

## **C3024 Internals**

### **Revision 0.1**

**23<sup>th</sup> July 2006**

#### **Hardware:**

The MR-C3024 controller for the RoboNova 1 is based on the Atmel ATMega128 processor.

Datasheet : [http://www.atmel.com/dyn/resources/prod\\_documents/doc2467.pdf](http://www.atmel.com/dyn/resources/prod_documents/doc2467.pdf)

Instruction set: [http://www.atmel.com/dyn/resources/prod\\_documents/doc0856.pdf](http://www.atmel.com/dyn/resources/prod_documents/doc0856.pdf)

The processor is clocked at 7.3728Mhz

Power for the processor is provided from the 6.0V NiMh batteries via a 5Vvoltage regulator

Interface for the head LED and the onboard piezo sounder is provided.

An external EEPROM Memory ( 24C512) of 32K bytes is provided on the 2 wire interface to the processor for the storage of the RoboBasic Intermediate Program code.

#### **Memory organisation:**

The C3024 has a number of separate memory spaces.

ATMega program Memory: 64K words of flash program memory on chip of the ATMega 128. Organised as 0 to 0xEFFF as application memory, and 0xF000 to 0xFFFF as boot loader. Write access to flash is only possible through the boot loader. The flash can be updated from RoboBasic by invoking the boot loader. The new firmware image is contained in the Robobasic program. Currently the size is less than 24K words.

ATMega128 Data Memory: 4K Bytes of internal static RAM. The data memory is used by all the internal processes.

ATMega128 Internal EEPROM: 4K Bytes of internal EEPROM used to store configuration information such as servo zero positions

External EEPROM Memory: 32K Bytes of external EEPROM for storage of RoboBasic Intermediate Byte codes.

#### **IO organisation:**

IO is pretty much directly connected to the processor pins and described here:

[http://www.hitecrobotics.com/Tony%20information/MR-C3024%20Spec%20English\\_Version%201.pdf](http://www.hitecrobotics.com/Tony%20information/MR-C3024%20Spec%20English_Version%201.pdf)

### **C3024 Processes:**

**Bootloader:** The bootloader is entered on power up. If the bootloader is not invoked within a preset time, then the processor jumps to the application code. The application can invoke the bootloader on command via the PC serial port. Protocol for the bootloader is currently not known.

**Initialisation:** When the application code is started, the memory, ports and other processes are setup.

**SCM Serial Command Monitor:** The PC connected to the processor USART1 is used for command and control of the C3024. The SCM continuously looks for input on the USART and responds as requested.

**IMI Intermediate Code Interpreter:** The IMI interprets the Intermediate byte code contained in the external EEPROM memory into Robonova inputs, actions, calculations and flow changes.

**Timer Driven Processes:** These processes are driven through processor interrupts, and may include timers, actions, etc. The WAIT command in Robobasic is usually used to determine if timer driven processes are complete.