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EZ App Lynx

Summary

EZ App Lynx is a smartphone/tablet application that pairs with a PIC® over Bluetooth and allows the PICmicro to control the appearance and control of the GUI on the smartphone/tablet. This allows PICmicro developers an easy way to deploy sensors or controllers that can be controlled from a smartphone/tablet over Bluetooth. Since the PICmicro™ controls all aspects of the GUI, the user only needs to install one smartphone/tablet application that works across a broad variety of devices.

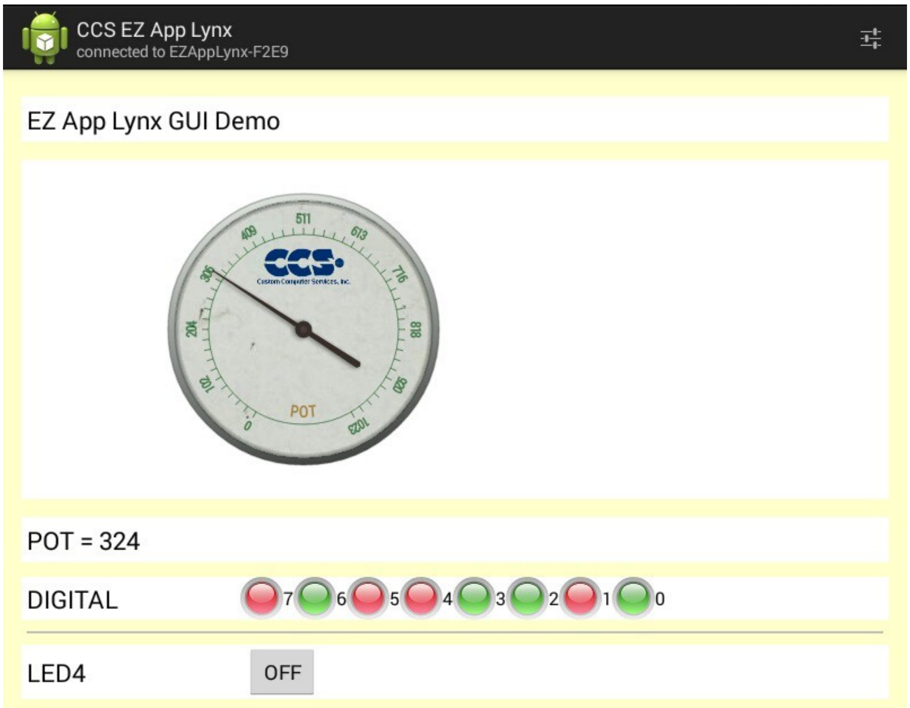
There are Android and iOS (iPhone, iPad) Apps available. The Android App can be downloaded from Google Play while the iOS App can be downloaded from the Apple App store. These Apps have already been written by CCS and are available on the appropriate app store, meaning utilizing the EZ App Lynx in a project does not require uploading an app to those stores or becoming an Android or iOS developer.

The EZ App Lynx comprises of two main components. First is the 'App', which is the application that runs on smartphone/tablets. Second is the 'Library' which which runs on the PICmicro and communicates with the App. Bluetooth is used to connect the the App to the Library. The Android and iOS App both support Bluetooth BLE modules with MLDP protocol (such as the Microchip RN4020 module). Android also supports any Bluetooth 'classic' modules with SPP protocol (the iOS app does not support SPP).

The EZ App Lynx Library for the comes with the IDE version of the CCS C Compiler (PCW, PCWH, PCWHD). The Library contains an API that controls all aspects of the GUI on the smartphone/tablet (including what to display on the screen) and also controls the data transfer between then smartphone/tablet and the PICmicro.

Run screen

This is the main screen of the application. The contents of this screen will change depending on the contents received by the PICmicro.



CCS EZ App Lynx
connected to EZAppLynx-F2E9

EZ App Lynx GUI Demo

POT = 324

DIGITAL 🔴 7 🟢 6 🔴 5 🔴 4 🟢 3 🟢 2 🔴 1 🟢 0

LED4 OFF

Illustration 1: Example run screen

Settings

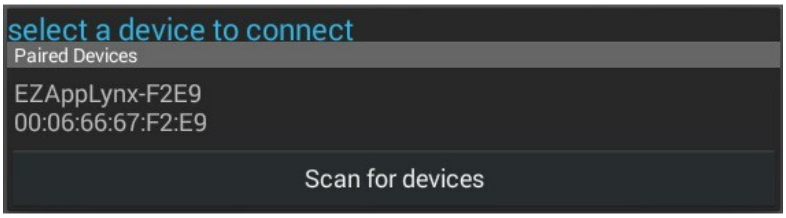
Pressing the Settings icon on the toolbar brings up the settings screen.

