Embedded systems characterized by single-functioned, tightly-coupled, and real-time constrained have been deployed in numerous applications ranging from civilian to military, and become increasingly popular. In this research, we design and develop multiple embedded applications using Arduino-compatible Intel Galileo development board, partially supported by Intel Corporation. The board is based on the Intel Quark SoC X1000 processor, which is a 32-bit Intel Pentium-class system on a chip. Four different applications are explored in the areas of Web server, wireless communication, music, and user interface. We are investigating system configuration and setup and programming in integrated development environment. This research will expose the cutting-edge technology and significantly enhance hands-on experience in embedded systems.

**Galileoties : Web-based Computing and Beyond**

This project turned the Intel Galileo into a tool with a two utilities, a calculator and a Morse Code encoder. Both of these are controlled through a web page.

The calculator is a very primitive calculator. It does addition, subtraction, multiplication, and division with two operands. It works with decimal and whole numbers. The input is parsed out and the correct calculation is displayed on the web page. An example of input would be, “20.25 * 4”. The Galileo then parses the input to determine which operation needs to be applied to the operands.

The Morse Code encoder takes in a message, flashes the messages on one of the Galileo’s LEDs, and then displays the text encoding of dots and dashes (“.”, “-”). The encoder and the calculator can be used at the same time or by themselves. The web page’s HTML is hardcoded into the Galileo’s program and it outputs it to the client. When the user clicks “Submit”, the Galileo receives the new request and processes according to the information it received from the query string.

For a video of the project in action please scan the QR code using a smartphone.

**Writing Audio Functions Using the Intel Galileo Arduino**

This project is concerned with the problem of audio playback from an Intel Galileo board. We bypass the default tone() library on the Arduino IDE, and establish a framework of classes designed to “replace” the tone() library. All you need is the following components:

- Intel Galileo Arduino Board
- 100-ohm resistor
- 8-ohm speaker

The code was written in Arduino IDE 1.5.3. You must establish a dedicated pin for the speaker. Your 4-ohm speaker will be connected to your dedicated pin through a 100-ohm resistor, and then grounded on the board. Using a connected computer, connect the computer to the USB client port on the board. The code contains a header file of corresponding frequencies. Using that header file the code will play given a melody for a duration translated frequency for a melody and outputs it to your dedicated speaker pin.

For a video of the project in action please scan the QR code using a smartphone.

**Intel Galileo Driven Character Display**

The purpose of this experiment is to explore the features, functionality, and capabilities of the Intel Galileo board. For this particular experiment, the Galileo will be driving a 16 x 2 character display (picture left).

The screen uses a simple bus interface by which we can issue commands and send character data. Reading is possible but unnecessary for this experiment. The following are some of the basic operations we have at our disposal:

- Clear LCD
- Set display position
- Set display modes (on/off, 1-line2-line, etc.)
- And of course, send a character
- Strings are sent by sending repeated characters.

This functionality is easily accessible through a self made class using the Arduino development environment.

This demo demonstrates simple screen operation by requesting a string from the user on the serial command line (simply done through PuTTY) then displays it on the users carriage return.

The functionality of this project could be easily used and modified to extend a greater number of features.

Scan the Code with your smart phone:

Check it out in action on YouTube.

Scan the Code with your smart phone:

For a video of the project in action please scan the QR code using a smartphone.

**Communications via Bluetooth**

The connection between the board and the laptop with the uploaded program.

QR code to YouTube video demonstration

The opening of the app.

The app while in progress.