.
ボタン 4: Not pressed.
www.microchip.com/android

ポテンションメータを操作



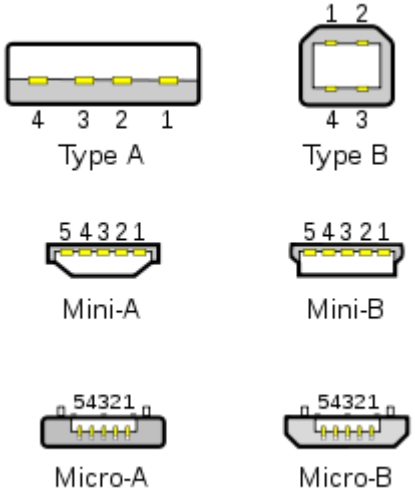
PART3
USBとOPEN ACCESSORY

USB　ホスト・ディバイス

- 基本は高速のシリアル通信
- ４線式
  - 通信はディファレンシャル D+,D-
  - 給電機能を持つ　5V, GND
- ホスト
  - 一般的にPC側
  - マスタとして動作
  - 複数のディバイスを収容・管理
  - 複雑なソフトウエアスタック
- ディバイス
  - 一般的に装置側、マウス、KBD、プリンタ、USBメモリ
  - スレーブとして動作
  - 単純な機能

USB　コネクタ

- 4線式　　1: +　2: D-　3: D+　4: -
  - ホスト側　　Type A
  - ディバイス側　　Type B
- 5線式　　1: +　2: D-　3: D+　4: ID　5:　-
  - IDでホスト、ディバイスを判別



Wikipediaより

Androidでの利用例

- ホスト
  - システム側での対応は限定的、マウス対応(ICS)など
  - アプリ側でUSB manager連携してドライバ相当の動作をアプリとして記述・配布
- ディバイス
  - Android側がディバイス
  - ADB, Mass Storage
- Open Accessory
  - PCがホスト、Android側がディバイス
  - システムのみで利用していたエンドポイントをアプリに開放

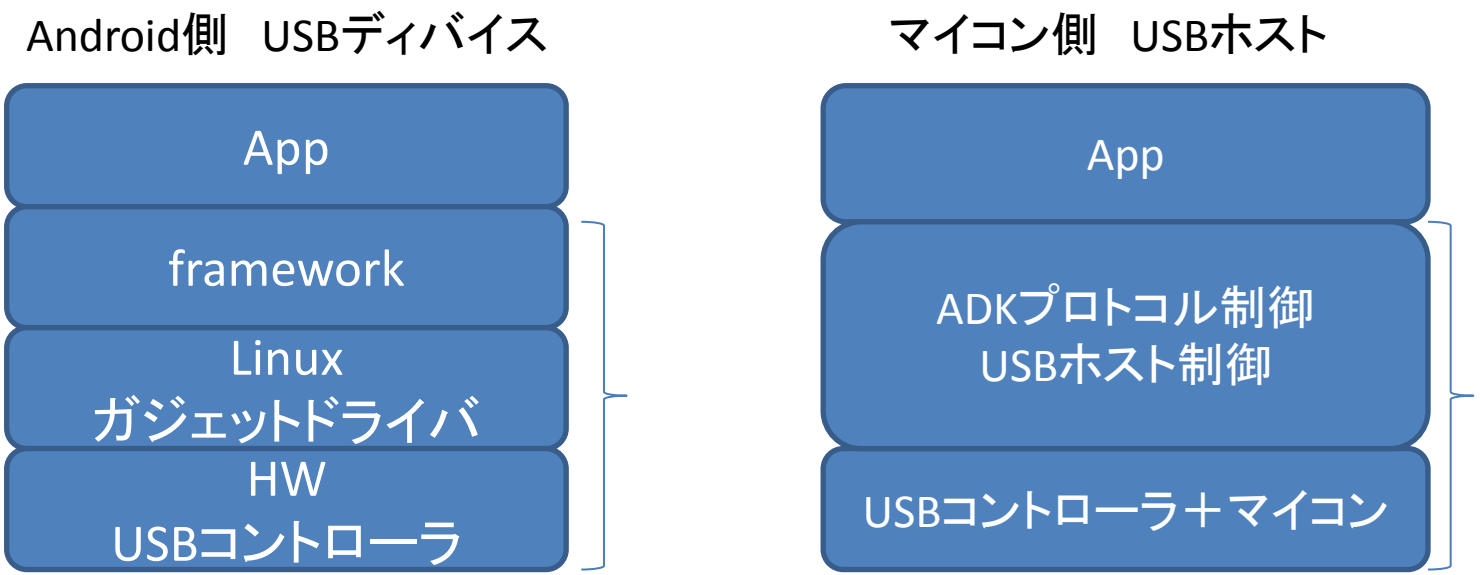
ADBの仕組み

- ドライバレイヤ
  - ADB用のVid, Pidを登録してエンドポイントを作成
- アプリレイヤ
  - システム起動時にadbdコマンドを起動
- PCに接続すると
  - Vid, PidがXXXを示し
  - adb用のEndpointがみえるのでこれをadbコマンドが握る
  - PC adbコマンド⇔PC バルク転送⇔Android バルク転送 ⇔ /dev/adb ⇔ adbd
- adb (クライアント)⇔adbd(サーバ)の関係

Open Accessoryの仕組み

Open Accessory modeとは何か

- AdbなどのUSBガジェットの仕組みを流用
- 専用エンドポイントを提供
- フレームワークがアプリを起動し、エンドポイントを接続



PART4
マイコン側の仕組み

PICマイコン

- マイコンとしては老舗
- ライバルはAtmel AVR
- PIC16シリーズ
- PIC24シリーズ
- PIC32シリーズ
  - MIPS社からライセンスしたMIPS M4K

開発環境

- MPLAB.X
  - 統合開発環境
  - 最近1.0に
  - NetBeansベース
    - MAC, Windows, Linuxの各プラットフォームで動作
- プログラマ
  - マイコン上のFlashにプログラムを転送
  - MPLAB.Xから書き込み
  - Pickit3

Pickit3 3900円
秋月　通販コード M-03608

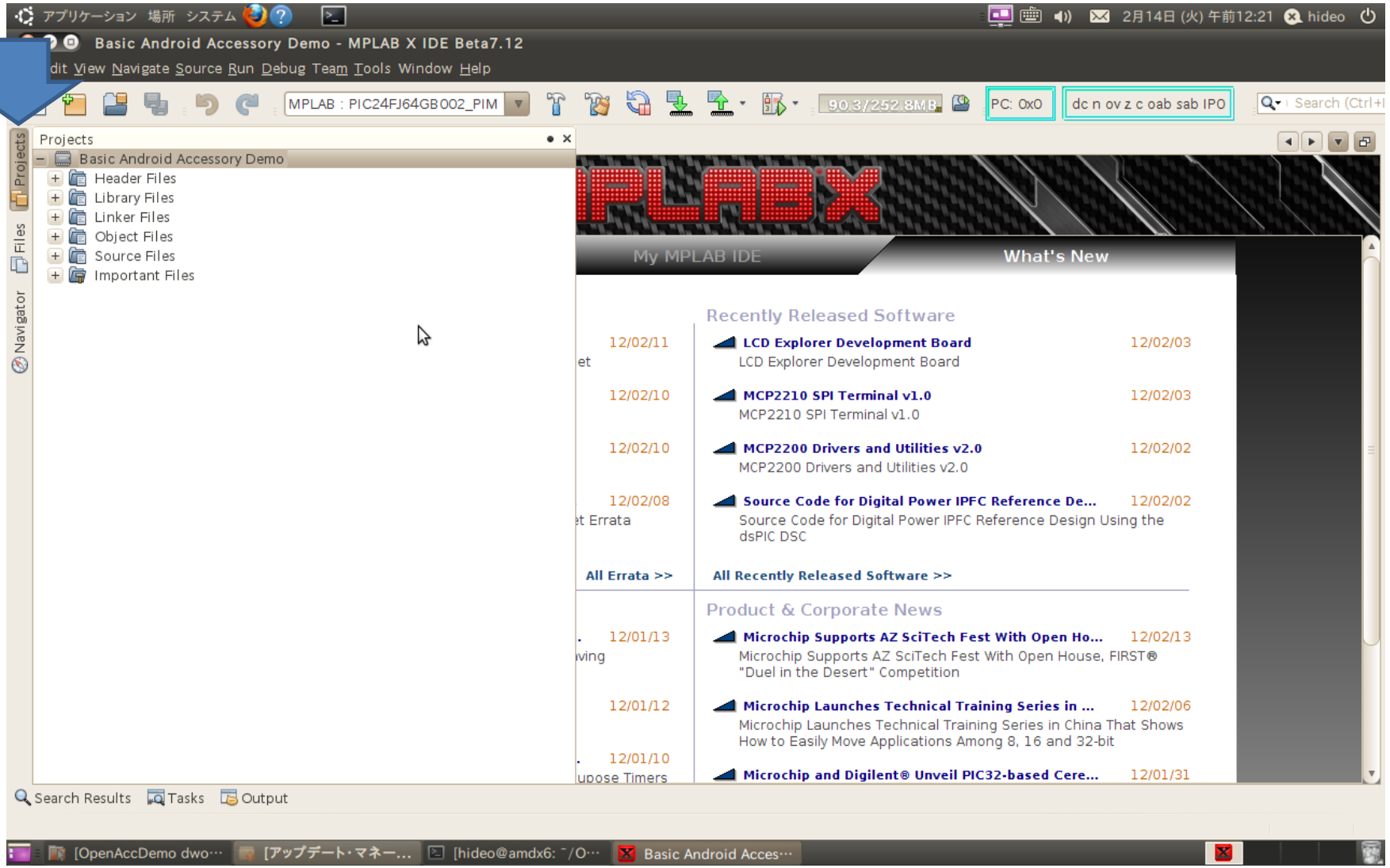
MPLABXの使い方

- プロジェクトの手順
- ビルドの手順
- プログラムの手順

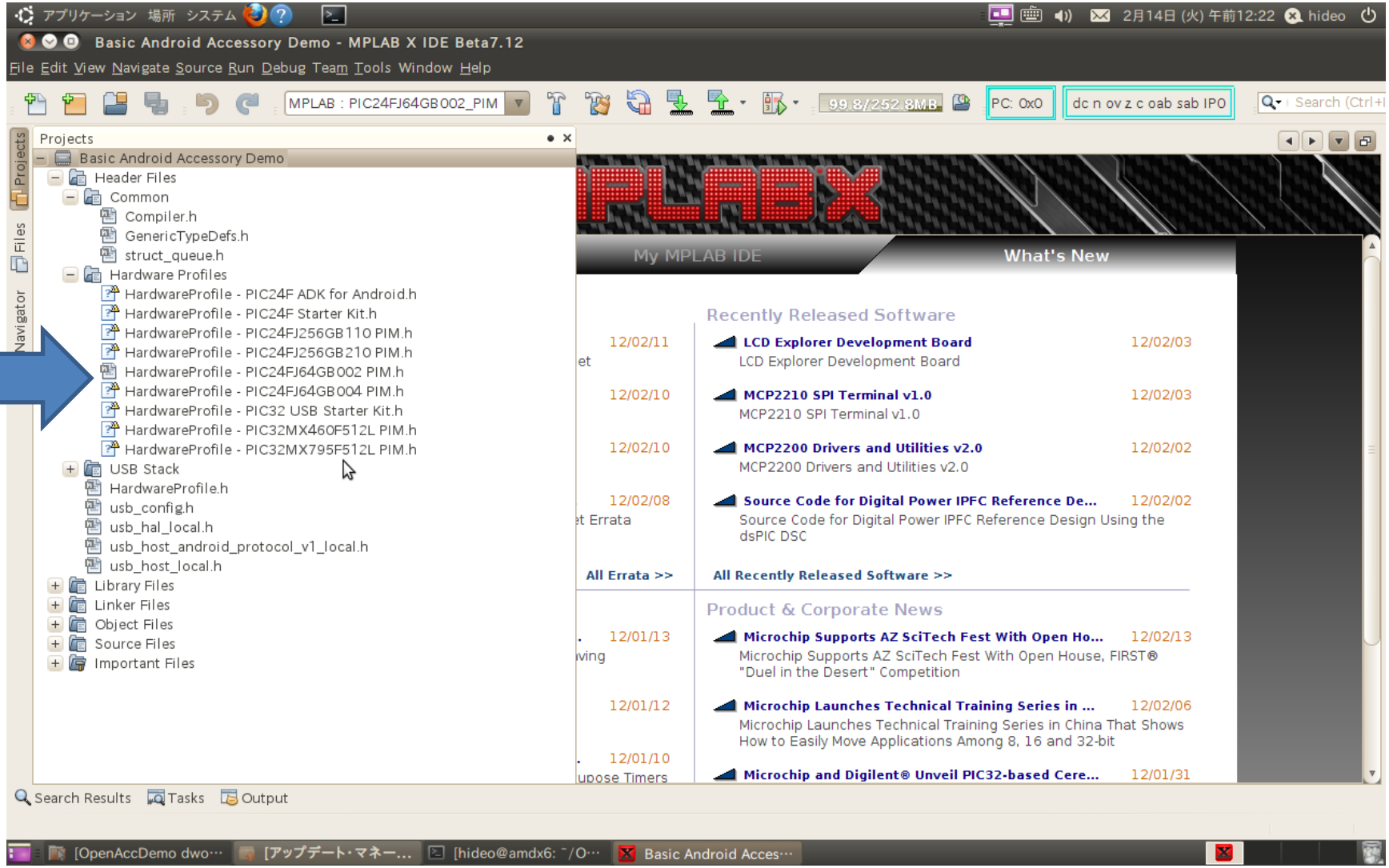
プロジェクトのOpen

- 左上メニューからFile -> Open Project….
- プロジェクトを選択
  - OpenAccessoryDemo/Firmware/MPXLABを選択

ファイルの閲覧


アプリケーション 場所 システム
2月14日 (火) 午前12:21 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
dit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
90.3/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
Projects
Files
Navigator
Basic Android Accessory Demo
Header Files
Library Files
Linker Files
Object Files
Source Files
Important Files
My MPLAB IDE
What's New
Recently Released Software
12/02/11
LCD Explorer Development Board
12/02/03
LCD Explorer Development Board
12/02/10
MCP2210 SPI Terminal v1.0
12/02/03
MCP2210 SPI Terminal v1.0
12/02/10
MCP2200 Drivers and Utilities v2.0
12/02/02
MCP2200 Drivers and Utilities v2.0
12/02/08
Source Code for Digital Power IPFC Reference De...
12/02/02
Source Code for Digital Power IPFC Reference Design Using the dsPIC DSC
All Errata >>
All Recently Released Software >>
Product & Corporate News
12/01/13
Microchip Supports AZ SciTech Fest With Open Ho...
12/02/13
Microchip Supports AZ SciTech Fest With Open House, FIRST® "Duel in the Desert" Competition
12/01/12
Microchip Launches Technical Training Series in ...
12/02/06
Microchip Launches Technical Training Series in China That Shows How to Easily Move Applications Among 8, 16 and 32-bit
12/01/10
Microchip and Digilent® Unveil PIC32-based Cere...
12/01/31
Search Results
Tasks
Output
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

