Microcontrollers, Sensors, ZigBee®

Freescale Tower System

Tower System mechatronics board and robot

Drivers Available in the Toolkit

- General purpose 16-bit timers (GPT): input capture, output compare and PWM
- PWM 16-bit controller
  - Less than 1μS resolution for RC servo control
- I²C master mode
  - Xtrinsic 3-axis accelerometer
  - Xtrinsic touch sensing
  - Xtrinsic 3-axis magnetometer
- QSPI master mode
- UART buffered and un-buffered
- Analog-to-digital converter
- Interrupt controller
- DMA controller
- FlexCan controller
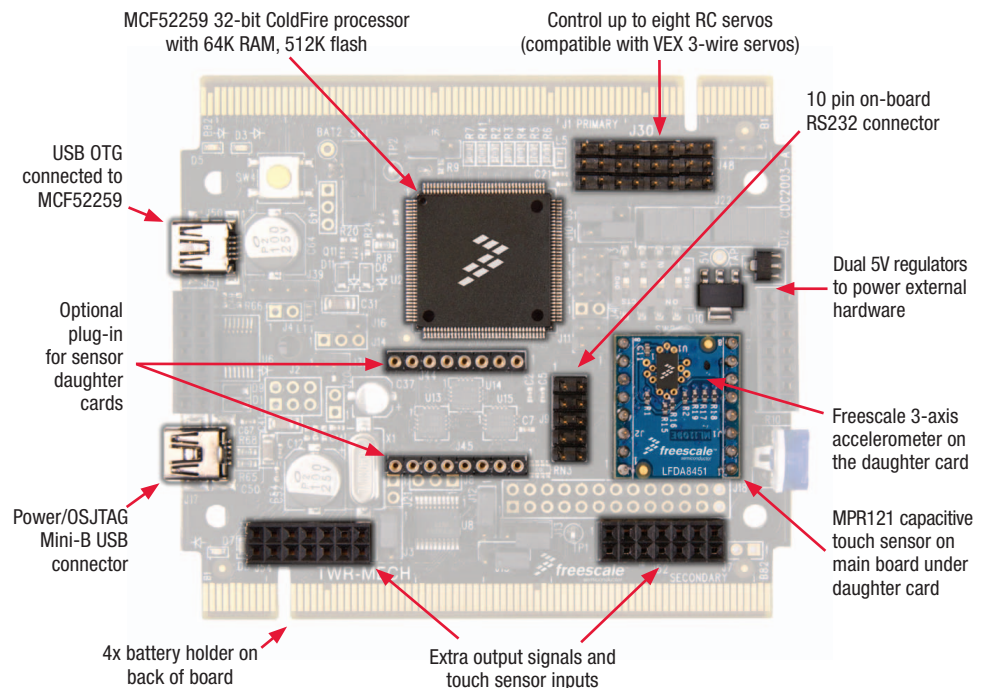- Periodic interrupt timers
- DMA timers

Overview

The Tower System mechatronics board combines 32-bit computing, sensors, actuator control and wireless into a single stand-alone board with an on-board battery supply. The Tower System mechatronics board has a 32-bit ColdFire microcontroller with 64K of RAM, 512K of flash and supports the full range of Freescale Xtrinsic sensors via plug-in daughter boards. The board can directly control up to eight actuators (PWM-controlled RC servos) via the eight industry standard 3-pin connectors.

In addition to stand-alone operation, the Tower System mechatronics board can be plugged into the Tower System to become a controller module, capable of interfacing with all peripheral modules available in the Tower System family to expand its capabilities.

Freescale's robot is a sensor development kit in the form of a four degrees of freedom (DOF) bipedal walking robot, controlled by the Tower System mechatronics board. Included are simple development tools that will help you learn to write software for sensors, while making a robot walk and respond to touch, motion, vibration, tilt and other external stimuli.

Tower System Mechatronics Board Features

MCF52259 32-bit ColdFire processor with 64K RAM, 512K flash

Control up to eight RC servos (compatible with VEX 3-wire servos)

10 pin on-board RS232 connector

USB OTG connected to MCF52259

Optional plug-in for sensor daughter cards

Power/OSJTAG Mini-B USB connector

Dual 5V regulators to power external hardware

Freescale 3-axis accelerometer on the daughter card

MPR121 capacitive touch sensor on main board under daughter card

4x battery holder on back of board

Extra output signals and touch sensor inputs

![freescale logo]

