Functional Specification for

Wireless Ultrasonic Waterflow Monitoring System

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Progress Report - March 19, 2012

Throughout the past two months, most of our time was spent on doing research to find the method of measuring the water flow rate. Also, we did lots of research on looking for the right type of ultrasonic sensor which is able to fit in our design. At the same time our team has been working on design and build the transmitter and receiver circuit. During this period of time we have finished our proposal, functional specification and design specification. By now, we have nearly finished purchasing all the components in our design and the apparatus for testing. Also, we have built our transmitter and receiver circuit for driving the sensor and capturing the return signal to the microcontroller.

Completed task

Electrical Considerations

Below are the figure of our transmitter circuit and the output we got from this circuit.

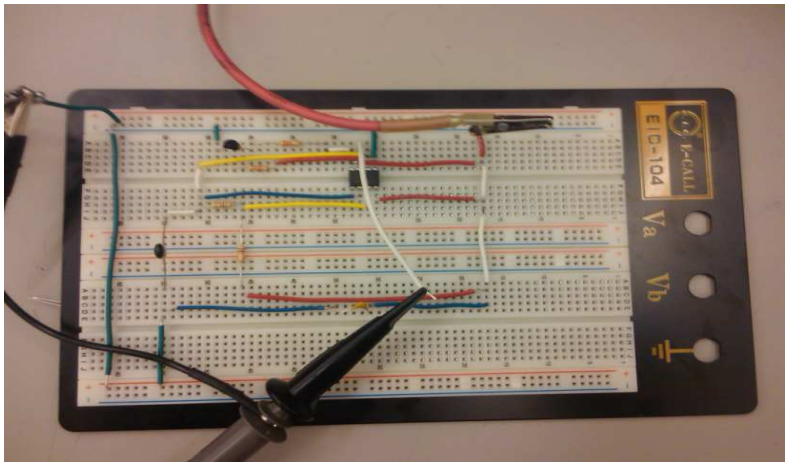

Figure 1: Transmitting Circuit

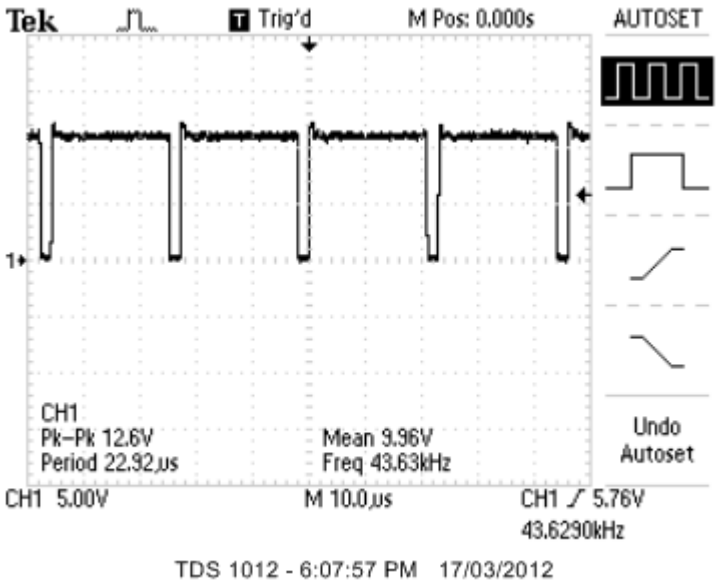

Figure 2: Output Waveform of Transmitter Circuit

From Figure 2, the output frequency of the transmitter circuit is 43.629kHz, which is very close to our designed 40kHz, which is also the resonant frequency of our transducers. After testing this circuit with a transducer, we are able to drive the transducer at good levels.

Transceiver Considerations

The transceiver unit has been assembled and proved to be functional along with the microcontroller. Communications between the microcontroller has been tested and has been functioning well with respect to digital transmission of data through its SPI uART connection. After modifying the Arduino libraries for the WiShield codes, it was able to generate a webpage and a WiFi server to host it. The analog input data sent from the microcontroller to the WiShield's webpage and the forms of logging that data is still being investigated.

Present stage

Right now we are working on the hardware integration and microcontroller programming. In hardware integration part we are going to connect our sensor to microcontroller through transceiver circuit. In microcontroller programming part we are going to input our water flow rate measuring formula to the microcontroller for getting right measuring value from microcontroller.

Budget

To date, GreenSense Systems is under the $300 project budget. The majority of our hardware purchases have been spent on microcontroller and electrical components. All essential parts have been purchased. Additionally, extra replacement parts of the ultrasonic transducers have been purchased. We still have a reasonable amount of funds left over for unexpected and emergency purchases in the future for the complete functional prototype.

Table 1 - List of Project Expenses (updated March 19th, 2012)

Component Name	Quantity	Cost ($CAD)
Arduino Uno	1	$33
LinkSprite CuHead WiFi Shield	1	$55
AC Adapter for Uno (9V,1A)	1	$8
USB Cable for Uno	1	$8
Testing apparatus	1	$60
Circuit components	N/A	$64
TOTAL		$228

The following are the components we purchased:

- Pipe
- Water tanks and water control switch
- Electronic components in our transmitter and receiver circuit
- Microcontroller and transceiver.

Action Items

According to our proposal we will finish our hardware integration and microcontroller programming by April 13 2012. Currently, we are a little falling behind the schedule. We have to catch up the schedule and finish the project by the end of this semester. Our final demo date is April 23 2012. By that time our project's first prototype will be finished with its enclosure, software systems, and integration of its microcontroller, transceiver, power supply, and electrical circuitry.