未来を先取りした最新テクノロジー マイクロソフトの技術でロボティクス

日本マイクロソフト株式会社
デベロッパー＆プラットフォーム統括本部
デベロッパーエバンジェリスト
太田　寛
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アジェンダ

- はじめに
- Kinectセンサー
- .NET Micro Framework
- Robotics Developer Studio 4
- Windows Phone
- まとめ

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はじめに

入力

出力

コンソール

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3

KINECT センサー
KINECT FOR WINDOWS SDK

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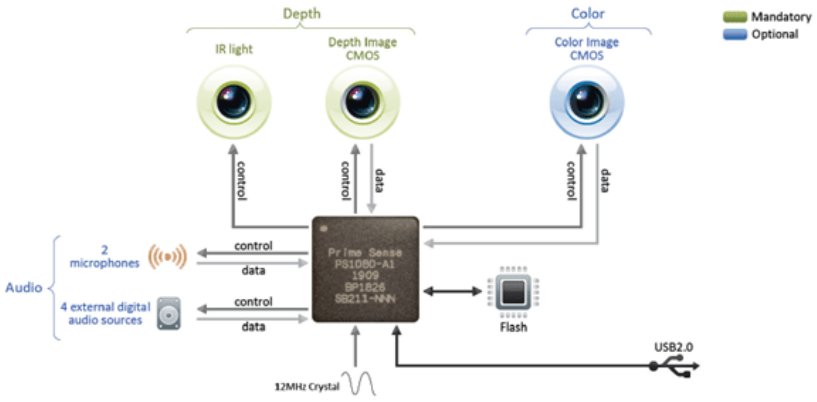

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開発に必要なのは

- Windows 7 （64bit版、32bit版）
- Visual Studio 2010
  - Visual C# Express 2010 も可
- Kinect for Windows SDK 1.0 Beta 2
  （64bit版、32bit版）
  - http://www.kinectforwindows.org/
- オプション
  - DirectX SDK (June 2010)
  - Speech Platform SDK（英語 & 32bitのみ）

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開発言語

- ネイティブ C++
  - MSR_NuiApi.h, MSRKinectAudio.h
  - MSRKinectNUI.lib
- マネージ C# / Visual Basic
  - Microsoft.Research.Kinect を参照追加
  - using Microsoft.Research.Kinect.Nui;
  - using Microsoft.Research.Kinect.Audio;
  - ターゲットは x86 に
  - XNA での使用は未テスト

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ライセンス

- 非商用
  - 研究、教育、個人的な調査
  - 開発者、研究者、ホビースト、学生
  - ランタイムなどの再頒布はできない
- 非商用で可能なこと
  - デモの共有
  - 教室での教育（有償でも）
  - 無償アプリ
  - プロトタイプ

来年初旬に、商用版リリースを予定

http://research.microsoft.com/KinectSDK-ToU
http://research.microsoft.com/en-us/um/redmond/projects/kinectsdk/faq.aspx

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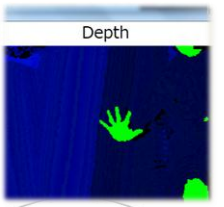
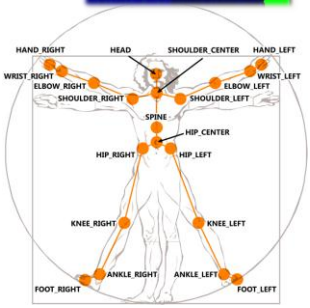
Kinect for Windows SDK機能

- 画像
  - 通常の画像
  - 深度画像：Player Indexあり・なし
- スケルトンデータ
  - Player 2名まで
- 音声
  - ビームフォーミング
  - 音声認識（英語のみ）
- チルト
- 複数センサーデバイス対応





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Microsoft® .NET | Micro Framework

超小型機器向け
オープンソース ファームウェア

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.NET Micro Framework

- 超小型組込み機器向けファームウェア
  - 256 KB Flash、64K RAM, MMU　無しで動作
    - Netduino、Lego Mindstorms NXTレベル
  - マルチ CPU アーキテクチャー
    - ARM、x86、SH2、SH4
  - C#、VB Managed アプリ開発可能
- 豊富なライブラリ
  - UX - WPF ライブラリのサブセットを活用
  - ネットワーク機能

