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## Adding to the DEFAULT Program and Sensors

by  
Bob Koehl  
Team Ford FIRST




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## Robot Control System Data

Download from the IFIRobotics website:  
[www.ifirobotics.com](http://www.ifirobotics.com)

[Robot Control System Reference Guides](#)  
[Robot Controller Documentation](#)  
[Operator Interface Documentation](#)

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## Robot Software System Data

Download from the IFIRobotics website:  
[www.ifirobotics.com](http://www.ifirobotics.com)

Latest version of:

- [DEFAULT Program \(zip\)](#) the robot program ([DEFAULT Program Reference guide](#))
- [Program Loader \(zip\)](#) to reprogram the robot ([Programming Reference Guide](#) pg 22)
- [Dashboard Viewer \(zip\)](#) to troubleshoot the robot program ([DashBoard Viewer Specifications](#))




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## Programming Software

- MicroCHIP provides a "project manager" program called [MPLAB\\_IDE](#) which can be downloaded from the web.
- Program files are edited, saved, and compiled in the computer using MPLAB.
- The C18 Programming Language Compiler is provided to each team with the Kit of Parts.




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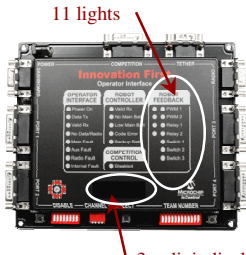
## Setup to Change DEFAULT

- "UNZIP" the DEFAULT Code
- Start MPLAB\_IDE Program
- Create New Project from the DEFAULT
  - Include the date in the new Project name.
  - Copy the files from the old to the new Project.
  - Do this EVERY time a major change is made.
  - This keeps a file of the old version that worked.

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## Program the Operator Interface

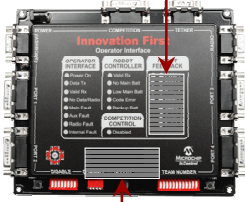


- See [ifi\\_aliases.h](#) for the name of each light on the Operator Interface (OI).
- With this information we see the names of each programmable indicator on the OI on the next slide.

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### OI Display Names






11 lights

- Pwm1\_red Pwm1\_green
- Pwm2\_red Pwm2\_green
- Relay1\_red Relay1\_green
- Relay2\_red Relay2\_green
- Switch1\_LED
- Switch2\_LED
- Switch3\_LED

3 - digit display  
User\_Mode\_byte




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### Search the DEFAULT Program

- Find in the DEFAULT Program where the OI lights and display are programmed.
- Do a "Project Search" for " Pwm1\_green"
- How would you change what it shows?
- Do a "Project Search" for " User\_Mode\_byte"
- How would you change what it shows?



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### Create new Program

- Change the 3 digit display so it shows the value being sent to pwm01.
- The program user\_routines.c contains:
- `User_Mode_byte = backup_voltage*10;`
- Let's change it to the Y value of Joystick 1:
- `User_Mode_byte = p1_y; //this makes the change`




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### Program Compile and Download

- Make or Build the project in MPLAB
- Fix any errors that are identified.
- Start the program IFILoader
- Select the file just created.
- Place the Robot Control in Program Mode by pressing and holding the Program Button
- Download the new program.




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### Confirm Program Works

- Robot Controller should automatically leave the Program Mode and begin to Run.
- Press the Mode Select Button on the Operator Interface until it displays the User\_Mode\_byte.
- Should be near 127
- Move Joystick 1 and observe the changes.


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### DEFAULT Sensors

- There are two types of sensors:
- Digital
  - Numerically either 0 or 1
  - Physically either OPEN or CLOSED, or PRESSED or RELEASED
- Includes: Limit Switches, Banner Photo Cells, Air Pressure Switch, Push Buttons on Joysticks, etc. Encoders can be 2 digital input devices.


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## DEFAULT Sensors

- Analogue sensors indicate the specific position of the device instead of only ON or OFF
  - Value on the Operator Interface is 0 to 255
  - Value in the Robot Controller is 0 to 1023
- Examples include: Joystick x, y, and wheel, Potentiometers (relate to degrees of rotation), Gyro (degrees/second of rotation), etc.


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## Operator Interface Sensors

- [ifi\\_aliases.h](#) defines NAMES for all of the Inputs possible from the Operator Interface
- Notice that they are named starting with either a p1, p2, p3, or p4 which indicates the desired PORT (1 through 4).
- Notice there is a \_trig, \_top, \_aux1, or \_aux2 for Digital Inputs. Inputs NOT connected == 0.
- Notice that there is an \_x, \_y, \_wheel, or \_aux for Analog Inputs. Inputs NOT connected == 127.