ファイルを選択


アプリケーション 場所 システム
2月14日 (火) 午前12:22 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
Projects
Basic Android Accessory Demo
Header Files
Common
Compiler.h
GenericTypeDefs.h
struct_queue.h
Hardware Profiles
HardwareProfile - PIC24F ADK for Android.h
HardwareProfile - PIC24F Starter Kit.h
HardwareProfile - PIC24FJ256GB110 PIM.h
HardwareProfile - PIC24FJ256GB210 PIM.h
HardwareProfile - PIC24FJ64GB002 PIM.h
HardwareProfile - PIC24FJ64GB004 PIM.h
HardwareProfile - PIC32 USB Starter Kit.h
HardwareProfile - PIC32MX460F512L PIM.h
HardwareProfile - PIC32MX795F512L PIM.h
USB Stack
HardwareProfile.h
usb_config.h
usb_hal_local.h
usb_host_android_protocol_v1_local.h
usb_host_local.h
Library Files
Linker Files
Object Files
Source Files
Important Files
My MPLAB IDE
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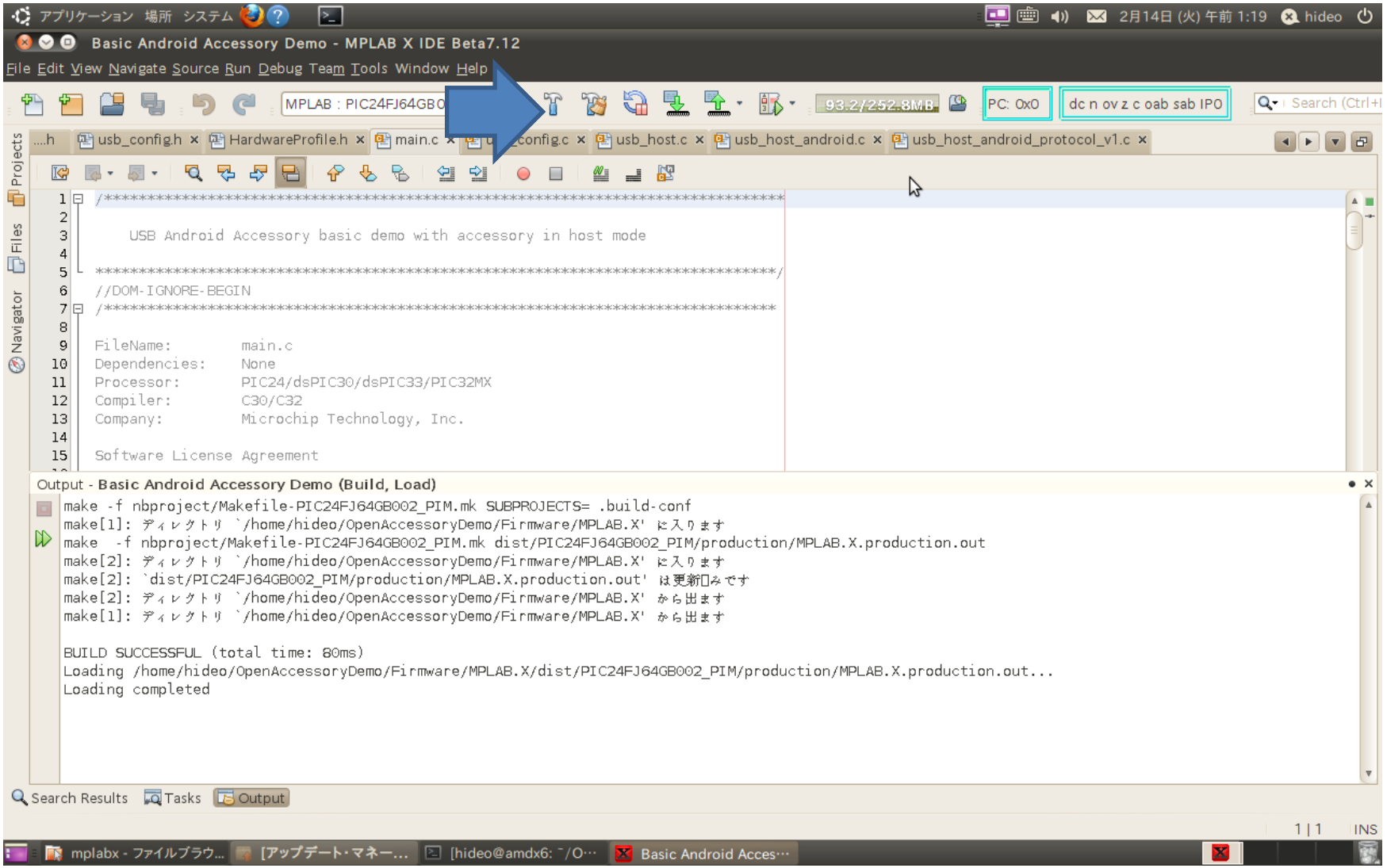
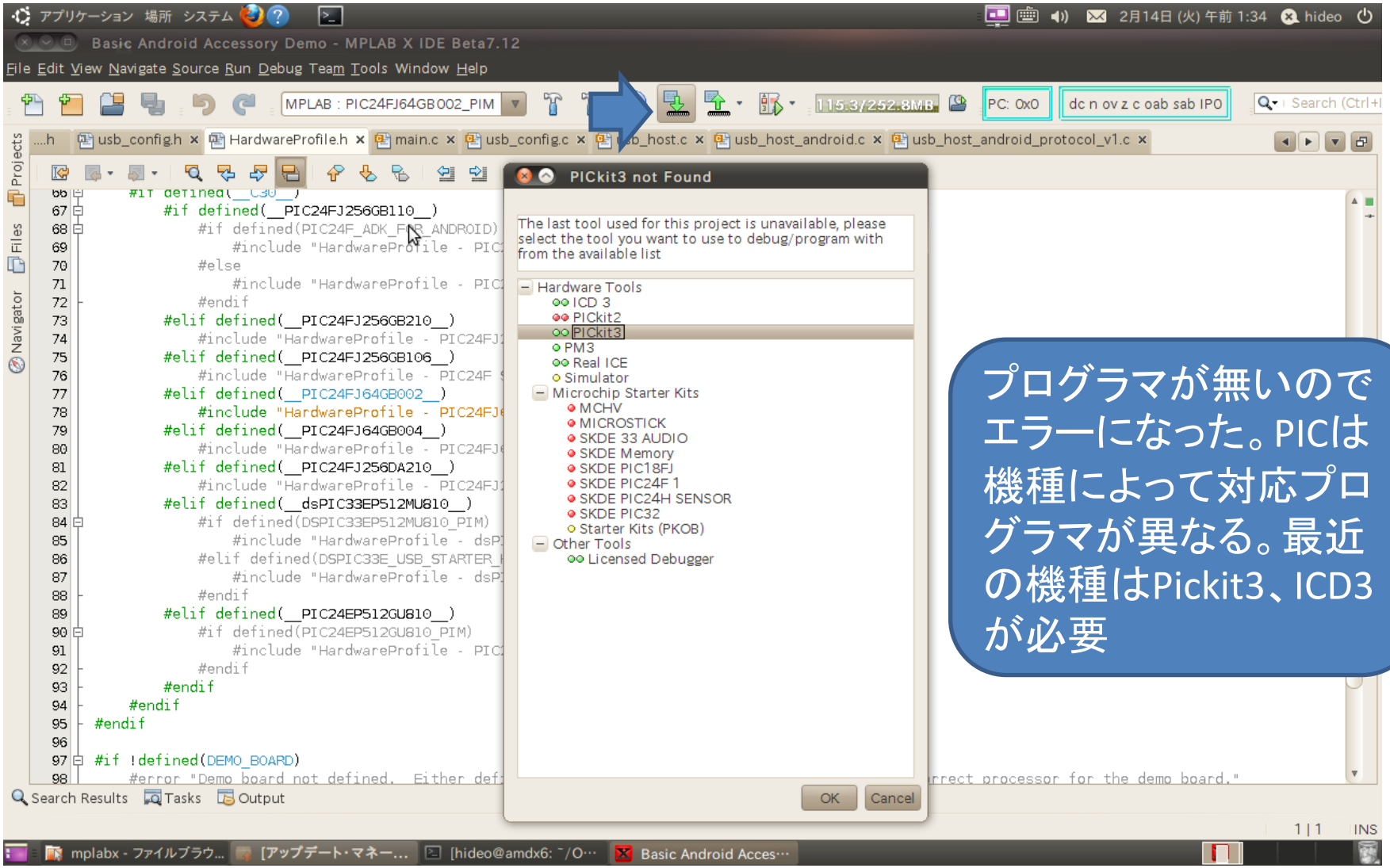
MCP2200 Drivers and Utilities v2.0
Source Code for Digital Power IPFC Reference De...
All Errata >>
All Recently Released Software >>
Product & Corporate News
Microchip Supports AZ SciTech Fest With Open Ho...
Microchip Launches Technical Training Series in ...
Microchip and Digilent® Unveil PIC32-based Cere...
Search Results
Tasks
Output

ビルド

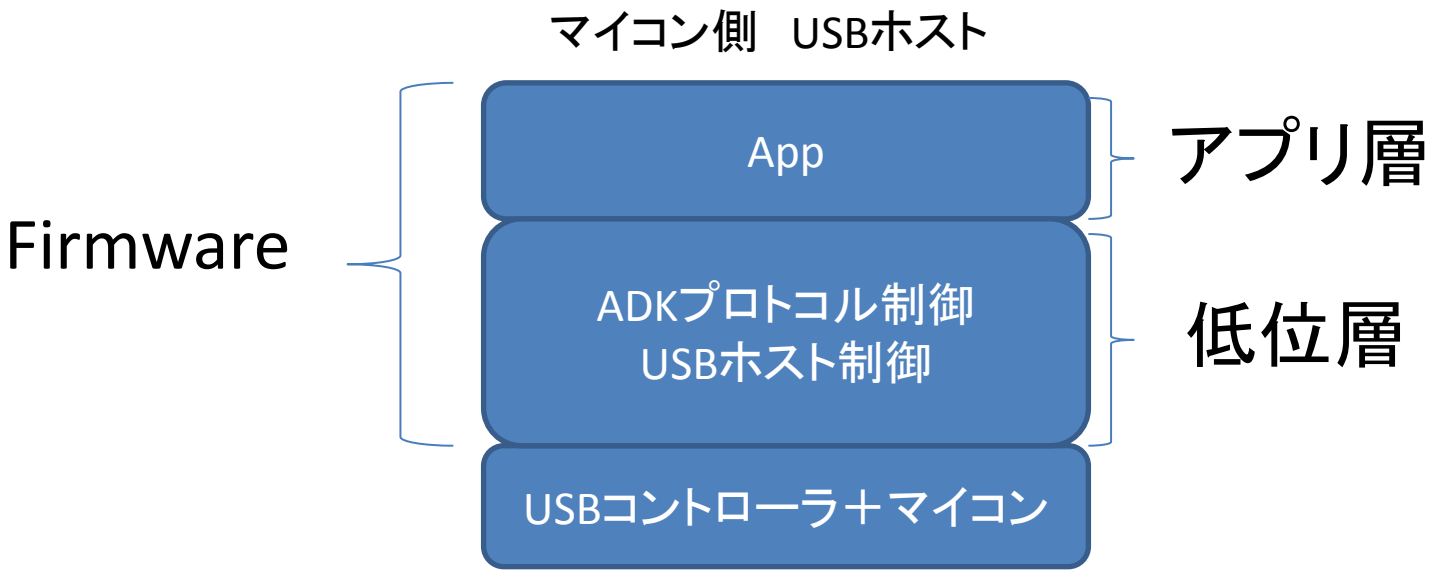

Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
usb_config.h
HardwareProfile.h
main.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
USB Android Accessory basic demo with accessory in host mode
FileName: main.c
Dependencies: None
Processor: PIC24/dsPIC30/dsPIC33/PIC32MX
Compiler: C30/C32
Company: Microchip Technology, Inc.
Software License Agreement
Output - Basic Android Accessory Demo (Build, Load)
make -f nbproject/Makefile-PIC24FJ64GB002_PIM.mk SUBPROJECTS= .build-conf
make[1]: ディレクトリ `/home/hideo/OpenAccessoryDemo/Firmware/MPLAB.X' に入ります
make -f nbproject/Makefile-PIC24FJ64GB002_PIM.mk dist/PIC24FJ64GB002_PIM/production/MPLAB.X.production.out
make[2]: ディレクトリ `/home/hideo/OpenAccessoryDemo/Firmware/MPLAB.X' に入ります
make[2]: `dist/PIC24FJ64GB002_PIM/production/MPLAB.X.production.out' は更新□みです
make[2]: ディレクトリ `/home/hideo/OpenAccessoryDemo/Firmware/MPLAB.X' から出ます
make[1]: ディレクトリ `/home/hideo/OpenAccessoryDemo/Firmware/MPLAB.X' から出ます
BUILD SUCCESSFUL (total time: 80ms)
Loading /home/hideo/OpenAccessoryDemo/Firmware/MPLAB.X/dist/PIC24FJ64GB002_PIM/production/MPLAB.X.production.out...
Loading completed
Search Results
Tasks
Output

プログラム

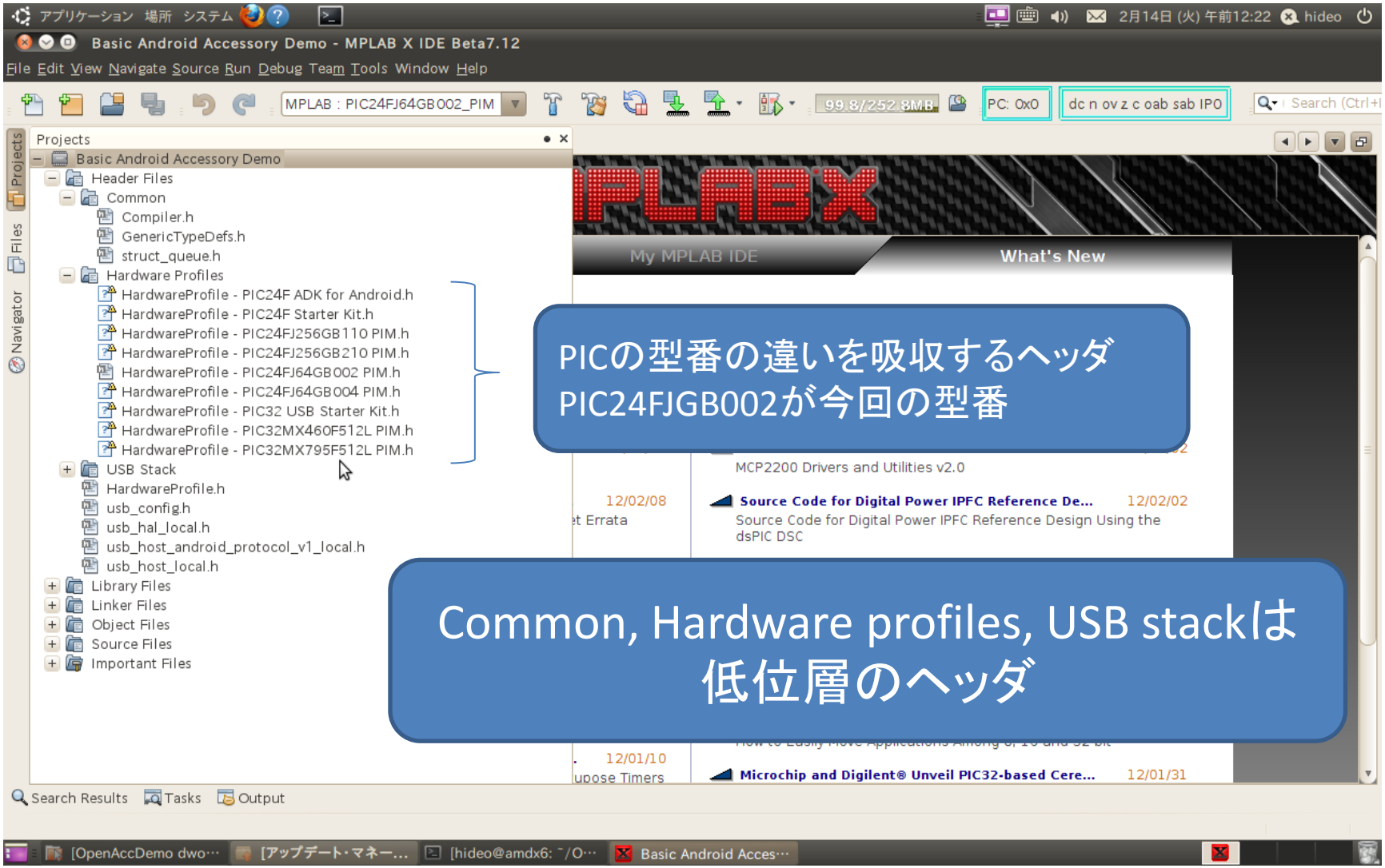

PICkit3 not Found
The last tool used for this project is unavailable, please select the tool you want to use to debug/program with from the available list
Hardware Tools
ICD 3
PICkit2
PICkit3
PM3
Real ICE
Simulator
Microchip Starter Kits
MCHV
MICROSTICK
SKDE 33 AUDIO
SKDE Memory
SKDE PIC18FJ
SKDE PIC24F 1
SKDE PIC24H SENSOR
SKDE PIC32
Starter Kits (PKOB)
Other Tools
Licensed Debugger
OK
Cancel
プログラマが無いのでエラーになった。PICは機種によって対応プログラマが異なる。最近の機種はPickit3、ICD3が必要

Firmwareのウォークスルー

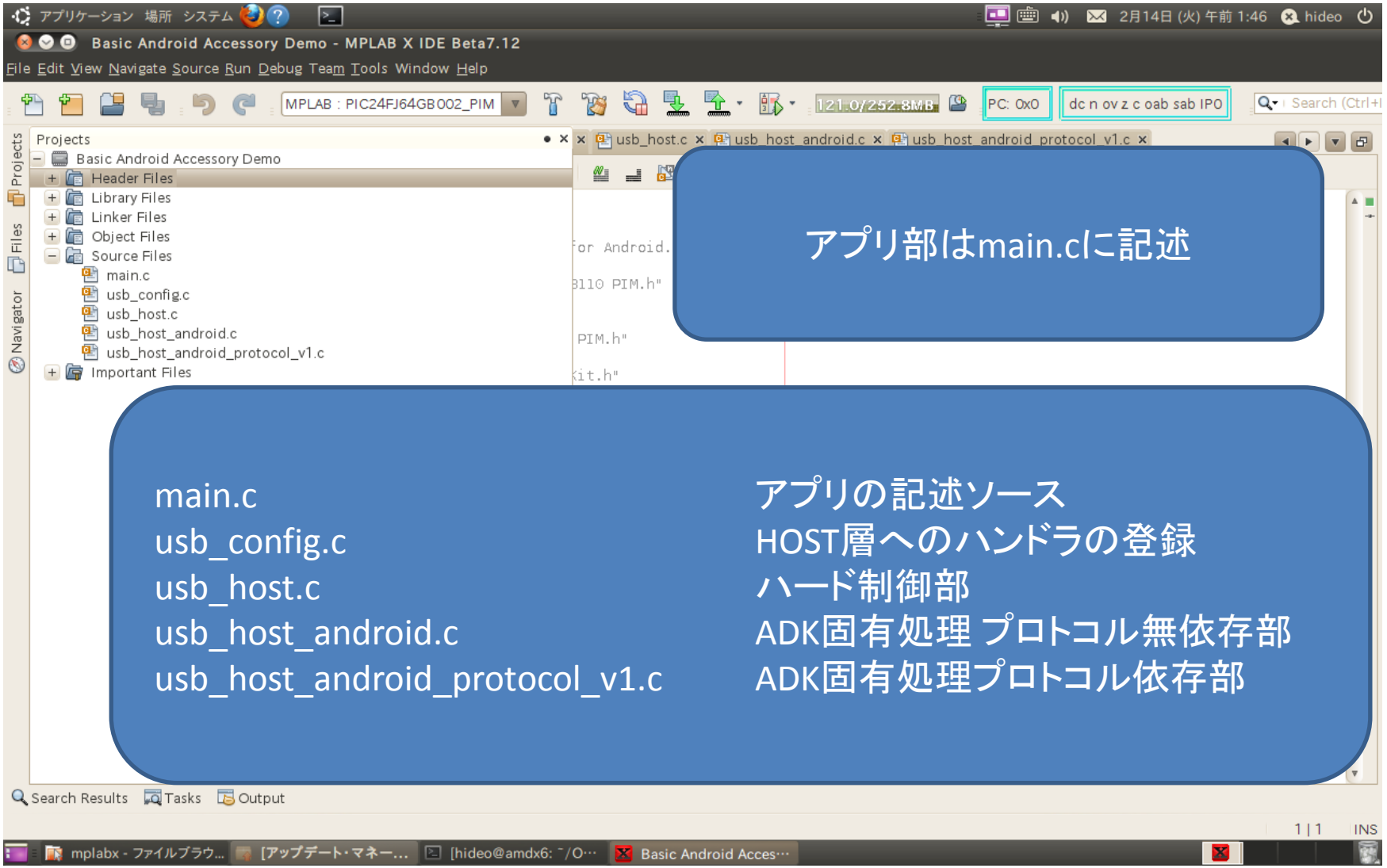
- Firmwareには、USBの低位層からアプリ層までのプログラムがソースで配置
- アプリ層のファイルは