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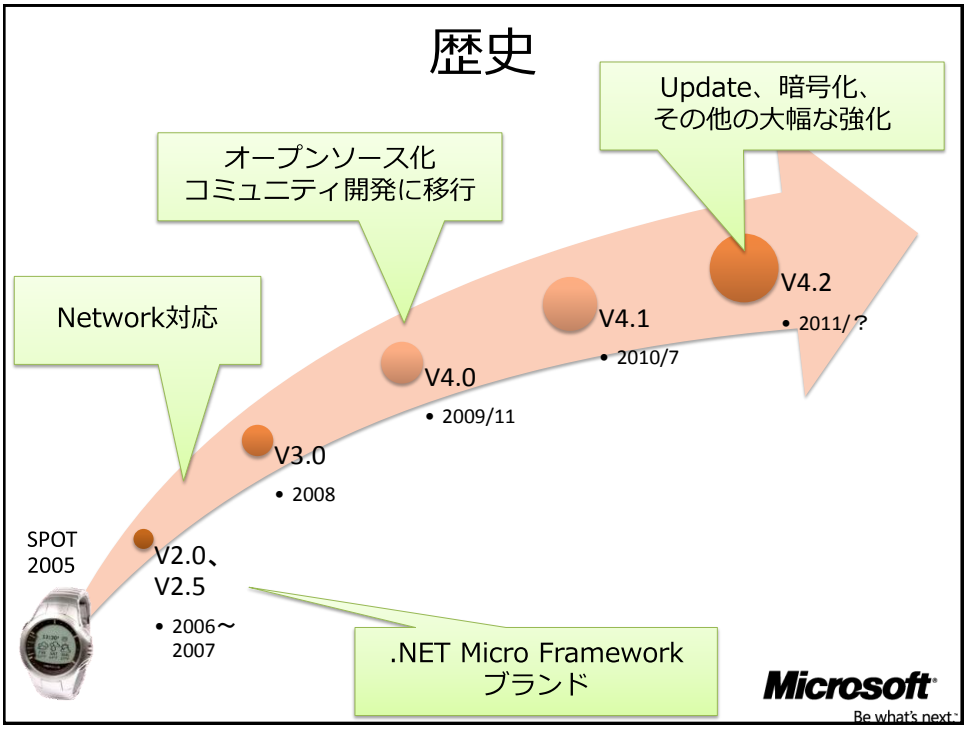
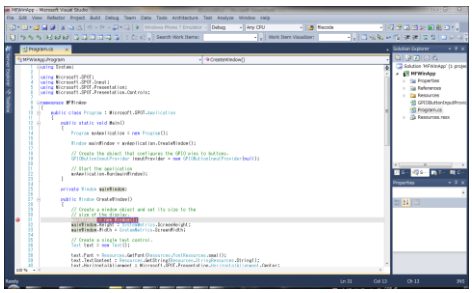


.NET Micro Framework による開発

- Visual Studio 2010による開発
  - エミュレーターによる PC 上での ロジック テスト & デバッグ
  - 実機上でのソース コード レベル デバッグ



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事例

海外の事例

- 日本での事例
  - フェリカカード端末
    - NSコンピュータ サービス
  - T-Kernel上へのポーティング
    - （株）コア
    - 日立超LSIシステムズ
    - （株）ルネサス
  - 評価ボード
    - デバイスドライバーズ
  - その他製品での利用

15

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.NET Micro Framework を始める

- 開発環境： .NET Micro Framework SDK
  - http://netmf.codeplex.com
  - http://www.netmf.com
- デバイス：
  - Fezシリーズ
    - Fez Domino、Fez Mini、Fez Panda
    - http://tinyclr.jp/ から購入可能
  - 他に…
    - Netduino
    - http://www.switch-science.com/products/detail.php?product_id=393 から購入可能