The settings screen has the following options:

- **Auto Connect**

  If checked, the application will auto connect to the previously connected device when the application is launched.

- **Scan for local devices**



select a device to connect
Paired Devices
EZAppLynx-F2E9
00:06:66:67:F2:E9
Scan for devices

Illustration 2: Scan for local devices

This will show all the available devices the application can connect to. Pressing a device in the list will connect to the device and launch the run screen. If you do not see the device you are looking for, press the 'Scan for devices' button and it will search for new devices.

If the device requires authorization, the application will ask the user for the password before showing the Run screen.

Version 2 Updates

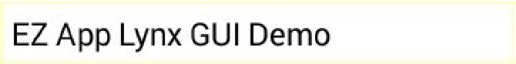
The following changes and additions have been made to version 2 of the App and Library:

- Android supports RN4020 BLE Bluetooth module using it's MLDP mode.
- iOS application (iPhone, iPad, etc). Only the RN4020 module is supported, the iOS application does not support SPP Bluetooth modules like the Android application.
- EZAppAddFieldText() has been added to the API, allows the user to add a left column header to a string or to make a text string editable from the host application. EZAppGetValueString() allows PIC to get changes from the host. EZAppSetValueStringEE() and EZAppGetValueStringEE() also allow the EZ App Lynx library to read/write strings from an external memory device, like an EEPROM.
- EZAppAddFieldButtons() and EZAppAddFieldButtonsROM() added to the API, that allows for more button types. This allows for a one-state button (value sent by host application is set when button is held down, cleared when released), a series of buttons on one row and the ability to add inset status LEDs inside the buttons. EZAppSetButtonLED() added to control the status of the inset status LED.
- EZAppStylesROM() added to the API that adds global configuration of many style elements in the application, such as colors, spacing, padding, etc.
- EZAppAddFieldAnalogValueScaled() added to the API that allows user to create analog fields that are scaled and/or have a minimum value that isn't 0.

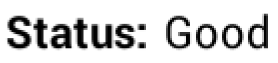
Changing the contents of the Run screen

The contents of this screen is controlled dynamically by the Library. CCS provides the Library for the CCS C Compiler that allows the user to control those contents. Read the EZApp.h file in the compiler's drivers directory for documentation of the API of this library. Also provided are several examples of how to use this library. To find these examples, look for files in the examples directory for files that start with ex_azapp (like ex_ezapp_pot.c).

Here is an overview of all the GUI elements that can be used/controlled by the library:

Text Field

EZ App Lynx GUI Demo
	Raw text is displayed as-is from the PIC. The application will reload the value when the PICmicro changes it.
	
	Example code:
	`idx = EZAppFieldString();`
	`EZAppSetValueString(idx,`
	`      "EZ App Lynx GUIDemo");`
	
	Relevant API functions:
	`EZAppAddFieldString()`
	`EZAppAddFieldStringDynamic()`
	`EZAppSetValueString()`
	`EZAppSetValueStringROM()`
	`EZAppSetStringStyle()`

Text field, with header column	Raw text is displayed as-is from the PIC. The application will reload



Added in V2

the right value column when the PICmicro changes it (the left header column cannot be changed).

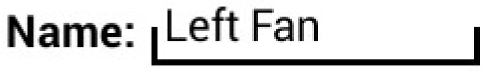
Example code:

```
idx = EZAppFieldText((rom char*)"Status:", 0);
EZAppSetValueString(idx, "Good");
```

Relevant API functions:

```
EZAppAddFieldText()
EZAppSetValueString()
EZAppSetValueStringROM()
EZAppSetStringStyle()
```

Editable text



Added in V2

An editable text box is displayed. When new text is entered into this field it is sent to the PIC.