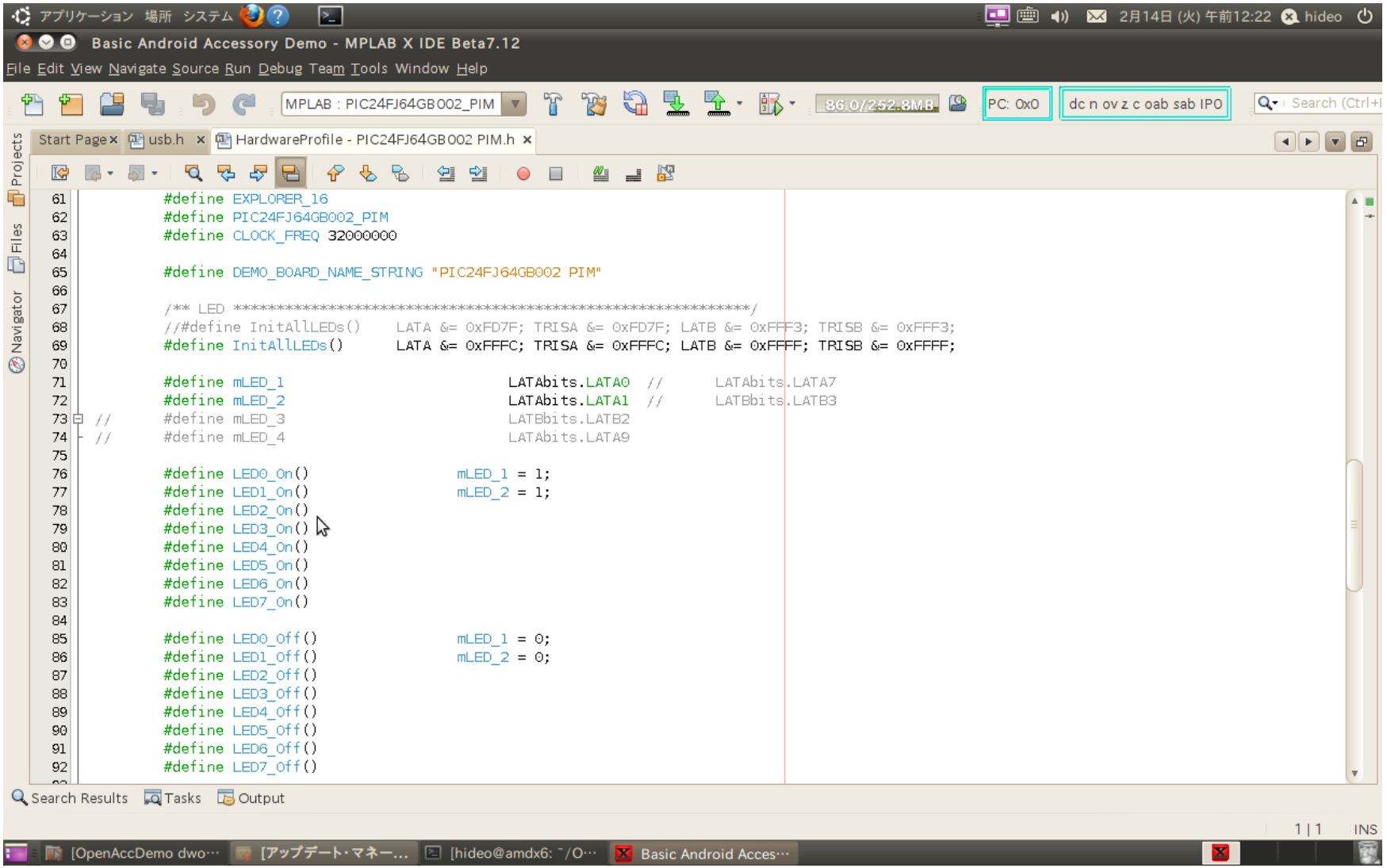
低位層のヘッダ


Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
Projects
Basic Android Accessory Demo
Header Files
Common
Compiler.h
GenericTypeDefs.h
struct_queue.h
Hardware Profiles
HardwareProfile - PIC24F ADK for Android.h
HardwareProfile - PIC24F Starter Kit.h
HardwareProfile - PIC24FJ256GB110 PIM.h
HardwareProfile - PIC24FJ256GB210 PIM.h
HardwareProfile - PIC24FJ64GB002 PIM.h
HardwareProfile - PIC24FJ64GB004 PIM.h
HardwareProfile - PIC32 USB Starter Kit.h
HardwareProfile - PIC32MX460F512L PIM.h
HardwareProfile - PIC32MX795F512L PIM.h
USB Stack
HardwareProfile.h
usb_config.h
usb_hal_local.h
usb_host_android_protocol_v1_local.h
usb_host_local.h
Library Files
Linker Files
Object Files
Source Files
Important Files
My MPLAB IDE
What's New
MCP2200 Drivers and Utilities v2.0
Source Code for Digital Power IPFC Reference De...
Source Code for Digital Power IPFC Reference Design Using the dsPIC DSC
Microchip and Digilent® Unveil PIC32-based Cere...
Search Results
Tasks
Output
PICの型番の違いを吸収するヘッダ
PIC24FJGB002が今回の型番
Common, Hardware profiles, USB stackは
低位層のヘッダ

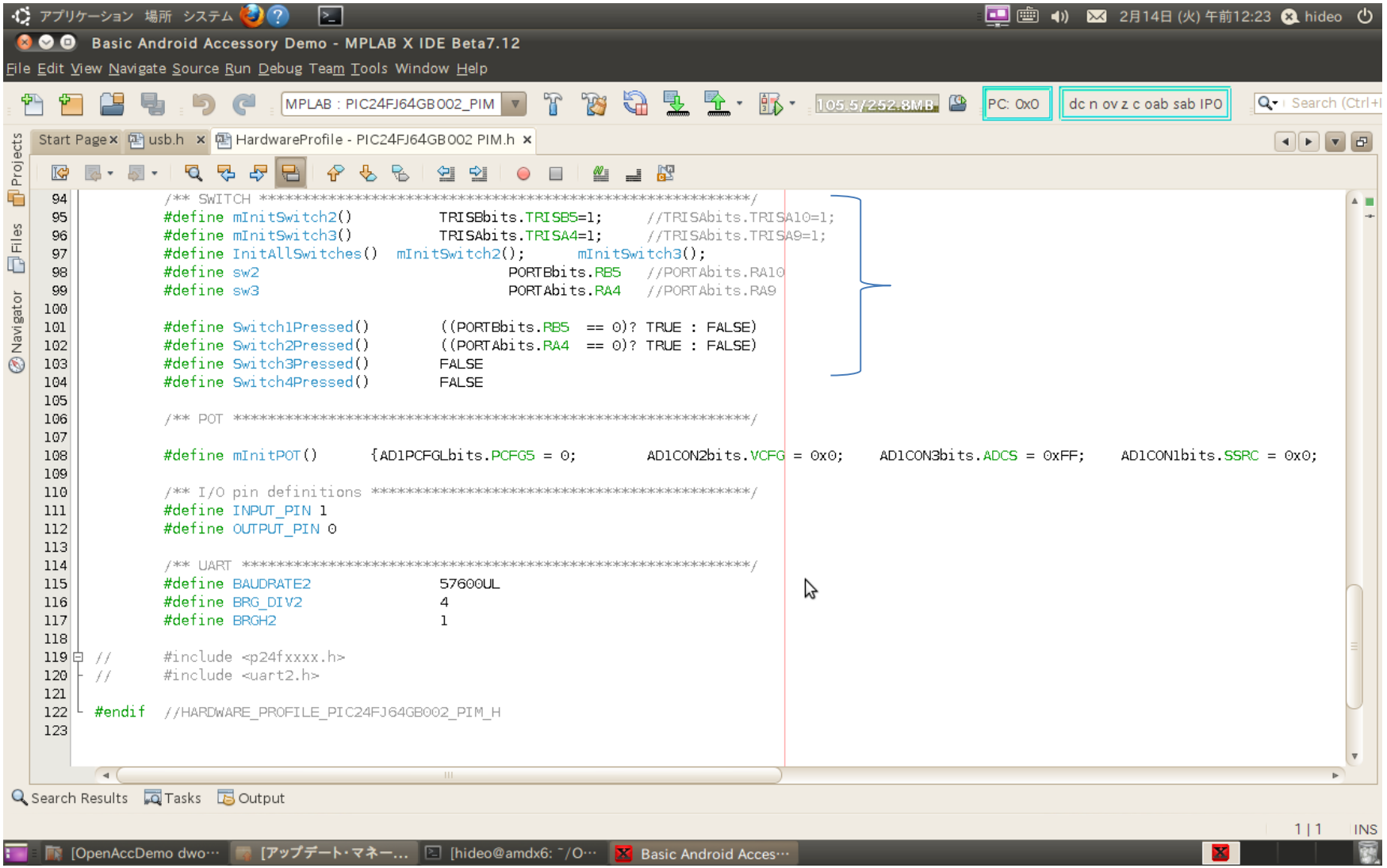
ソースファイル


Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
Projects
Basic Android Accessory Demo
Header Files
Library Files
Linker Files
Object Files
Source Files
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Important Files
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Search Results
Tasks
Output
アプリ部はmain.cに記述
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
アプリの記述ソース
HOST層へのハンドラの登録
ハード制御部
ADK固有処理 プロトコル無依存部
ADK固有処理プロトコル依存部

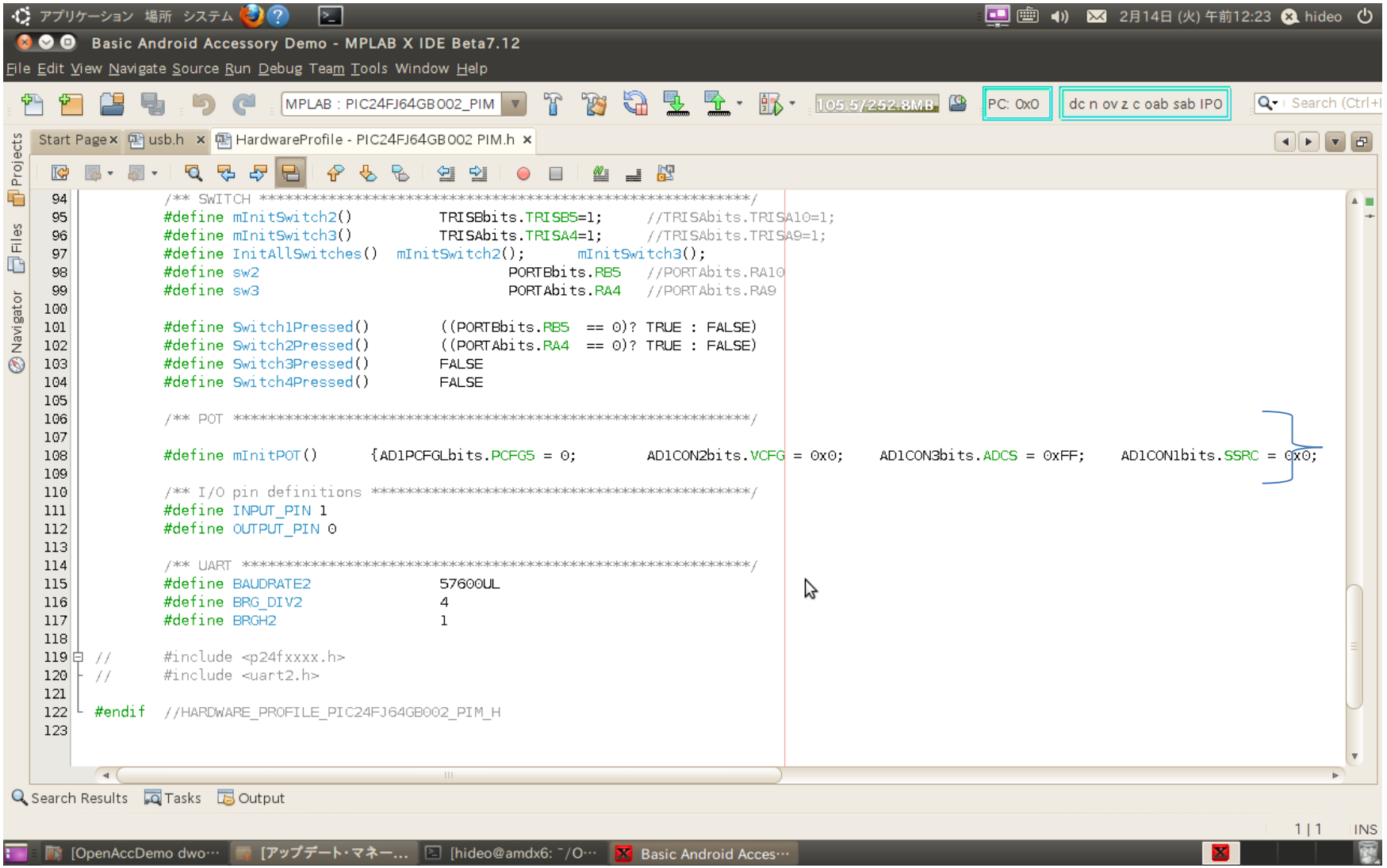
GPIOポートの出力設定



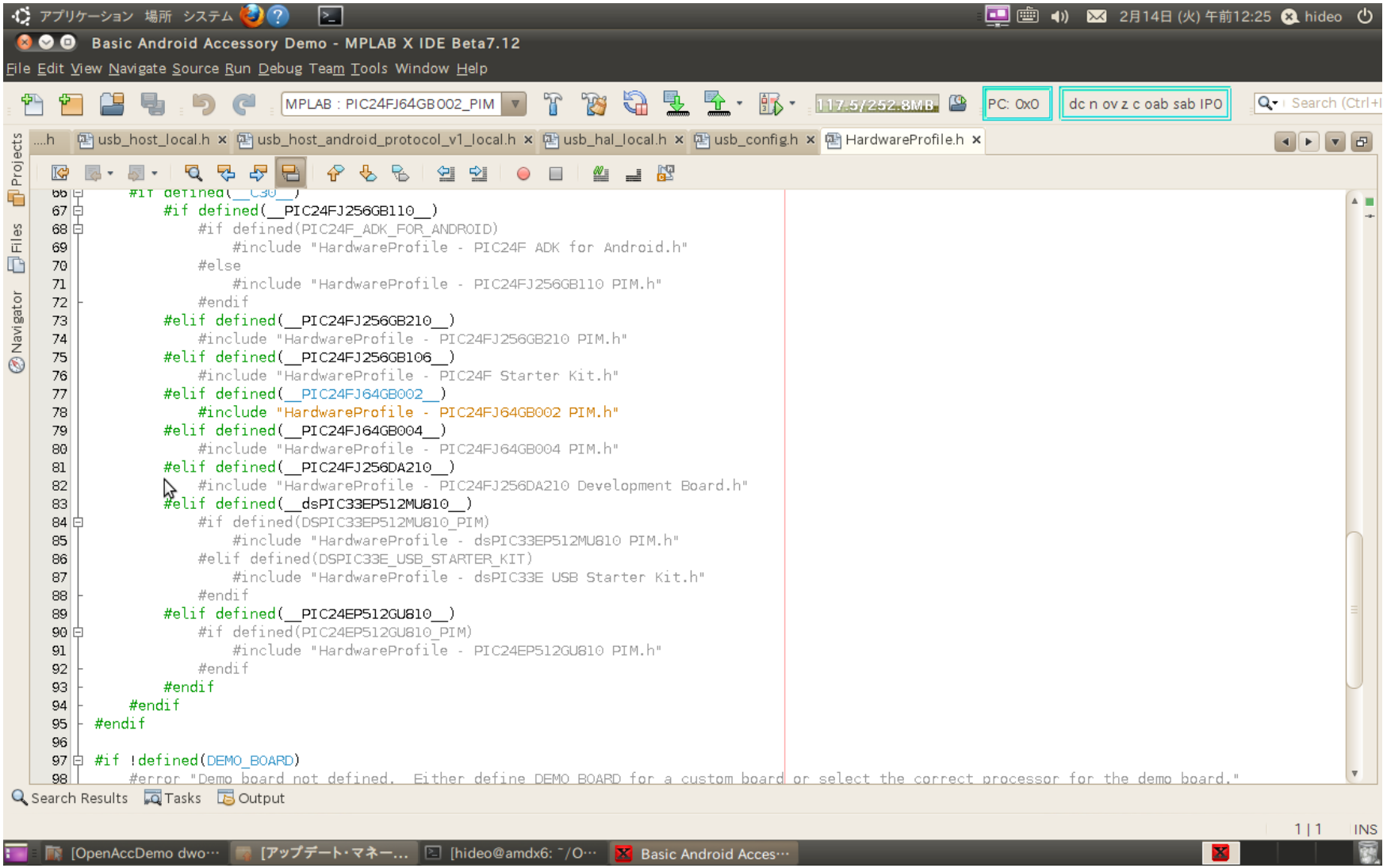
GPIOの入力設定


Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
Start Page
usb.h
HardwareProfile - PIC24FJ64GB002 PIM.h
94 /** SWITCH *****/
95 #define mInitSwitch2() TRISBbits.TRISB5=1; //TRISAbits.TRISA10=1;
96 #define mInitSwitch3() TRISAbits.TRISA4=1; //TRISAbits.TRISA9=1;
97 #define InitAllSwitches() mInitSwitch2(); mInitSwitch3();
98 #define sw2 PORTBbits.RB5 //PORTAbits.RA10
99 #define sw3 PORTAbits.RA4 //PORTAbits.RA9
100
101 #define Switch1Pressed() ((PORTBbits.RB5 == 0)? TRUE : FALSE)
102 #define Switch2Pressed() ((PORTAbits.RA4 == 0)? TRUE : FALSE)
103 #define Switch3Pressed() FALSE
104 #define Switch4Pressed() FALSE
105
106 /** POT *****/
107
108 #define mInitPOT() {AD1PCFGLbits.PCFG5 = 0; AD1CON2bits.VCFG = 0x0; AD1CON3bits.ADCS = 0xFF; AD1CON1bits.SSRC = 0x0;
109
110 /** I/O pin definitions *****/
111 #define INPUT_PIN 1
112 #define OUTPUT_PIN 0
113
114 /** UART *****/
115 #define BAUDRATE2 57600UL
116 #define BRG_DIV2 4
117 #define BRGH2 1
118
119 // #include <p24fxxxx.h>
120 // #include <uart2.h>
121
122 #endif //HARDWARE_PROFILE_PIC24FJ64GB002_PIM_H
123
Search Results
Tasks
Output
1 | 1
INS