16

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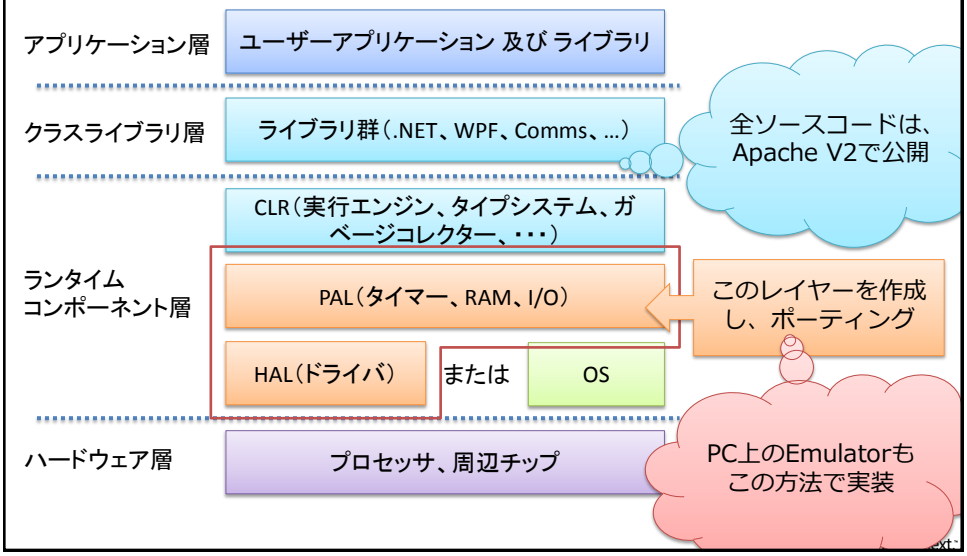
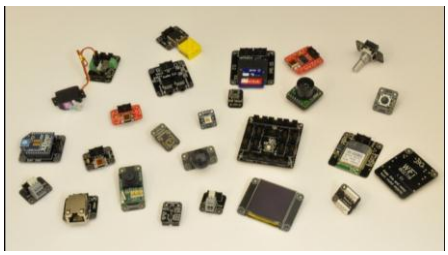
.NET Micro Frameworkの アーキテクチャとポーティング



.NET Gadgeteer

- 小型機器向けRAPID開発環境
  - Microsoft Research提供
  - .NET Micro Framework
  - GHI Electronics Fezシリーズ＋周辺部品



http://research.microsoft.com/en-us/projects/gadgeteer/default.aspx から

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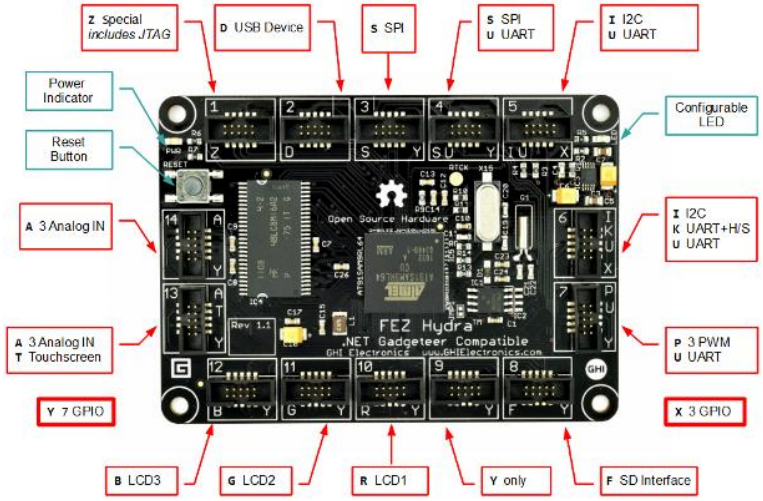
例）Fez Hydra



http://research.microsoft.com/en-us/projects/gadgeteer/default.aspx から

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Windows® Phone

Put people first.

WINDOWS PHONE 7

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Windows Phone

Put people first.