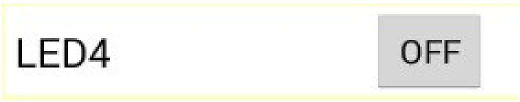
Example code:

```
char editStr[LEN] = "\0";
idx = EZAppFieldText(
       (rom char*)"Name:",
       sizeof(editStr));
EZAppSetValueString(idx, editStr);
```

Relevant API functions:

```
EZAppAddFieldText()
EZAppSetValueString()
EZAppSetValueStringROM()
EZAppSetStringStyle()
EZAppGetKbhit()
EZAppGetValueString()
```

One Button Field



A pressable button. When pressed, the value is toggled and sent to the PIC. The text string on the button represents the current value.

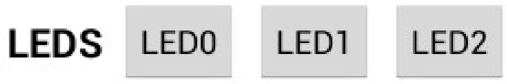
Example code:

```
idx = EZAppAddFieldButtonTwoState(
       (rom char *)"LED4",
       (rom char *)"OFF\tON");
```

Relevant API functions:

```
EZAppAddFieldButtonTwoState()
EZAppGetKbhit()
EZAppGetValue()
EZAppSetValue()
```

Buttons Field



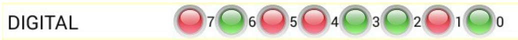
Added in V2

One or a series of buttons on one row. Buttons can be one-state or two-state. Buttons can have an inset status LED (optional, not required).

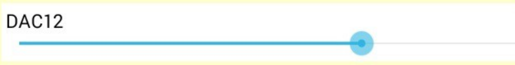
Example code:

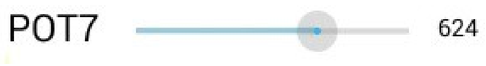
```
ezapp_buttons_t buttonCfg;
buttonCfg.numButtons = 3;
buttonCfg.oneState = TRUE;
idx = EZAppAddFieldButtonsROM(
      buttonCfg,
       (rom char *)"LEDS",
       (rom char*)"LED0\tLED1\tLED2");
```

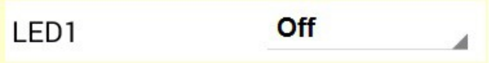
	Relevant API functions:
	`EZAppAddFieldButtons()`
	`EZAppAddFieldButtonsROM()`
	`EZAppGetKbhit()`
	`EZAppGetValue()`
	`EZAppSetValue()`
	`EZAppSetButtonLED()`

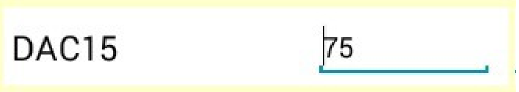
Digital Field

 	
	A series of LEDs is displayed to display a digital (on/off) state. The application will reload the value when the PICmicro changes it.
	
	Example code:
	`idx = EZAppAddFieldDigitalValue(`
	`      (rom char*)"Digital", 8);`
	`EZAppSetValueDigital(idx, 0x4d);`
	
	Relevant API functions:
	`EZAppAddFieldDigitalValue()`
	`EZAppSetValue()`

Silder	A slider. Application can control and send new value as the user slides the position. **Example code:**

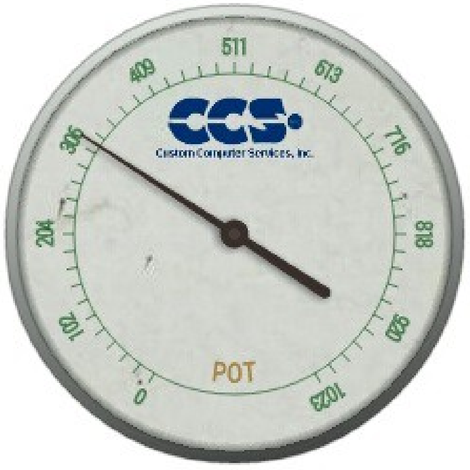
	`idx = EZAppAddFieldAnalogValue(`
	`      (rom char *)"DAC12",`
	`      EZAPP_ANALOG_TYPE_SLIDER_RW, 4095);`
	`EZAppSetValueAnalog(idx, 1000);`
	
	When creating field with EZAppAddFieldAnalogValue(), use `EZAPP_ANALOG_TYPE_SLIDER_RW type.`
	
	Relevant API functions:
	`EZAppAddFieldAnalogValue()`
	`EZAppSetValue()`
	`EZAppGetValue()`
	`EZAppGetKbhit()`

Silder (Read only) 	This is the same as the Slider GUI type, but this one is read-only. The application cannot update this value, instead the value is read from the PICmicro. When creating field with EZAppAddFieldAnalogValue(), use EZAPP_ANALOG_TYPE_SLIDER type.