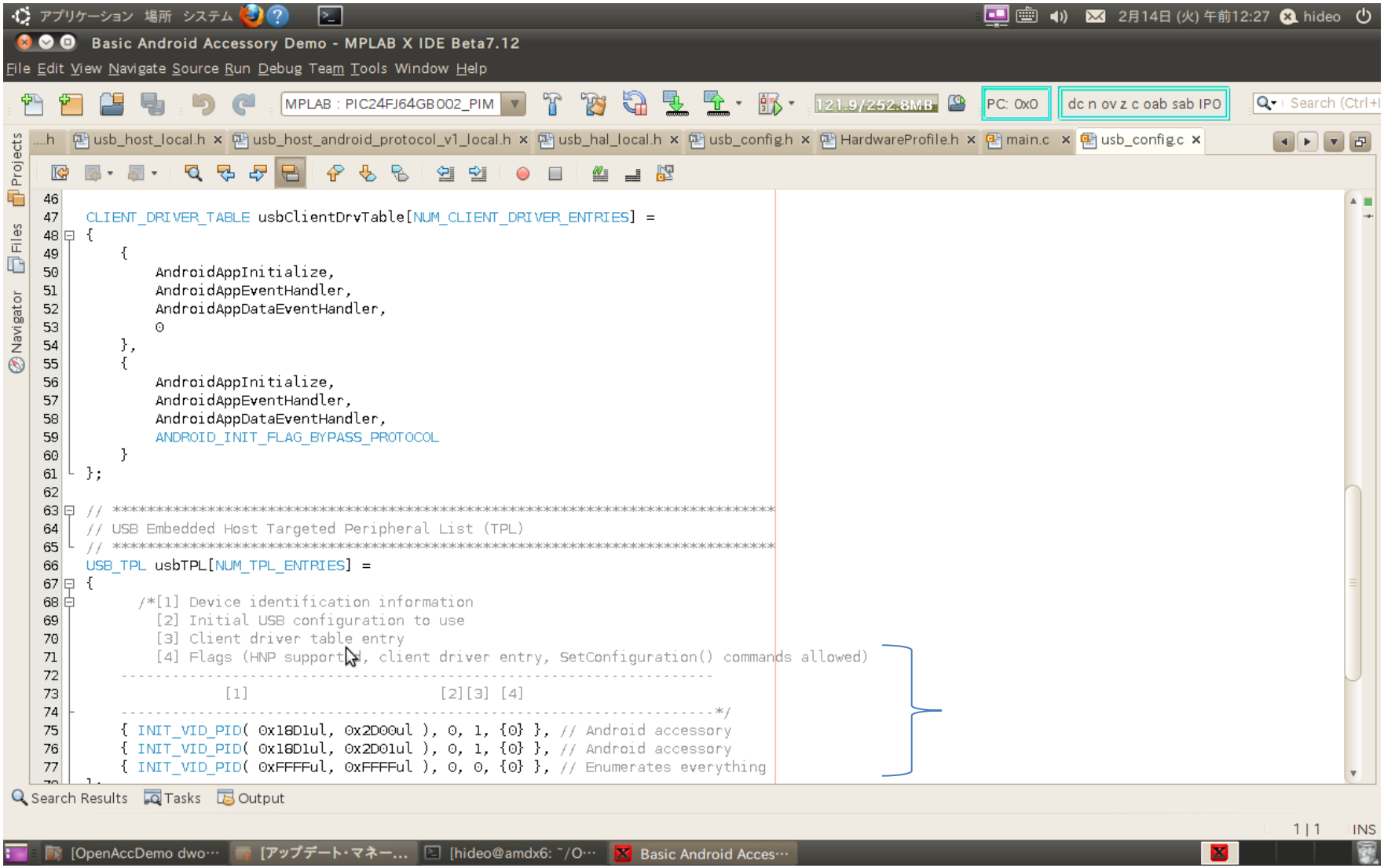
ADCの設定

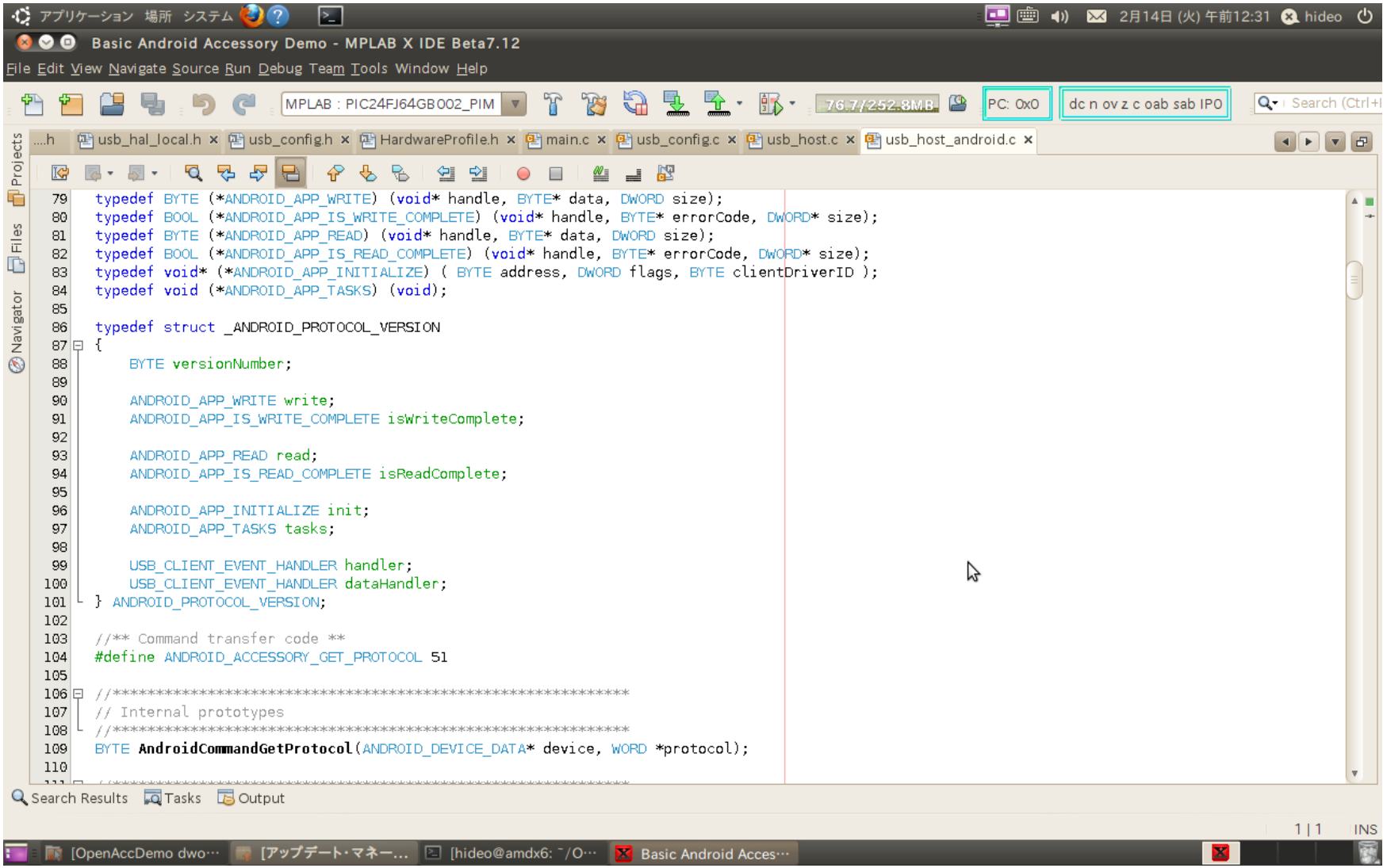

アプリケーション 場所 システム
2月14日 (火) 午前12:23 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
105.5/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
Start Page
usb.h
HardwareProfile - PIC24FJ64GB002 PIM.h
Projects
Files
Navigator
94 /** SWITCH *****/
95 #define mInitSwitch2() TRISBbits.TRISB5=1; //TRISAbits.TRISA10=1;
96 #define mInitSwitch3() TRISAbits.TRISA4=1; //TRISAbits.TRISA9=1;
97 #define InitAllSwitches() mInitSwitch2(); mInitSwitch3();
98 #define sw2 PORTBbits.RB5 //PORTAbits.RA10
99 #define sw3 PORTAbits.RA4 //PORTAbits.RA9
100
101 #define Switch1Pressed() ((PORTBbits.RB5 == 0)? TRUE : FALSE)
102 #define Switch2Pressed() ((PORTAbits.RA4 == 0)? TRUE : FALSE)
103 #define Switch3Pressed() FALSE
104 #define Switch4Pressed() FALSE
105
106 /** POT *****/
107
108 #define mInitPOT() {AD1PCFGLbits.PCFG5 = 0; AD1CON2bits.VCFG = 0x0; AD1CON3bits.ADCS = 0xFF; AD1CON1bits.SSRC = 0x0;
109
110 /** I/O pin definitions *****/
111 #define INPUT_PIN 1
112 #define OUTPUT_PIN 0
113
114 /** UART *****/
115 #define BAUDRATE2 57600UL
116 #define BRG_DIV2 4
117 #define BRGH2 1
118
119 // #include <p24fxxxx.h>
120 // #include <uart2.h>
121
122 #endif //HARDWARE_PROFILE_PIC24FJ64GB002_PIM_H
123
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo…
[アップデート・マネー…
[hideo@amdx6: ~/O…
Basic Android Acces…

型番依存部の切り替え

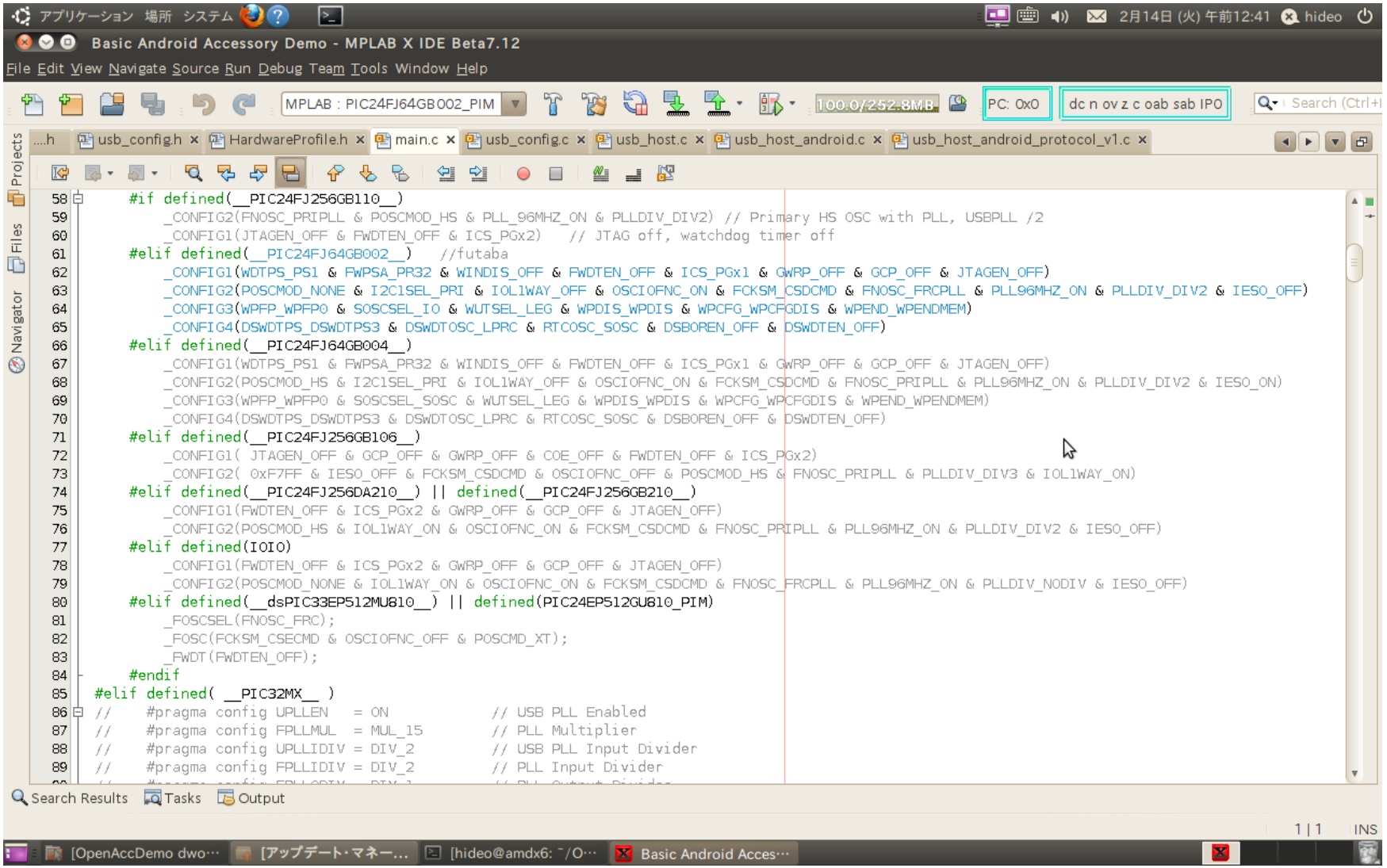

アプリケーション 場所 システム
2月14日 (火) 午前12:25 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
117.5/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
usb_host_local.h
usb_host_android_protocol_v1_local.h
usb_hal_local.h
usb_config.h
HardwareProfile.h
Projects
Files
Navigator
#if defined(__C30__)
#if defined(__PIC24FJ256GB110__)
#if defined(PIC24F_ADK_FOR_ANDROID)
#include "HardwareProfile - PIC24F ADK for Android.h"
#else
#include "HardwareProfile - PIC24FJ256GB110 PIM.h"
#endif
#elif defined(__PIC24FJ256GB210__)
#include "HardwareProfile - PIC24FJ256GB210 PIM.h"
#elif defined(__PIC24FJ256GB106__)
#include "HardwareProfile - PIC24F Starter Kit.h"
#elif defined(__PIC24FJ64GB002__)
#include "HardwareProfile - PIC24FJ64GB002 PIM.h"
#elif defined(__PIC24FJ64GB004__)
#include "HardwareProfile - PIC24FJ64GB004 PIM.h"
#elif defined(__PIC24FJ256DA210__)
#include "HardwareProfile - PIC24FJ256DA210 Development Board.h"
#elif defined(__dsPIC33EP512MU810__)
#if defined(DSPIC33EP512MU810_PIM)
#include "HardwareProfile - dsPIC33EP512MU810 PIM.h"
#elif defined(DSPIC33E_USB_STARTER_KIT)
#include "HardwareProfile - dsPIC33E USB Starter Kit.h"
#endif
#elif defined(__PIC24EP512GU810__)
#if defined(PIC24EP512GU810_PIM)
#include "HardwareProfile - PIC24EP512GU810 PIM.h"
#endif
#endif
#endif
#endif
#if !defined(DEMO_BOARD)
#error "Demo board not defined. Either define DEMO_BOARD for a custom board or select the correct processor for the demo board."
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