Software Enablement

The Tower System mechatronics board is supported with a full range of software. StickOS is an entirely MCU-Resident interactive BASIC language programming environment, which includes an easy to use editor, transparent line compiler, interactive debugger and flash file system. When used with the Freescale robot, StickOS makes it easy to learn about electromechanical designs using sensors.
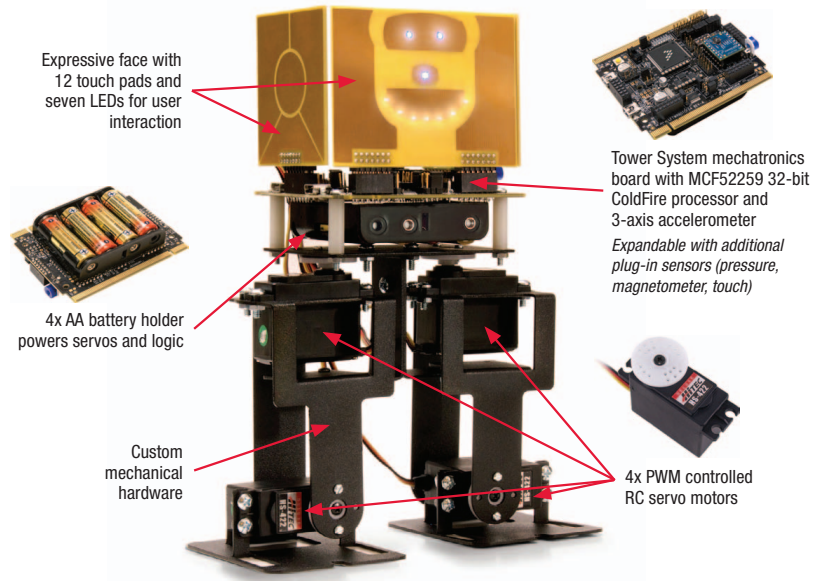
For the more advanced programmer, C is also supported. Using the on-board OSBDM debugger and CodeWarrior Special Suite integrated development studio (IDE), the board can easily be programmed in either C or assembly (C++ is available with the CodeWarrior Professional Suite). CodeWarrior Special Suite plus OSBDM is a complete debugging solution that includes flash programming, run control (source level single step) and trace.

Code samples make getting up and running easy, and both the robot and the Tower System mechatronics board are backed up with many samples in both C and StickOS. Basic StickOS examples are available to make the robot walk, access various sensors, and even reconfigure the MCU. A complete C CodeWarrior project is available with examples of how to make the robot walk and access its sensors. The goal of the Tower System mechatronics board and Freescale robot is to help you create innovative projects as quickly and easily as possible.

About element14

Launched in June 2009, element14 is the first innovative information portal and eCommunity specifically built for electronic design engineers. It now has over 65,000 members from around the world and enables members to consult experts, discover trends, post blogs, articles and comments in this worldwide forum. It provides product data, design tools and technology information, while incorporating Web 2.0 functionality to facilitate communication, interaction, collaboration and information sharing between colleagues around the world. Visit **element14.com** for more information.

Sensor Robot Features

Expressive face with 12 touch pads and seven LEDs for user interaction

Tower System mechatronics board with MCF52259 32-bit ColdFire processor and 3-axis accelerometer
Expandable with additional plug-in sensors (pressure, magnetometer, touch)

4x AA battery holder powers servos and logic

Custom mechanical hardware

4x PWM controlled RC servo motors

Development Tools

Kit Number	Price	Includes
FSLBOT	$199	• Tower System mechatronics board • 4x PWM controlled RC servos • Leg mechanics and associated hardware • Bipedal 4DOF walking robot assembly instructions • Tower System mechatronics board user guide • Quick Start Guide
TWR-MECH	$99	• Xtrinsic MMA8451Q 3-axis accelerometer • MCF52259 32-bit ColdFire processor • MPR121 touch sensor • Xtrinsic MAG3110 3-axis magnetometer
LFDA8451	$25	The LFDA8451 is a device adapter for Freescale's MMA8451Q 14-bit, 3-axis accelerometer
LFDA3110	$25	The LFDA3110 is a device adapter for Freescale's MAG3110 3-axis magnetometer
1320XRFC	$79	The 1320XRFC daughter card supports direct connection to ColdFire MCU development boards, providing an ideal platform for developing wireless applications

Documentation

Document Title	Description
Tower System Mechatronics Board User Guide	This user guide explains how to use the TWR-MECH board to write software for sensors to control the robot.
Tower System Mechatronics Board Quick Start Guide	This quick start guide will help you use the Tower System mechatronics board as quickly and easily as possible.
Bipedal Four Degrees of Freedom Walking Robot Assembly Instructions	The assembly instructions will guide you in putting together the physical robot pieces. The robot will ship with brackets, screws and motors for assembly.

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Tower Geeks Online Community

TowerGeeks.org is an online design engineer community that allows members to interact, develop designs and share ideas with the Tower System.

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