Software Manual
Asuro xTend

For use with ASURO Robot and ASURO xTend

Asuro xTend Board
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Impressum

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Symbols

The manual uses following symbols:

The exclamation mark attracts the attention of the user to important instructions that must be adhered to. If you make a mistake in this part, it can lead eventually to the destruction of the robot or its accessories and even endanger your health or that of your environment!

The "Information" symbol draws the attention to useful tips and tricks or background information. It is not always essential to understand everything but it is often very useful.

Content

1. Introduction

This document is intended to explain the function of the Asuro Robot with the Asuro xTend board. The focus will be kept on the implemented software functions, but since it is a embedded System we have to explain the hardware functionality and the interaction between the Asuro Robot and the Asuro xTend.

The software programming language is C++ - all library function and the demo program are based on this language. C/C++ knowledge is a prerequisite - this means the principle language elements won't be explained in this manual.

It is highly recommended to expand your C++ knowledge.

The following book is recommended:

> Sams Teach Yourself C++ in 21 Days - Jesse Liberty   ISBN-13: 978-0672327117

> This is an excellent hands-on guide for the beginning programmer. Packed with examples of syntax and detailed analysis of code, fundamentals such as managing I/O, loops, arrays and creating C++ applications are all covered in the 21 easy-to-follow lessons.

2. Asuro Architecture

2.1 Asuro Robot and Asuro xTend Block Diagram

The Asuro Robot and the Asuro xTend are working as a Master/Slave-Configuration. The Asuro Robot is the Slave and the Asuro xTend the Master. To control the Asuro and to solve tasks with the available sensors can be split into the following parts:

1) *Master*

   The Demo program or your application software will run here. Messages or data can be display on the LC-Display and the optional sensor module (e.g. Compass/Gyro) can be used by the algorithms.

   The *Master* evaluates the sensor signals and the data from the *Slave*. He also calculates the new set points, e.g. for speed or direction and sent to the *Slave* on the I2C bus.

2) *Slave*

   The *Slave* controls the motors on the robot and regulates the speed in accordance to the set point. Both wheel speeds, the battery voltage and the state of the tactile sensors (switches on the Robot) will be measured and sent to the *Master*.
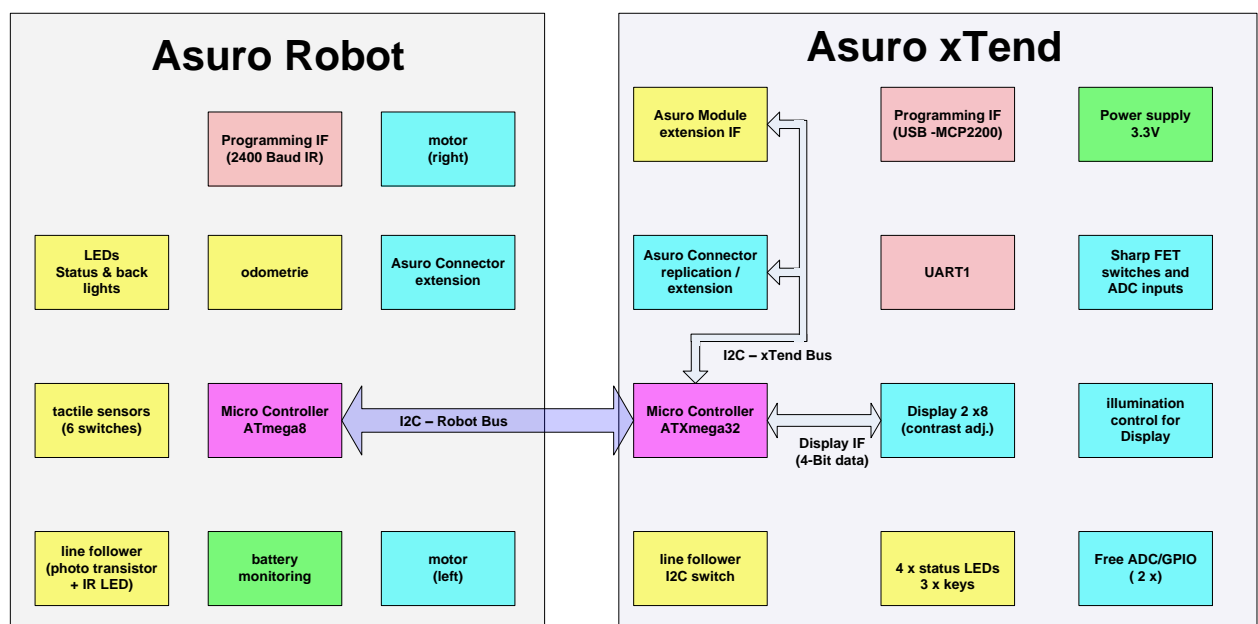
2.2 Asuro Robot

The Asuro Robot has got a small micro controller and simple tactile sensors (switches) and a IR transmitter diode with 2 photo transistors for the line follower and controls the two motors (PID). The speed sensors are counting pluses which are proportional to the wheel speed.

The power supply and the Asuro Bus are routed to the Asuro xTend board. The I2C bus connects the Asuro xTend with the Asuro Robot to exchange data in both directions.

2.3 Asuro xTend

The Asuro xTend board has got a powerful micro controller, two IC2 bus and two UART interfaces and a LC-Display. Additionally, two Sharp distance sensors can be attached. All sensors will be read and used in the algorithms to let the robot drive ‚autonomously'.

In this configuration, you will put your programs on the xTend board. Under normal conditions you don't have to change the provided Asuro Robot software.

3. Asuro Software

The provided Asuro Demo software can be divided into 3 main parts:

1) Asuro Base Demo – the s/w for the Asuro Robot
2) Asuro Control - the s/w for the Asuro xTend)
3) IoExt – s/w for the Asuro Sensor Modules (part will run on the xTend)

The modular software structure is divided into the following functions:

1) Common Files – general definitions which are valid for both micro-controller
2) Library for the low-level hardware driver (*.h und *.cpp files)
   This are program parts which are directly communication to the hardware including the initialization routines.
   You shouldn't make changes here unless you really know what you are doing!
3) Header files of the software module (*.h files)
4) Main program (main.cpp –file) and other function modules (*.cpp files)

Hint: The following section are available in the next revision of the document. See 'News' on our homepage!

4. Program Examples