処理対象のVid,Pidの定義

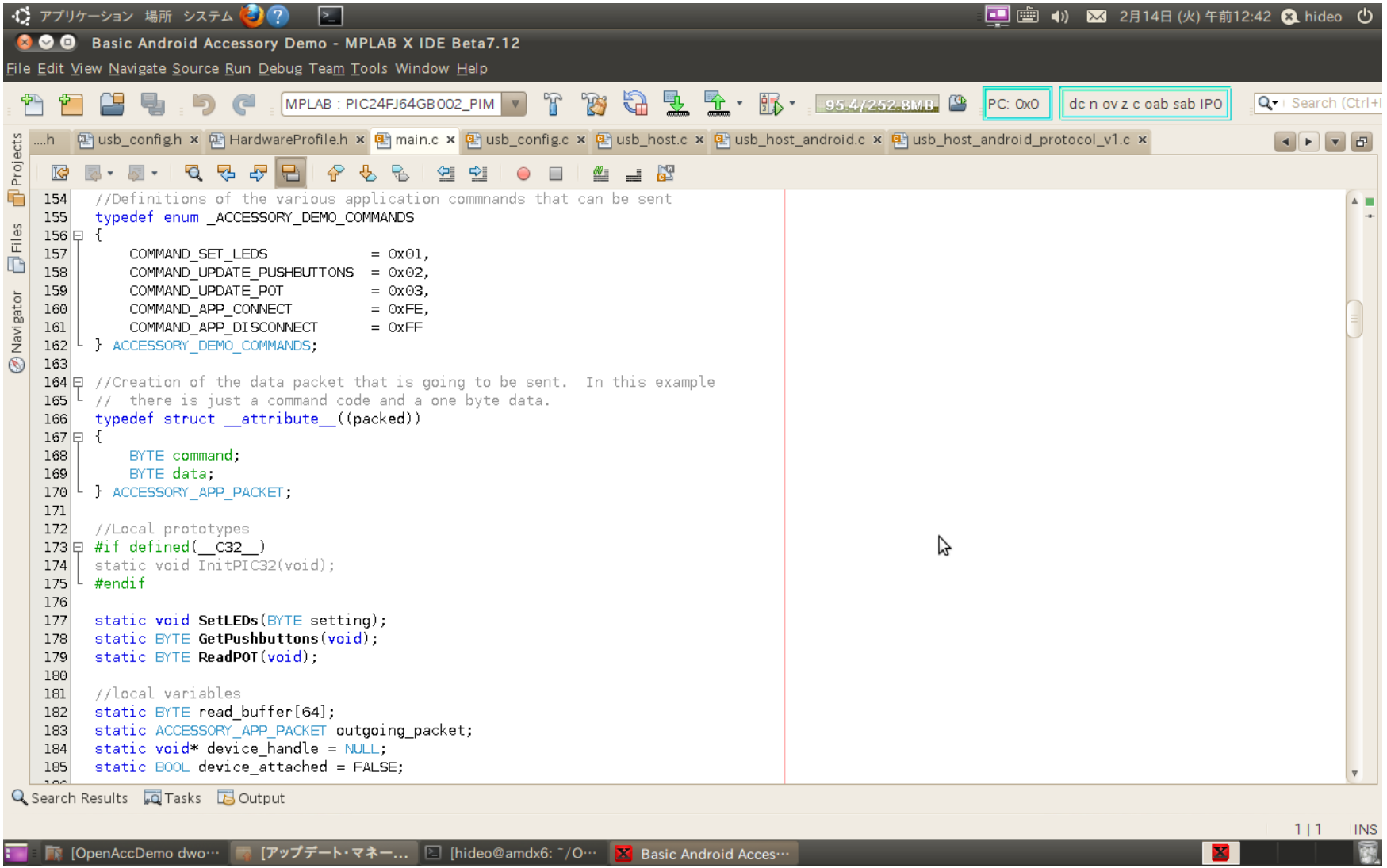



アプリケーション 場所 システム
2月14日 (火) 午前12:31 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
76.7/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_hal_local.h
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
Projects
Files
Navigator
79 typedef BYTE (*ANDROID_APP_WRITE) (void* handle, BYTE* data, DWORD size);
80 typedef BOOL (*ANDROID_APP_IS_WRITE_COMPLETE) (void* handle, BYTE* errorCode, DWORD* size);
81 typedef BYTE (*ANDROID_APP_READ) (void* handle, BYTE* data, DWORD size);
82 typedef BOOL (*ANDROID_APP_IS_READ_COMPLETE) (void* handle, BYTE* errorCode, DWORD* size);
83 typedef void* (*ANDROID_APP_INITIALIZE) (BYTE address, DWORD flags, BYTE clientDriverID);
84 typedef void (*ANDROID_APP_TASKS) (void);
85
86 typedef struct _ANDROID_PROTOCOL_VERSION
87 {
88 BYTE versionNumber;
89
90 ANDROID_APP_WRITE write;
91 ANDROID_APP_IS_WRITE_COMPLETE isWriteComplete;
92
93 ANDROID_APP_READ read;
94 ANDROID_APP_IS_READ_COMPLETE isReadComplete;
95
96 ANDROID_APP_INITIALIZE init;
97 ANDROID_APP_TASKS tasks;
98
99 USB_CLIENT_EVENT_HANDLER handler;
100 USB_CLIENT_EVENT_HANDLER dataHandler;
101 } ANDROID_PROTOCOL_VERSION;
102
103 //** Command transfer code **
104 #define ANDROID_ACCESSORY_GET_PROTOCOL 51
105
106 //***
107 // Internal prototypes
108 //***
109 BYTE AndroidCommandGetProtocol(ANDROID_DEVICE_DATA* device, WORD *protocol);
110
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