Pull-down

	A pull-down list of select-able items. When user selects new item, application sends it to the PIC.
	
	Example code:
	`idx = EZAppAddFieldPulldownValue(`
	`      (rom char*)"LED1", 2,`
	`      (rom char*)"Off\tOn");`
	
	Relevant API functions:
	`EZAppAddFieldPulldownValue()`
	`EZAppSetValue()`
	`EZAppGetValue()`
	`EZAppGetKbhit()`

Numeral Field

	A numeric value that can be edited with a text-field. When new values are entered by the user in the application it is sent to the PICmicro.
	
	Example code:
	`idx = EZAppAddFieldAnalogValue(`
	`      (rom char *)"DAC15",`
	`      EZAPP_ANALOG_TYPE_RW_TEXT_VALUE, 4095);`
	
	`When creating field with EZAppAddFieldAnalogValue(), use EZAPP_ANALOG_TYPE_RW_TEXT_VALUE type.`
	
	Relevant API functions:
	`EZAppAddFieldAnalogValue()`
	`EZAppSetValue()`
	`EZAppGetValue()`
	`EZAppGetKbhit()`

Gas Gauge	A representation of a numeral value with an analog gas gauge type display.
	
	Example code:
	`idx = EZAppAddFieldAnalogValue(`
	`      (rom char *)"POT",`

	EZAPP_ANALOG_TYPE_GAUGE, 1023);
	When creating field with EZAppAddFieldAnalogValue(), use EZAPP_ANALOG_TYPE_GAUGE type.
	Relevant API functions:
	EZAppAddFieldAnalogValue()
	EZAppSetValue()

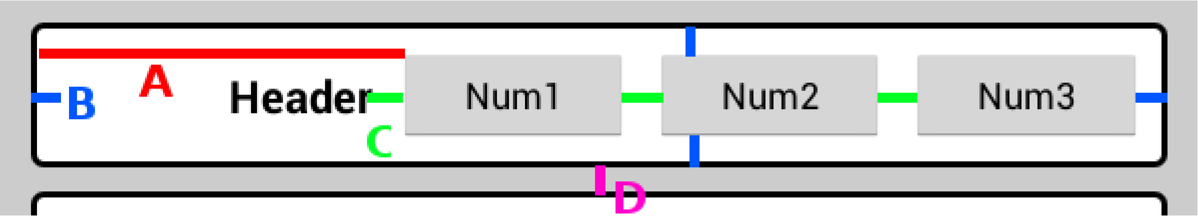
The library allows you the user to develop a multi-screen GUI. This can be achieved with the function EZAppFieldsClearAll(), which clears the screen of all previous GUI elements.

Applying Styles

Added in V2. EZAppStylesROM() can be used in the Library API to apply one or more styles. A style contains information about how things should look, like colors, sizes, margins and spacing, etc.

After EZAppAddStylesROM() is called, all following fields added with EZAppAddField***() will use the previous added styles. Styles can also accumulate, so calling EZAppAddStylesROM() a second time will add new styles on top of the previously added styles.

See the ex_ezapp_style.c for a demonstration of how to use and apply styles.



A = the length of header column, if it's used. This is set with the 'leftWidth' parameter of the EZAPP_STYLE_ROW_SPACINGS_CREATE() macro.

B = The inner padding. This is set with the 'paddingInner' parameter of the EZAPP_STYLE_ROW_SPACINGS_CREATE() macro.

C = The per column padding. This is set with the 'paddingPerColumn' parameter of the EZAPP_STYLE_ROW_SPACINGS_CREATE() macro.

D = The padding below each row. This is set with the 'paddingBelow' parameter of the EZAPP_STYLE_ROW_SPACINGS_CREATE() macro.

Legal information

EZ App Lynx is developed and maintained by Custom Computer Services, Inc (CCS). For support and more help and documentation regarding EZ App Lynx, go to http://www.ccsinfo.com/ezapp

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