Smarter and Easier…

- コミュニケーション
- アプリケーション
- インターネット

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デザインコンセプトと特徴

Metro Design

Hub & Panorama

Live Tile & HW SPEC

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Windows Phone 7.1

	Windows Phone 7	“Mango”
クラウド&OS 連携	プッシュ配信・アラート Facebook 連携 タイル連携	カレンダー・コンタクト アクセス・**Twitter** **マルチタイル**、スケジュール
アプリケーション モデル	Silverlight / XNA タッチ対応入力 Tombstone Model	Silverlight & XNA 連携強化 **マルチタスク**・エージェント タスクスイッチング
ソフトウェア アーキテクチャ	Silverlight 3 Linq to XML Internet Explorer	Silverlight 4, **ソケット** SQL CE サポート, **IE9** パフォーマンスチューニング
ハードウェア プラットフォーム	GPS, 加速度度センサーを含む5つのセンサーとカメラ 4ポイントタッチパネル	**カメラRAW, Gyro**, コンパス モーションセンサーAPI バーコード認識、音声
	対応国 欧米16か国 Developer Tools APP Hub	対応国 **35か国**（日本含む） エミュレーター拡張 プロファイラ

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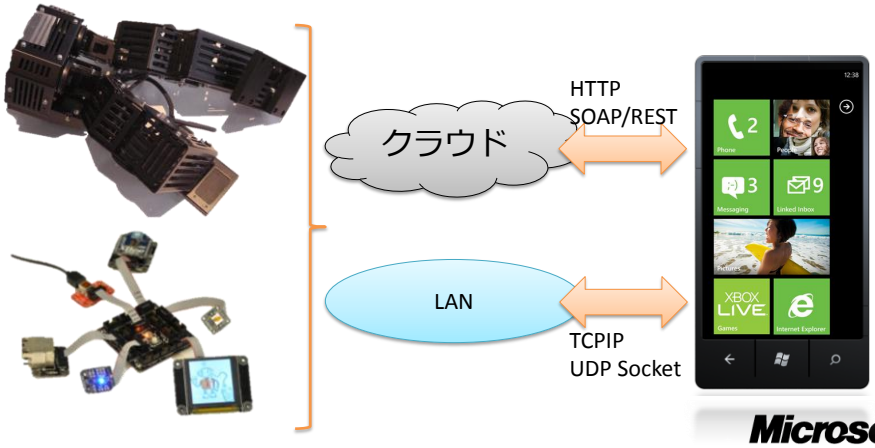
コンシューマーデバイス連携

コンソールとして

モニタリングとして



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Microsoft®
Robotics Developer Studio 4
Beta 2

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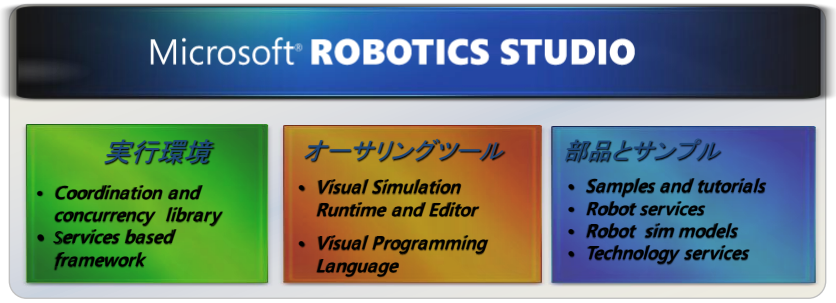
Microsoft Robotics Developer Studio