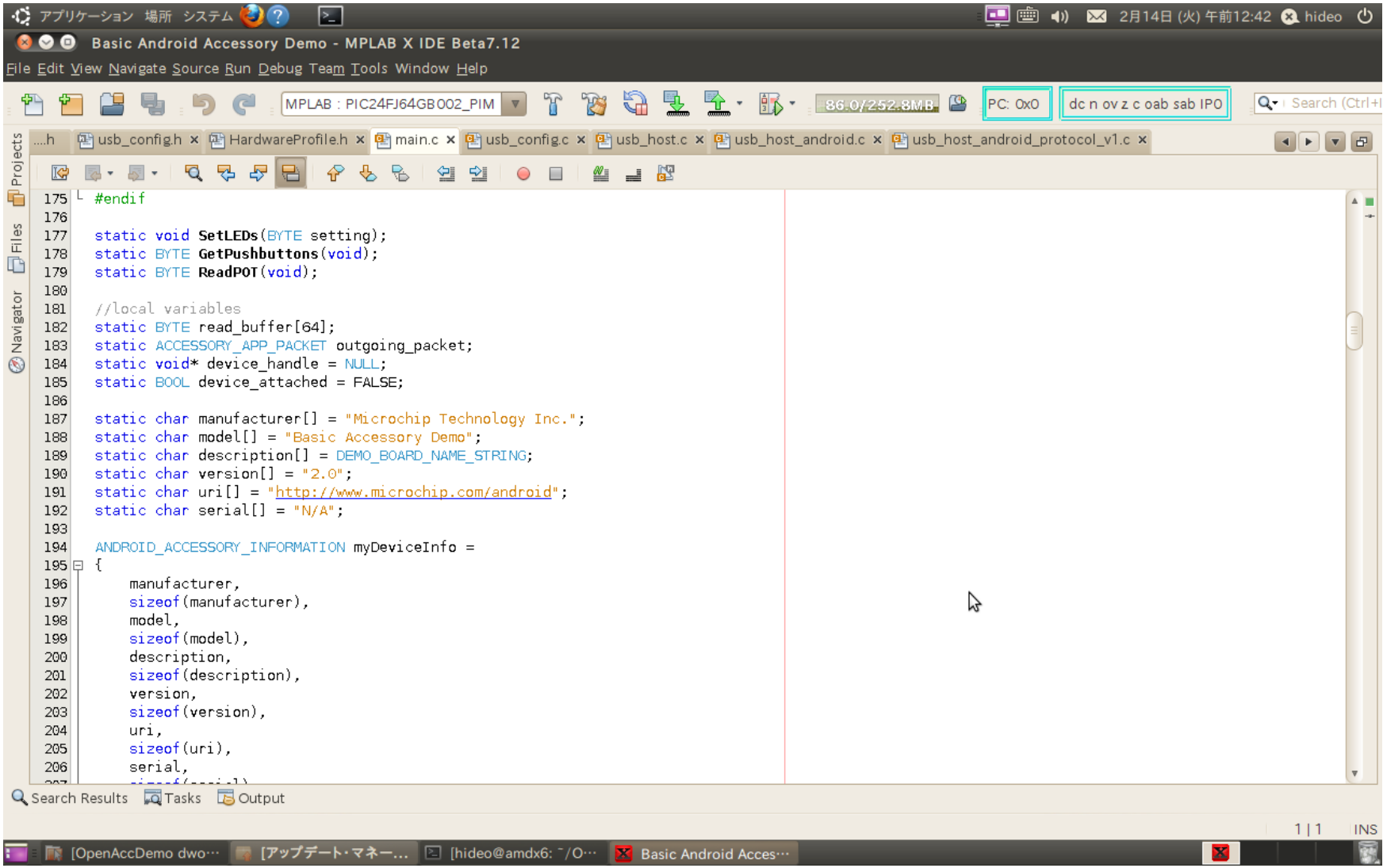
PICのファンクション指定

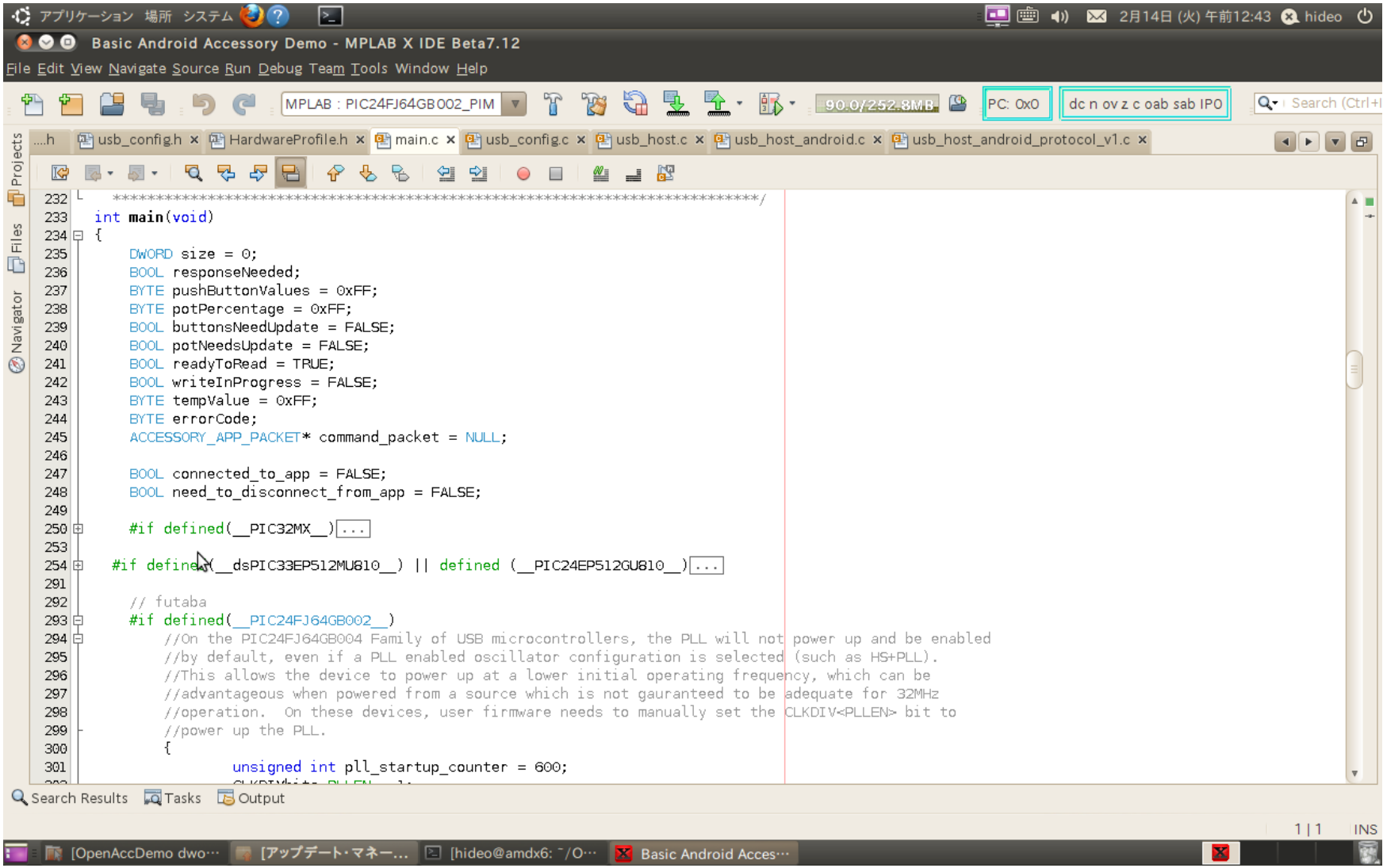


Appとのプロトコル定義

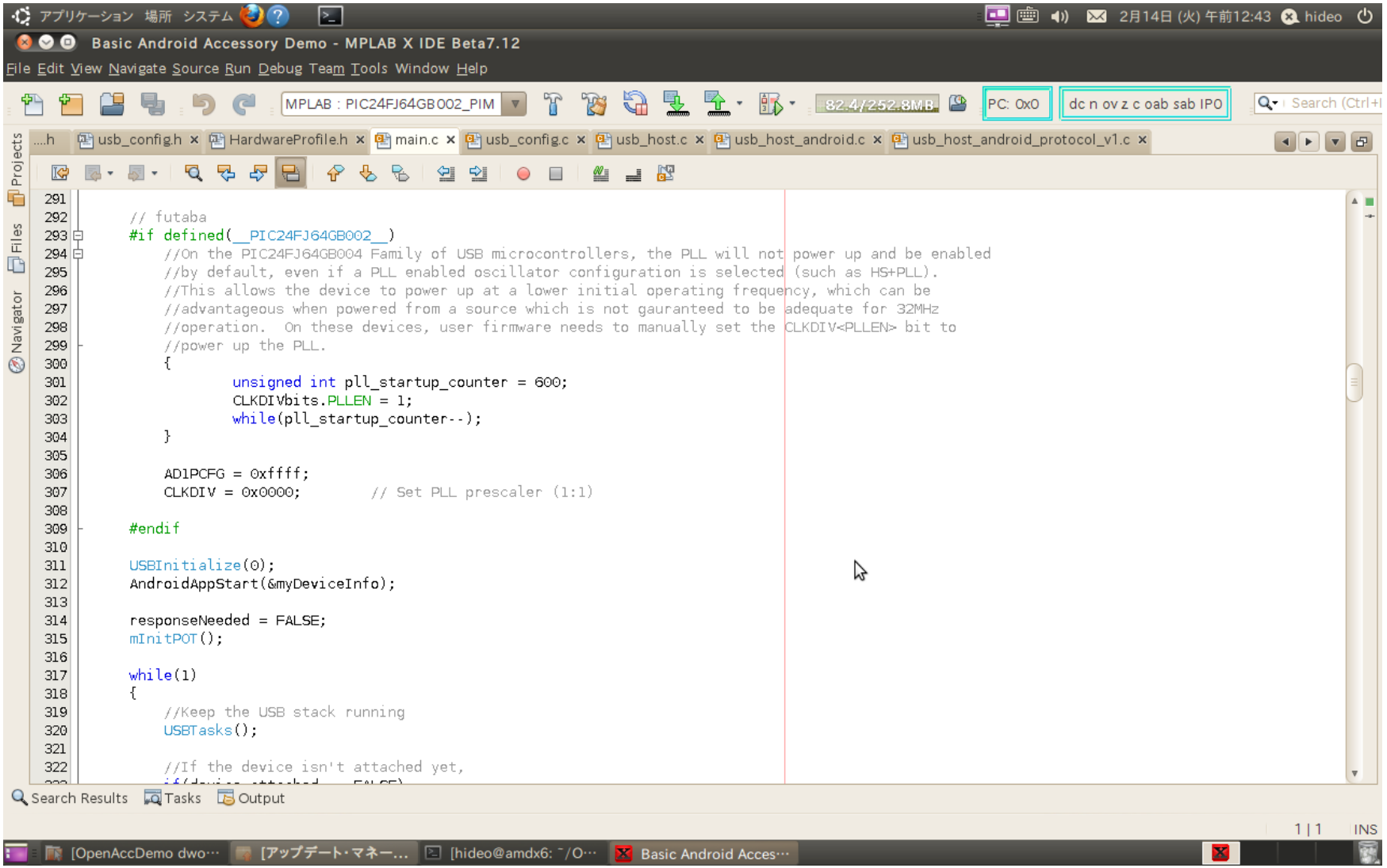


アクセサリの識別情報

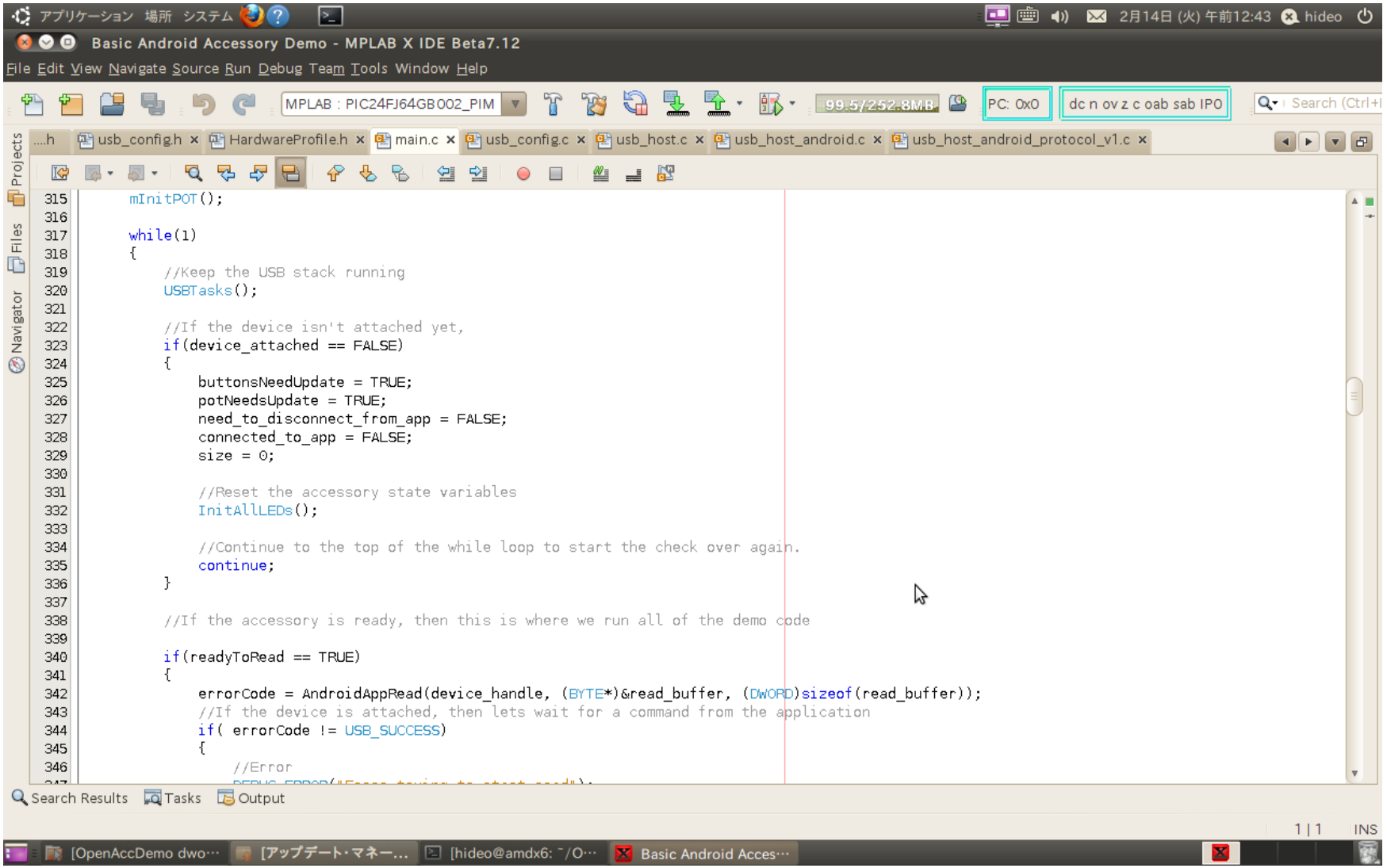

Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
#endif
static void SetLEDs(BYTE setting);
static BYTE GetPushbuttons(void);
static BYTE ReadPOT(void);
//local variables
static BYTE read_buffer[64];
static ACCESSORY_APP_PACKET outgoing_packet;
static void* device_handle = NULL;
static BOOL device_attached = FALSE;
static char manufacturer[] = "Microchip Technology Inc.";
static char model[] = "Basic Accessory Demo";
static char description[] = DEMO_BOARD_NAME_STRING;
static char version[] = "2.0";
static char uri[] = "http://www.microchip.com/android";
static char serial[] = "N/A";
ANDROID_ACCESSORY_INFORMATION myDeviceInfo =
{
manufacturer,
sizeof(manufacturer),
model,
sizeof(model),
description,
sizeof(description),
version,
sizeof(version),
uri,
sizeof(uri),
serial,
Search Results
Tasks
Output


アプリケーション 場所 システム
2月14日 (火) 午前12:43 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
90.0/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
int main(void)
{
DWORD size = 0;
BOOL responseNeeded;
BYTE pushButtonValues = 0xFF;
BYTE potPercentage = 0xFF;
BOOL buttonsNeedUpdate = FALSE;
BOOL potNeedsUpdate = FALSE;
BOOL readyToRead = TRUE;
BOOL writeInProgress = FALSE;
BYTE tempValue = 0xFF;
BYTE errorCode;
ACCESSORY_APP_PACKET* command_packet = NULL;
BOOL connected_to_app = FALSE;
BOOL need_to_disconnect_from_app = FALSE;
#if defined(__PIC32MX__)...
#if defined(__dsPIC33EP512MU810__) || defined (__PIC24EP512GU810__)...
// futaba
#if defined(__PIC24FJ64GB002__)
//On the PIC24FJ64GB004 Family of USB microcontrollers, the PLL will not power up and be enabled
//by default, even if a PLL enabled oscillator configuration is selected (such as HS+PLL).
//This allows the device to power up at a lower initial operating frequency, which can be
//advantageous when powered from a source which is not gauranteed to be adequate for 32MHz
//operation. On these devices, user firmware needs to manually set the CLKDIV<PLLEN> bit to
//power up the PLL.
{
unsigned int pll_startup_counter = 600;
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

PLLモードの設定/POTの初期化



メインループの入り口


Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
mInitPOT();
while(1)
{
//Keep the USB stack running
USBTasks();
//If the device isn't attached yet,
if(device_attached == FALSE)
{
buttonsNeedUpdate = TRUE;
potNeedsUpdate = TRUE;
need_to_disconnect_from_app = FALSE;
connected_to_app = FALSE;
size = 0;
//Reset the accessory state variables
InitAllLEDs();
//Continue to the top of the while loop to start the check over again.
continue;
}
//If the accessory is ready, then this is where we run all of the demo code
if(readyToRead == TRUE)
{
errorCode = AndroidAppRead(device_handle, (BYTE*)&read_buffer, (DWORD)sizeof(read_buffer));
//If the device is attached, then lets wait for a command from the application
if(errorCode != USB_SUCCESS)
{
//Error
Search Results
Tasks
Output

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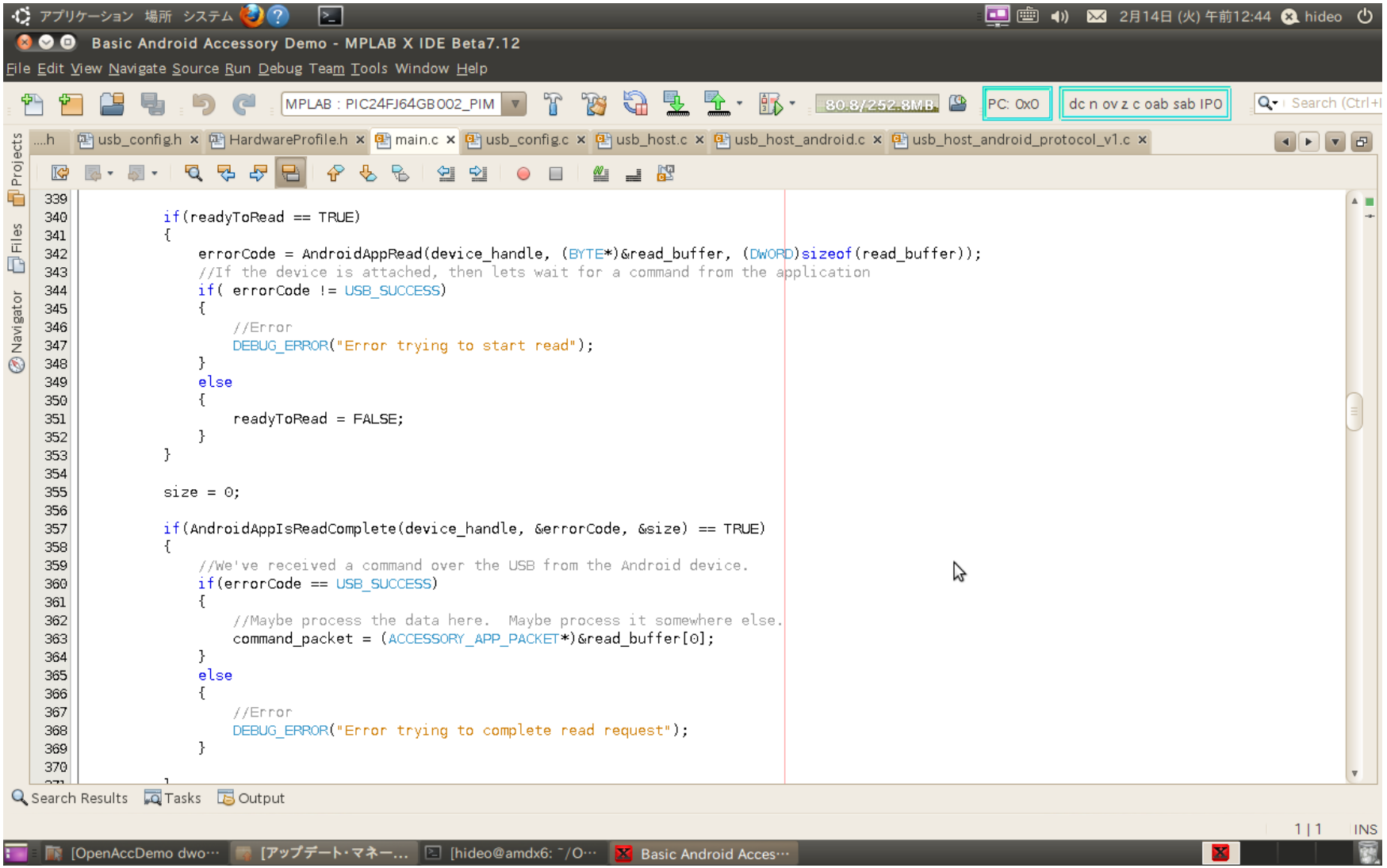
アプリケーション 場所 システム
2月14日 (火) 午前12:44 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
80.8/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
339 if(readyToRead == TRUE)
340 {
341 errorCode = AndroidAppRead(device_handle, (BYTE*)&read_buffer, (DWORD)sizeof(read_buffer));
342 //If the device is attached, then lets wait for a command from the application
343 if(errorCode != USB_SUCCESS)
344 {
345 //Error
346 DEBUG_ERROR("Error trying to start read");
347 }
348 else
349 {
350 readyToRead = FALSE;
351 }
352 }
353
354 size = 0;
355
356 if(AndroidAppIsReadComplete(device_handle, &errorCode, &size) == TRUE)
357 {
358 //We've received a command over the USB from the Android device.
359 if(errorCode == USB_SUCCESS)
360 {
361 //Maybe process the data here. Maybe process it somewhere else.
362 command_packet = (ACCESSORY_APP_PACKET*)&read_buffer[0];
363 }
364 else
365 {
366 //Error
367 DEBUG_ERROR("Error trying to complete read request");
368 }
369
370 }
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo…
[アップデート・マネー…
[hideo@amdx6: ~/O…
Basic Android Acces…

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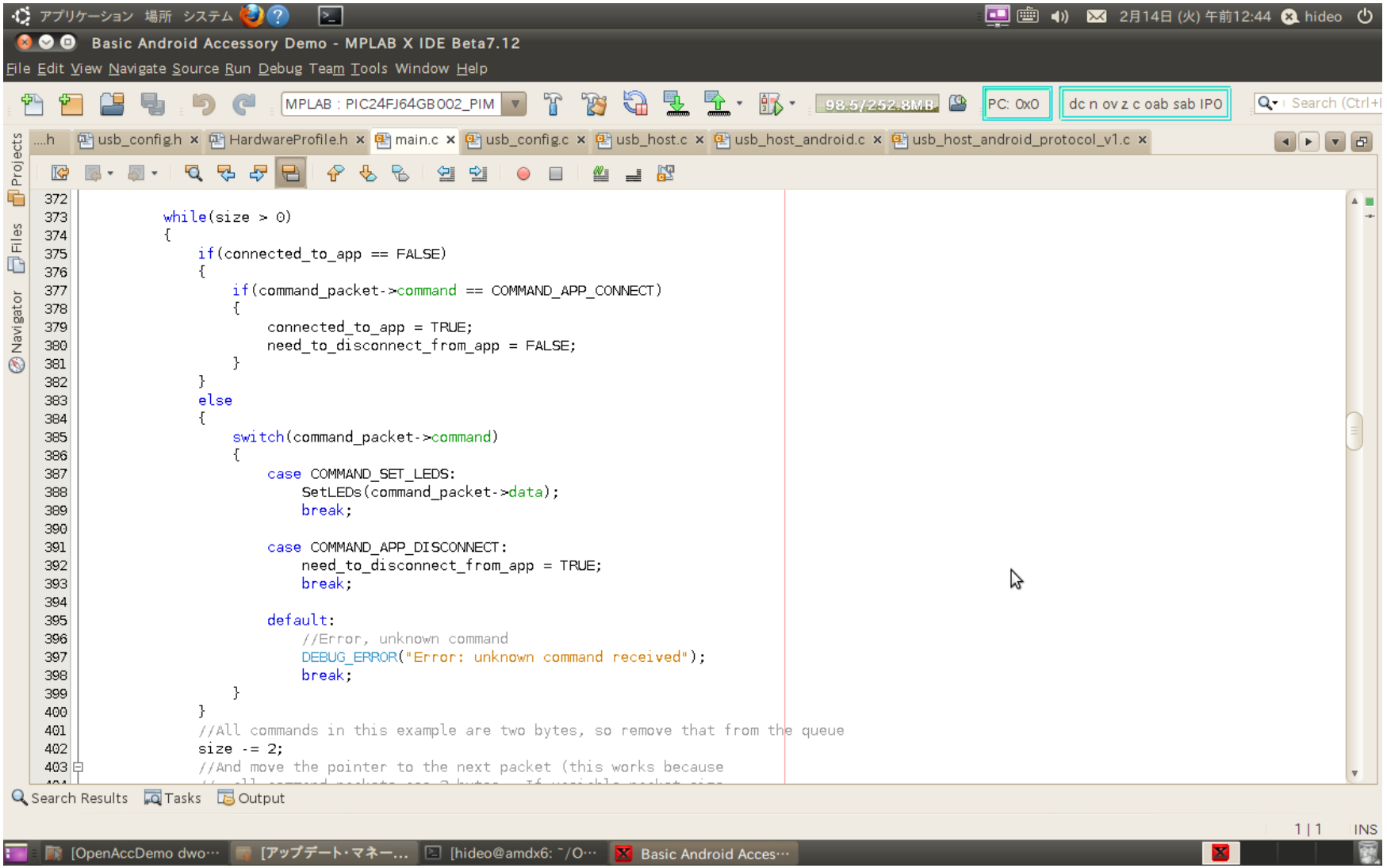
アプリケーション 場所 システム
2月14日 (火) 午前12:44 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
98.5/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
372 while(size > 0)
373 {
374 if(connected_to_app == FALSE)
375 {
376 if(command_packet->command == COMMAND_APP_CONNECT)
377 {
378 connected_to_app = TRUE;
379 need_to_disconnect_from_app = FALSE;
380 }
381 }
382 else
383 {
384 switch(command_packet->command)
385 {
386 case COMMAND_SET_LEDS:
387 SetLEDs(command_packet->data);
388 break;
389
390 case COMMAND_APP_DISCONNECT:
391 need_to_disconnect_from_app = TRUE;
392 break;
393
394 default:
395 //Error, unknown command
396 DEBUG_ERROR("Error: unknown command received");
397 break;
398 }
399 }
400 //All commands in this example are two bytes, so remove that from the queue
401 size -= 2;
402 //And move the pointer to the next packet (this works because
403
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