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## Robot Controller Sensors

- [ifi\\_aliases.h](#) defines NAMES for all of the Inputs possible from the Robot Controller
- Digital Inputs are defined as rc\_dig\_in01 through rc\_dig\_in16. A Digital Input with nothing connected is a 1 == OPEN
- Analogue Inputs are defined as rc\_ana\_01 through rc\_ana\_16. The value when read by the controller is between 0 and 1023.


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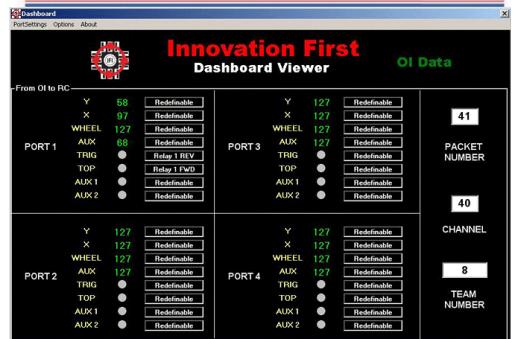
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## Use DashBoard Viewer


- Start the Program Dashboard\_Viewer
- Connect the Program Cable to the Dashboard Port of the Operator Interface.
- Move the Jumper to show OI Data.
- Move the Jumper back to show RC Data

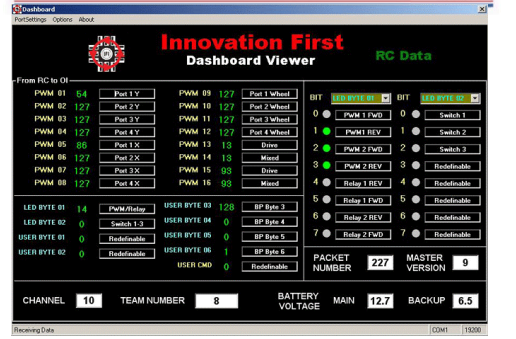
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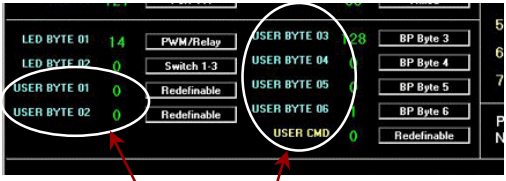
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### Display Additional Robot Data



Notice User\_Byte1 through User\_Byte6.  
They can be programmed to display Robot Values.

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### Add Robot Analogue Input

- Assume the Robot has a potentiometer wired to its Analog Input # 1.
- Use the [Programming Reference Guide](#) (page 16) we see how to read a potentiometer.
- The DashBoard Viewer can only display 8-bits so we need to program:
 

```
sensor1 = Get_Analog_Value( rc_ana_in01 ); //read 10-bits of data
sensor1_8bits = (unsigned char)(sensor1 >> 2);
//shift the 2 lease significant bits out is the same as divide by 2
User_Byte1 = sensor1_8bits; //Display on the DashBoard
```


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### Make the Program Change

- Using MPLAB, add the program lines in user\_routine.c
- "Make" or "Build" the Project.
- Fix any errors and "Make" again.
- Use IFI\_Loader to Download the robot.
- Use DashBoard Viewer to verify the results.


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### Summary

- Today we learned where to find the DEFAULT Program, Programming and Hardware documentation, DashBoard Viewer, and the Program Loader.
- HINT: [www.ifrobotics.com](http://www.ifrobotics.com)


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### Summary

- Today we have learned how to find the DEFAULT NAMES of every connection to the Robot Controller and to the Operator Interface.
- HINT: ifi\_aliases.h of the DEFAULT Program
- Also defined in the OI Reference Guide (oi-ref-guide-2-21-05.pdf) and the RC Reference Guide (rc-ref-guide-01-31-2005.pdf)

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### Summary

- Today we learned how to make different versions of our program PROJECT using the "Program Wizard" in the MPLAB program development system.
- We also learned that the C Compiler software is provided to each team with the Kit of Parts.

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## Summary

- Today we learned that by using the software tools we can add to the DEFAULT Program.
- We demonstrated displaying sensor values on the Operator Interface panel.
- We demonstrated displaying sensor values through the DashBoard Viewer.

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## Questions ???

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