幅広い、ユーザー、ハードウェアとアプリケーションシナリオに支えられた、
ロボティクスコミュニティ向け開発プラットフォーム



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Robotics Studioのチャレンジ

実行環境

ロボットアプリの実行、モニタリングと相互連携

オーサリング環境

ロボットアプリの記述、調整、 配置

シミュレーション環境

ロボットアプリケーションを、シミュレートされた、ハードウェア、物理実体、地形で実行する

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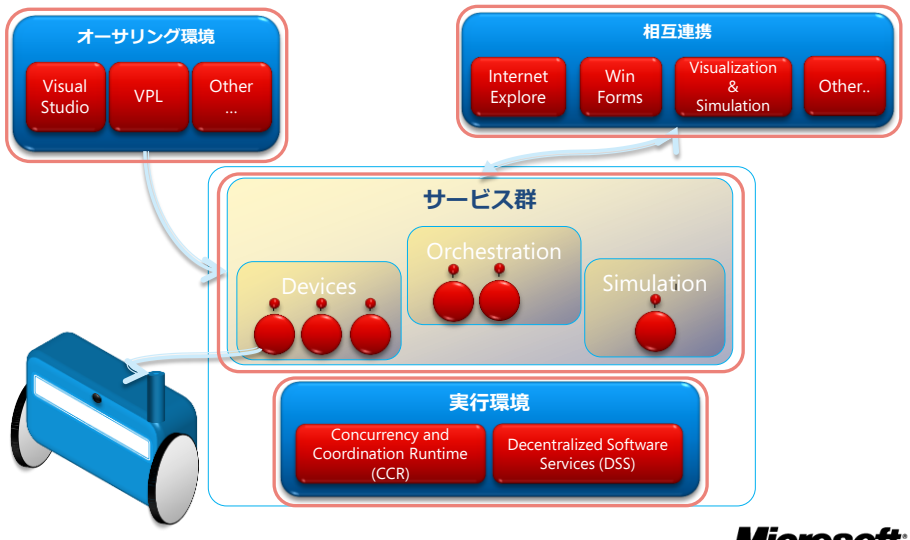
ハイレベルアーキテクチャ



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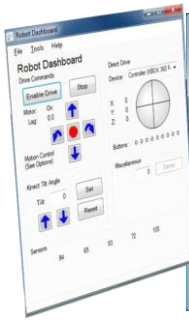
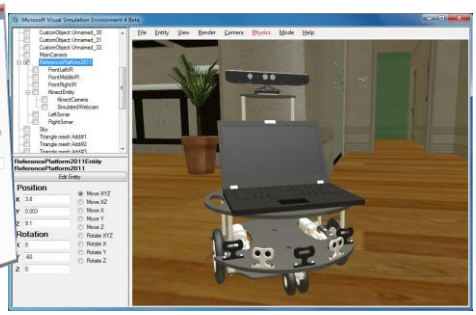
RDS 4.0 特徴

- Kinectセンサー対応
  - 実デバイス
  - シミュレーター
  - サンプルプログラム

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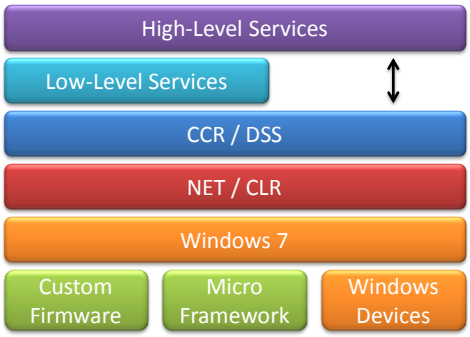
RDS 4.0 特徴

- リファレンスプラットフォーム

ソフトウェア アーキテクチャ



リファレンス ハードウェア

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Microsoft Windows UX チーム

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- Facebook
  - http://www.facebook.com/mswinux
- UX-TV
  - http://msdn.microsoft.com/ja-jp/hh162048
  - http://www.ustream.tv/channel/ux-tv

“いいね”
Please

毎週、水・金の
12:15～12:45
生放送中

まとめ

- Kinect for Windows SDK
  - ナチュラル ユーザー インターフェイス
- .NET Micro Framework
  - ハードウェアノード ソフトウェアを
    PCアプリ開発並みに
- Windows Phone
  - コンシューマーデバイスの活用
- Robotics Developer Studio
  - 分散システムミドルウェア＋.NET MF＋センサー

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参考サイト

- Kinect for Windows SDK
  - http://www.kinectforwindows.org/
- .NET Micro Framework
  - http://www.netmf.com
  - http://msdn.microsoft.com/ja-jp/netframework/bb267253
  - http://research.microsoft.com/en-us/projects/gadgeteer/default.aspx
- Windows Phone
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