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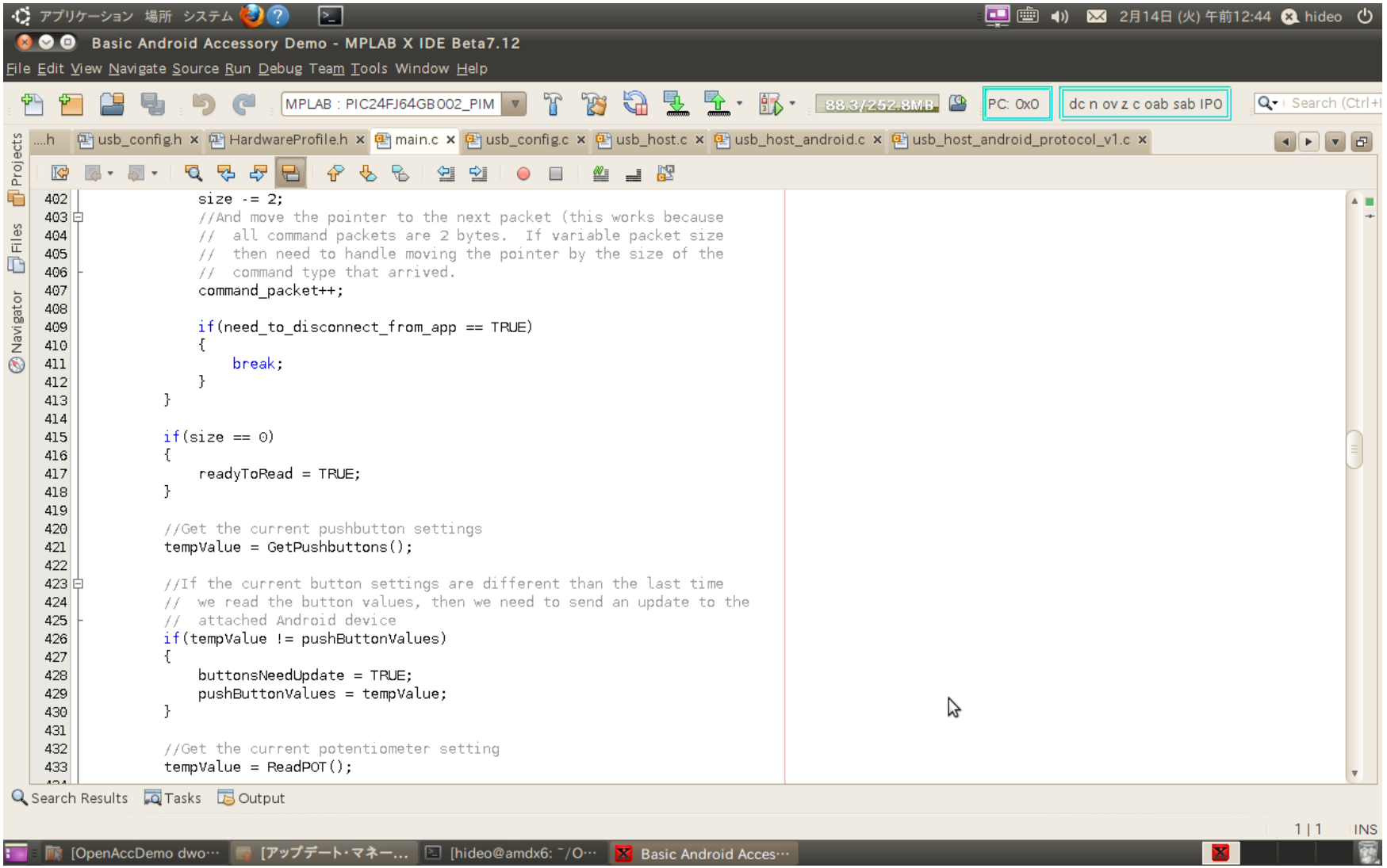
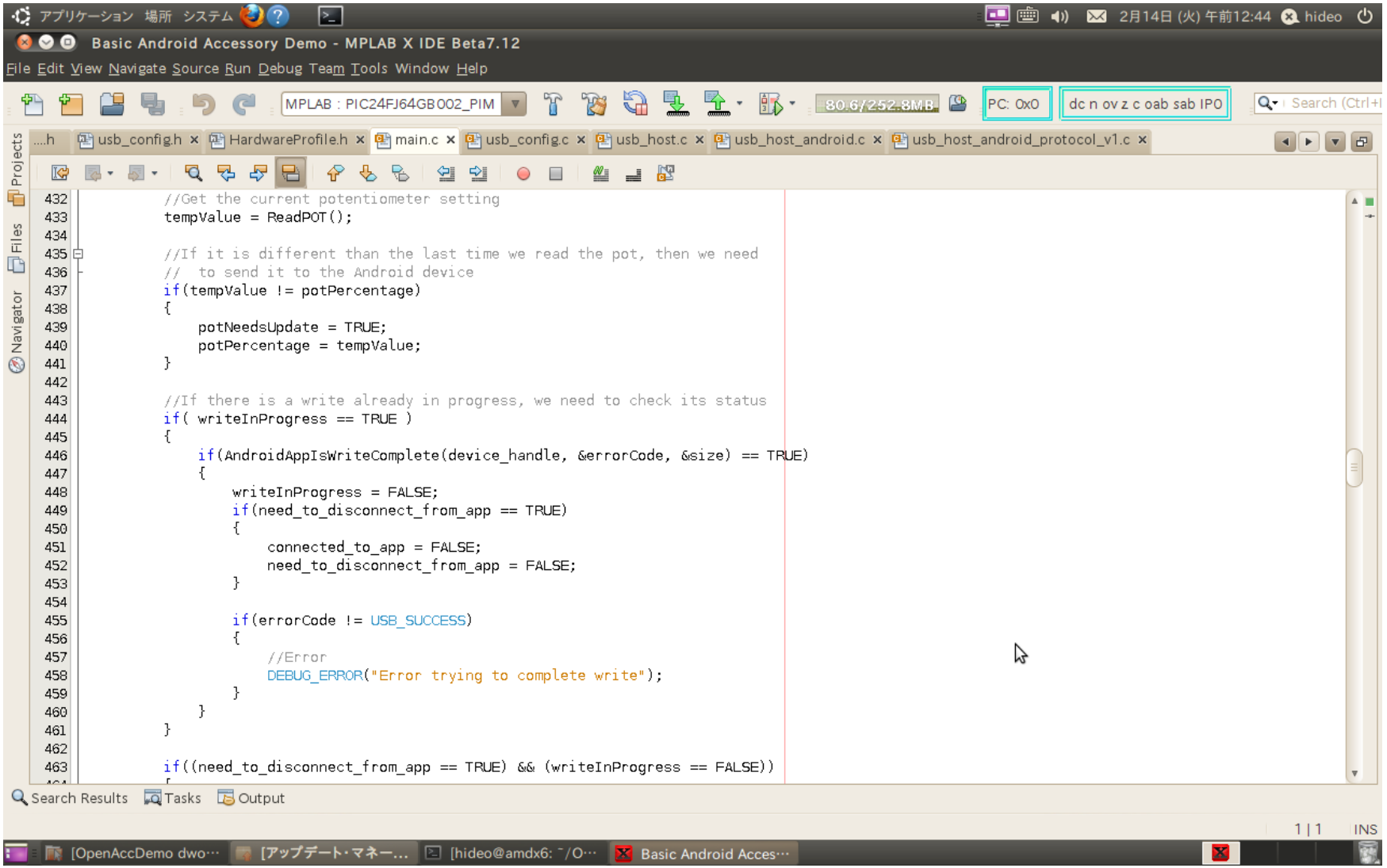

アプリケーション 場所 システム
2月14日 (火) 午前12:44 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
88.3/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
size -= 2;
//And move the pointer to the next packet (this works because
// all command packets are 2 bytes. If variable packet size
// then need to handle moving the pointer by the size of the
// command type that arrived.
command_packet++;
if(need_to_disconnect_from_app == TRUE)
{
break;
}
}
if(size == 0)
{
readyToRead = TRUE;
}
//Get the current pushbutton settings
tempValue = GetPushbuttons();
//If the current button settings are different than the last time
// we read the button values, then we need to send an update to the
// attached Android device
if(tempValue != pushButtonValues)
{
buttonsNeedUpdate = TRUE;
pushButtonValues = tempValue;
}
//Get the current potentiometer setting
tempValue = ReadPOT();
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···


アプリケーション 場所 システム
2月14日 (火) 午前12:44 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
80.6/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
//Get the current potentiometer setting
tempValue = ReadPOT();
//If it is different than the last time we read the pot, then we need
// to send it to the Android device
if(tempValue != potPercentage)
{
potNeedsUpdate = TRUE;
potPercentage = tempValue;
}
//If there is a write already in progress, we need to check its status
if(writeInProgress == TRUE)
{
if(AndroidAppIsWriteComplete(device_handle, &errorCode, &size) == TRUE)
{
writeInProgress = FALSE;
if(need_to_disconnect_from_app == TRUE)
{
connected_to_app = FALSE;
need_to_disconnect_from_app = FALSE;
}
if(errorCode != USB_SUCCESS)
{
//Error
DEBUG_ERROR("Error trying to complete write");
}
}
}
if((need_to_disconnect_from_app == TRUE) && (writeInProgress == FALSE))
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

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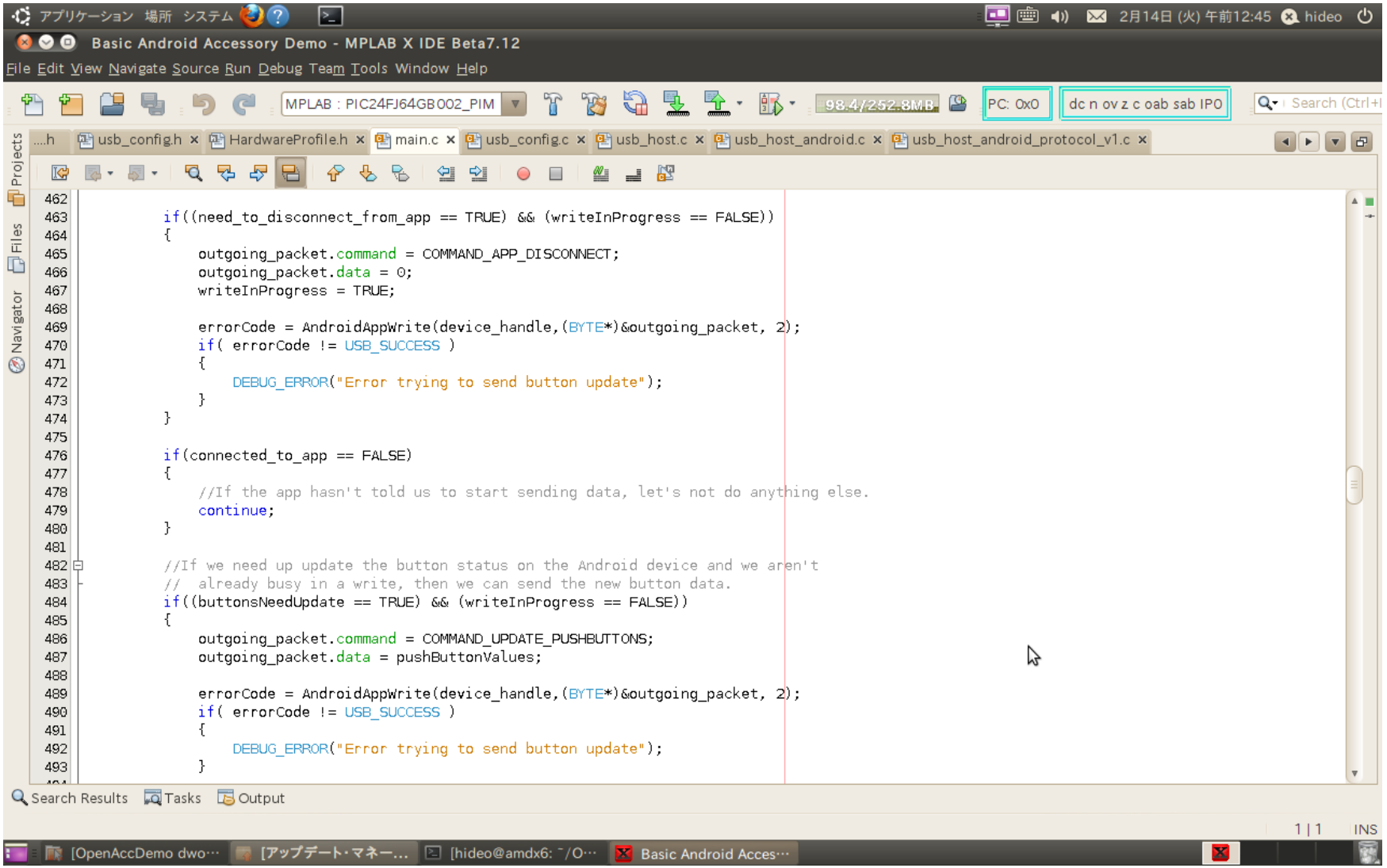
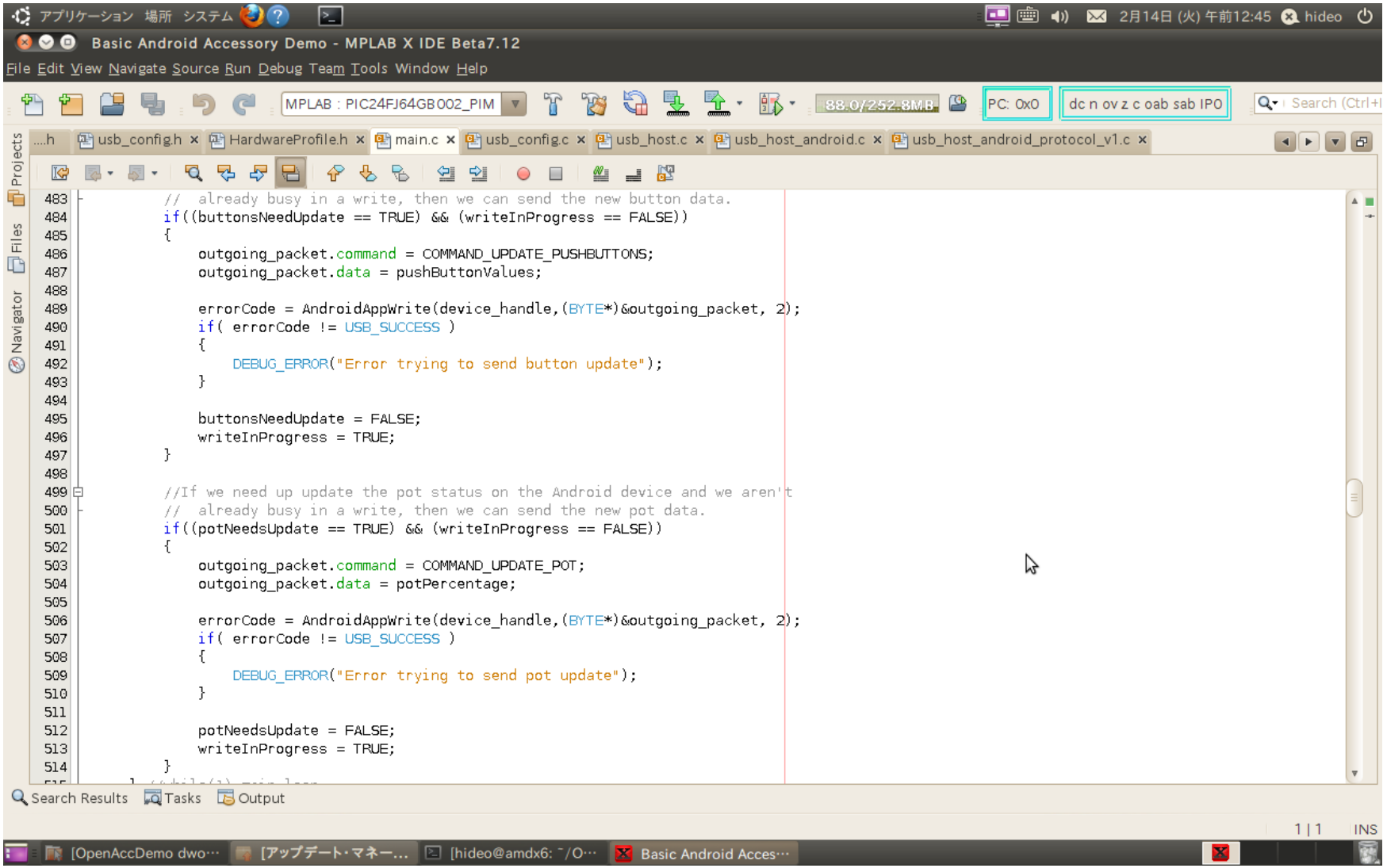
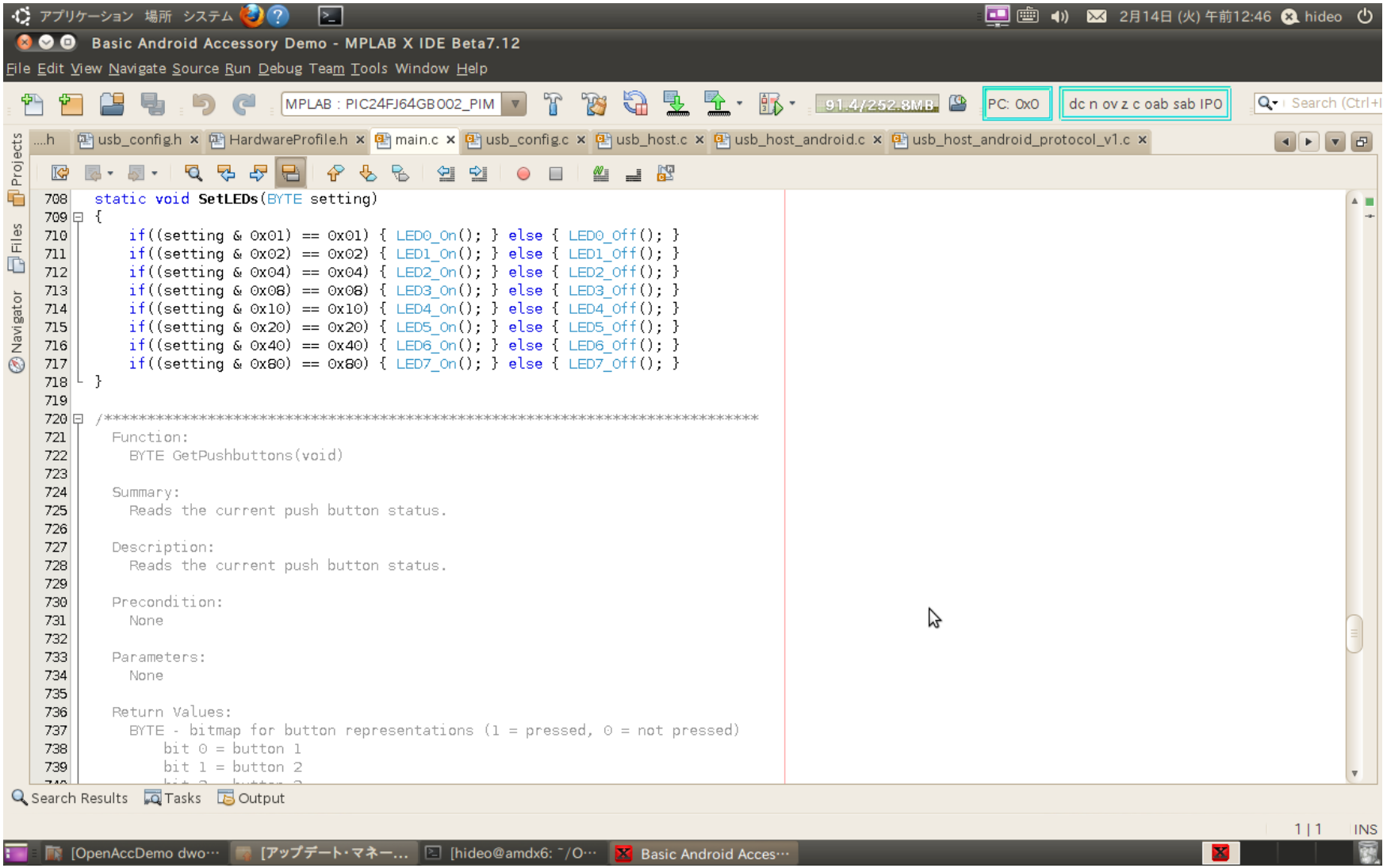

アプリケーション 場所 システム
2月14日 (火) 午前12:45 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
98.4/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
462 if((need_to_disconnect_from_app == TRUE) && (writeInProgress == FALSE))
463 {
464 outgoing_packet.command = COMMAND_APP_DISCONNECT;
465 outgoing_packet.data = 0;
466 writeInProgress = TRUE;
467
468 errorCode = AndroidAppWrite(device_handle,(BYTE*)&outgoing_packet, 2);
469 if(errorCode != USB_SUCCESS)
470 {
471 DEBUG_ERROR("Error trying to send button update");
472 }
473 }
474
475 if(connected_to_app == FALSE)
476 {
477 //If the app hasn't told us to start sending data, let's not do anything else.
478 continue;
479 }
480
481 //If we need up update the button status on the Android device and we aren't
482 // already busy in a write, then we can send the new button data.
483 if((buttonsNeedUpdate == TRUE) && (writeInProgress == FALSE))
484 {
485 outgoing_packet.command = COMMAND_UPDATE_PUSHBUTTONS;
486 outgoing_packet.data = pushButtonValues;
487
488 errorCode = AndroidAppWrite(device_handle,(BYTE*)&outgoing_packet, 2);
489 if(errorCode != USB_SUCCESS)
490 {
491 DEBUG_ERROR("Error trying to send button update");
492 }
493
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo…
[アップデート・マネー…
[hideo@amdx6: ~/O…
Basic Android Acces…

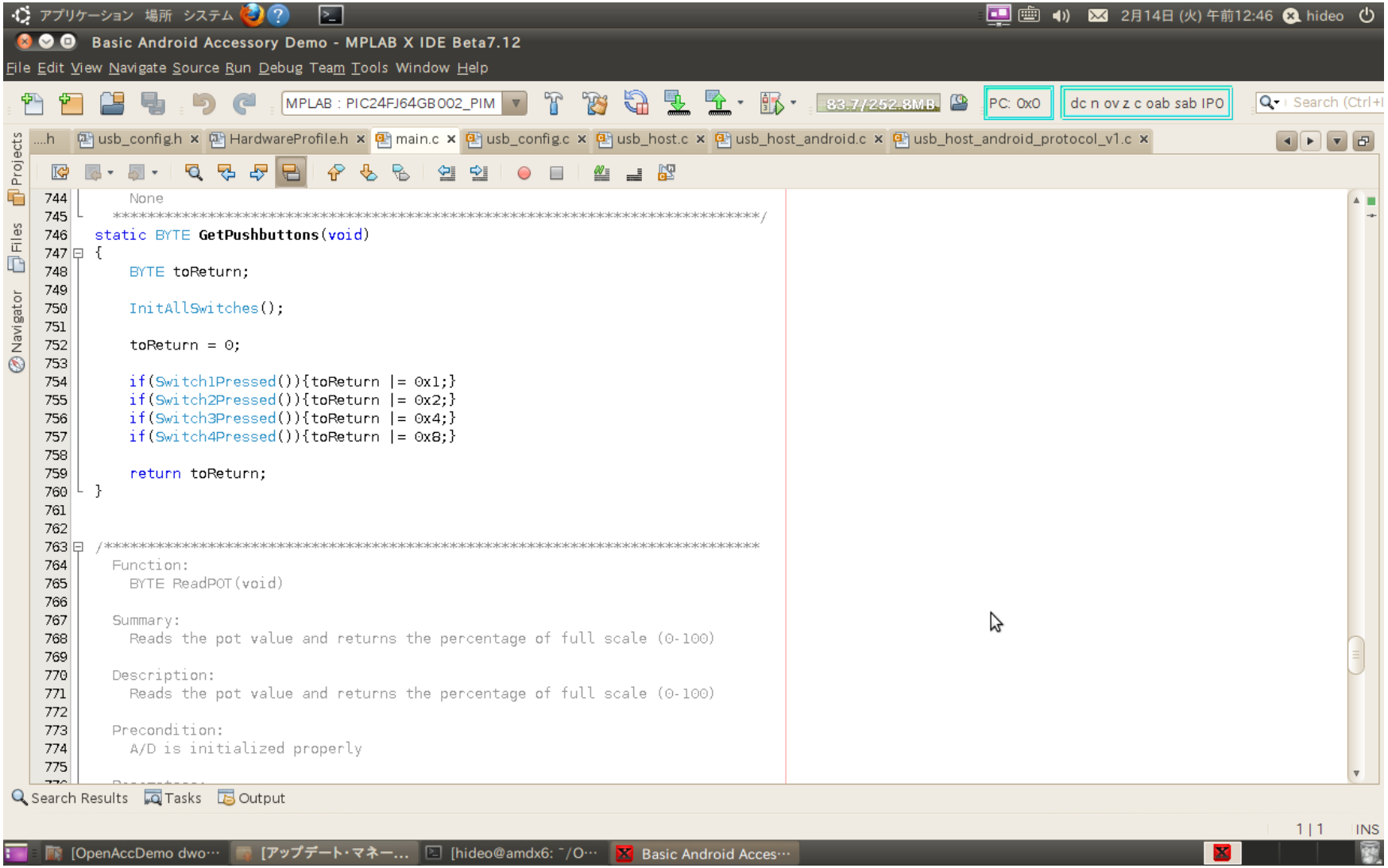
55


アプリケーション 場所 システム
2月14日 (火) 午前12:45 hideo
Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
88.0/252.8MB
PC: 0x0
dc n ov z c oab sab IPO
Search (Ctrl+I
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
Projects
Files
Navigator
483 // already busy in a write, then we can send the new button data.
484 if((buttonsNeedUpdate == TRUE) && (writeInProgress == FALSE))
485 {
486 outgoing_packet.command = COMMAND_UPDATE_PUSHBUTTONS;
487 outgoing_packet.data = pushButtonValues;
488
489 errorCode = AndroidAppWrite(device_handle,(BYTE*)&outgoing_packet, 2);
490 if(errorCode != USB_SUCCESS)
491 {
492 DEBUG_ERROR("Error trying to send button update");
493 }
494
495 buttonsNeedUpdate = FALSE;
496 writeInProgress = TRUE;
497 }
498
499 //If we need up update the pot status on the Android device and we aren't
500 // already busy in a write, then we can send the new pot data.
501 if((potNeedsUpdate == TRUE) && (writeInProgress == FALSE))
502 {
503 outgoing_packet.command = COMMAND_UPDATE_POT;
504 outgoing_packet.data = potPercentage;
505
506 errorCode = AndroidAppWrite(device_handle,(BYTE*)&outgoing_packet, 2);
507 if(errorCode != USB_SUCCESS)
508 {
509 DEBUG_ERROR("Error trying to send pot update");
510 }
511
512 potNeedsUpdate = FALSE;
513 writeInProgress = TRUE;
514 }
Search Results
Tasks
Output
1 | 1
INS
[OpenAccDemo dwo···
[アップデート・マネー...
[hideo@amdx6: ~/O···
Basic Android Acces···

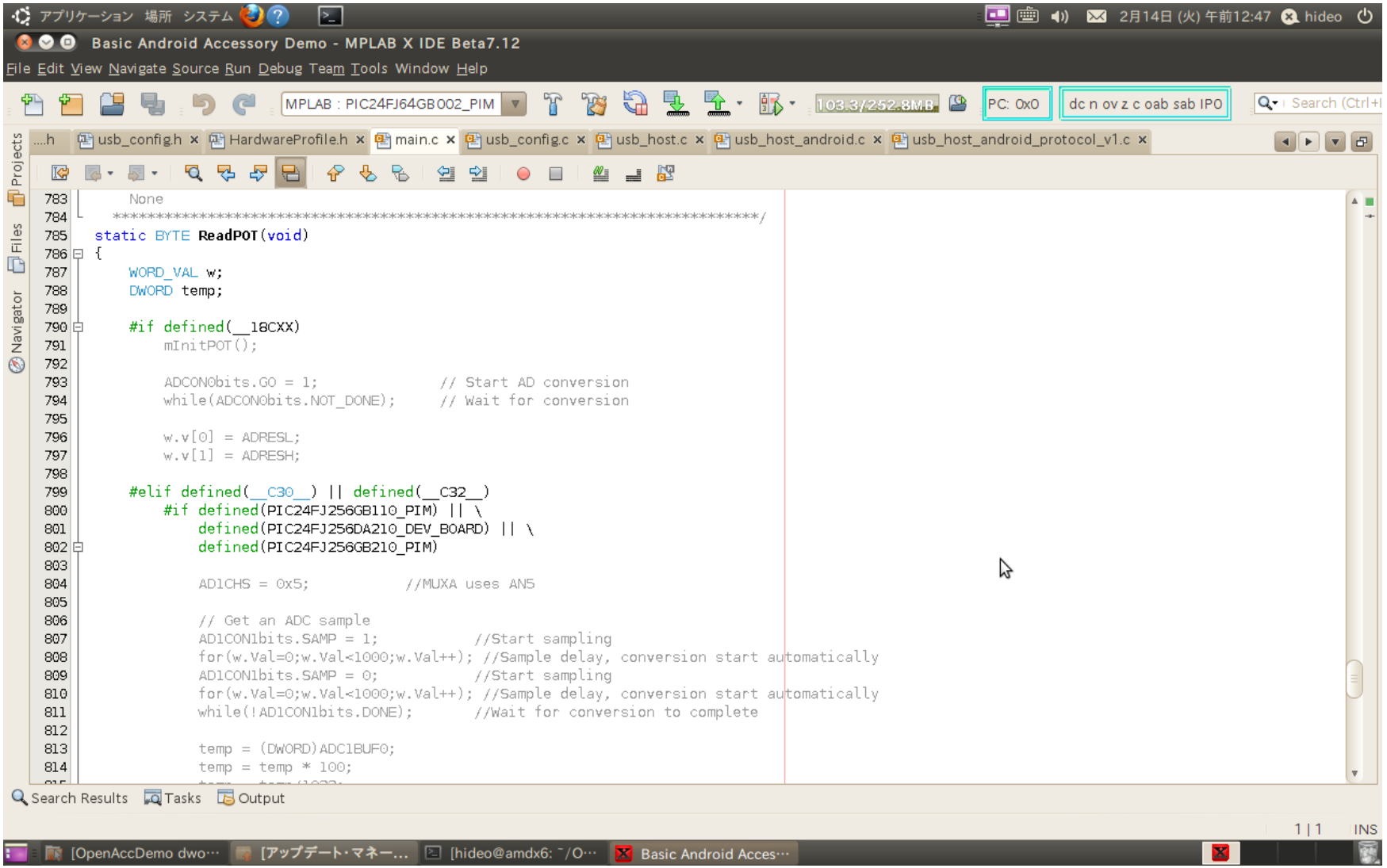
SetLEDs 56


Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
static void SetLEDs(BYTE setting)
{
if((setting & 0x01) == 0x01) { LED0_On(); } else { LED0_Off(); }
if((setting & 0x02) == 0x02) { LED1_On(); } else { LED1_Off(); }
if((setting & 0x04) == 0x04) { LED2_On(); } else { LED2_Off(); }
if((setting & 0x08) == 0x08) { LED3_On(); } else { LED3_Off(); }
if((setting & 0x10) == 0x10) { LED4_On(); } else { LED4_Off(); }
if((setting & 0x20) == 0x20) { LED5_On(); } else { LED5_Off(); }
if((setting & 0x40) == 0x40) { LED6_On(); } else { LED6_Off(); }
if((setting & 0x80) == 0x80) { LED7_On(); } else { LED7_Off(); }
}
/***
Function:
BYTE GetPushbuttons(void)
Summary:
Reads the current push button status.
Description:
Reads the current push button status.
Precondition:
None
Parameters:
None
Return Values:
BYTE - bitmap for button representations (1 = pressed, 0 = not pressed)
bit 0 = button 1
bit 1 = button 2
Search Results
Tasks
Output

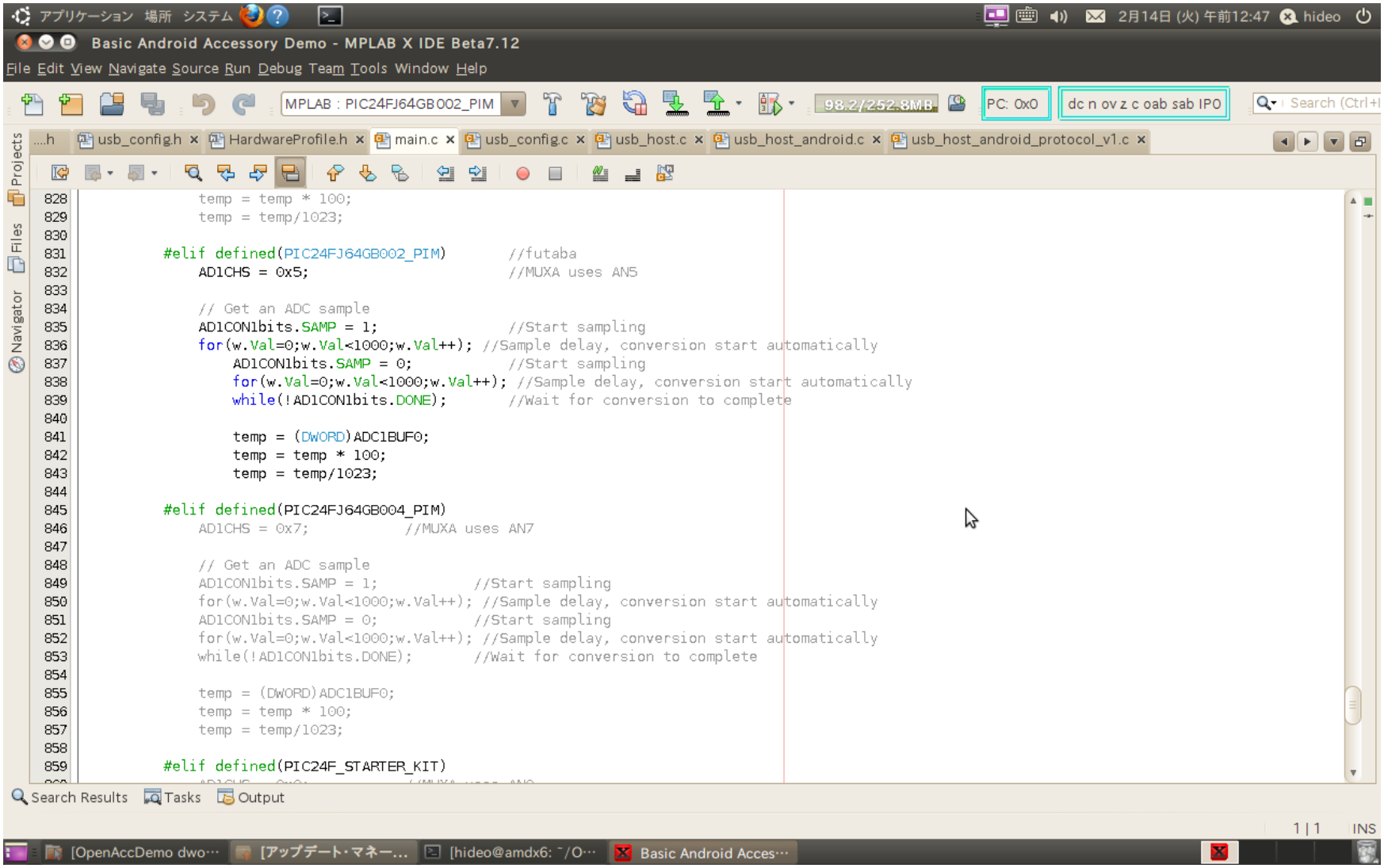
GetPushbuttons 57



POTの読み取り


Basic Android Accessory Demo - MPLAB X IDE Beta7.12
File Edit View Navigate Source Run Debug Team Tools Window Help
MPLAB : PIC24FJ64GB002_PIM
usb_config.h
HardwareProfile.h
main.c
usb_config.c
usb_host.c
usb_host_android.c
usb_host_android_protocol_v1.c
783 None
784 **/
785 static BYTE ReadPOT(void)
786 {
787 WORD_VAL w;
788 DWORD temp;
789
790 #if defined(__18CXX)
791 mInitPOT();
792
793 ADCON0bits.GO = 1; // Start AD conversion
794 while(ADCON0bits.NOT_DONE); // Wait for conversion
795
796 w.v[0] = ADRESL;
797 w.v[1] = ADRESH;
798
799 #elif defined(__C30__) || defined(__C32__)
800 #if defined(PIC24FJ256GB110_PIM) || \
801 defined(PIC24FJ256DA210_DEV_BOARD) || \
802 defined(PIC24FJ256GB210_PIM)
803
804 AD1CHS = 0x5; //MUXA uses AN5
805
806 // Get an ADC sample
807 AD1CON1bits.SAMP = 1; //Start sampling
808 for(w.Val=0;w.Val<1000;w.Val++); //Sample delay, conversion start automatically
809 AD1CON1bits.SAMP = 0; //Start sampling
810 for(w.Val=0;w.Val<1000;w.Val++); //Sample delay, conversion start automatically
811 while(!AD1CON1bits.DONE); //Wait for conversion to complete
812
813 temp = (DWORD)ADC1BUF0;
814 temp = temp * 100;
Search Results
Tasks
Output
1 | 1
INS

ADCの起動と読み込み　59



PART5
ANDROID側の仕組み

おわり