

ABSTRACT

The Everything is OK Alarm

Freescale Wireless Design Challenge entry FZ1608.

The Everything is OK Alarm is a wireless home health monitoring system based on the IEEE 802.15.4 wireless data modem specification, and implemented with Freescale's SimpleMAC (SMAC) software running on MC9S08GT family microcontrollers.

The name of this project is inspired by a popular cartoon character that, when he saw how many inventions Thomas Edison had by the time Edison was his age, decided he would become an inventor. One of his inventions looked like a smoke alarm and beeped loudly constantly. As he is demonstrating it, over the loud beeping he yells "This is an everything is OK alarm. It keeps beeping as long as everything is OK."

Actually, the Everything Is OK Alarm is more like a security system, yet very different.

After leaving home, how many times have you wondered if you remembered to close the garage door? Or, if you live in the northern parts of the country in the winter, worry that the heat has quit and your water pipes are about to freeze and break. Or maybe your sump pump has quit, and your basement is filling with water.

A traditional security system only activates when something "bad" has happened, such as a door or window being opened as a burglar breaks in. It will not notify you that the front door isn't locked, as long as it is closed, and most don't monitor such things as water in the basement or the current temperature.

The Everything is OK alarm can monitor all these things through the use of remote wireless sensors and let you know that "Everything is OK" when you call home and enter a security code to receive a home health status report.

The system consists of the following components:

The Base Unit: The base unit receives the status from the remote wireless sensors and acts on that information appropriately. The base unit will light an LED to alert local users to indicate that an error condition exists. The user can press a button to get a spoken report on the remote sensors, or if away from home, can call the phone number of a line connected to the base unit, enter a security code, and get a spoken report of the state of the system.

Garage Door Module: The garage door module is attached to the inside of a garage door and senses the position of the garage door and transmits the door position to the base unit, sending an error condition if the door is open.

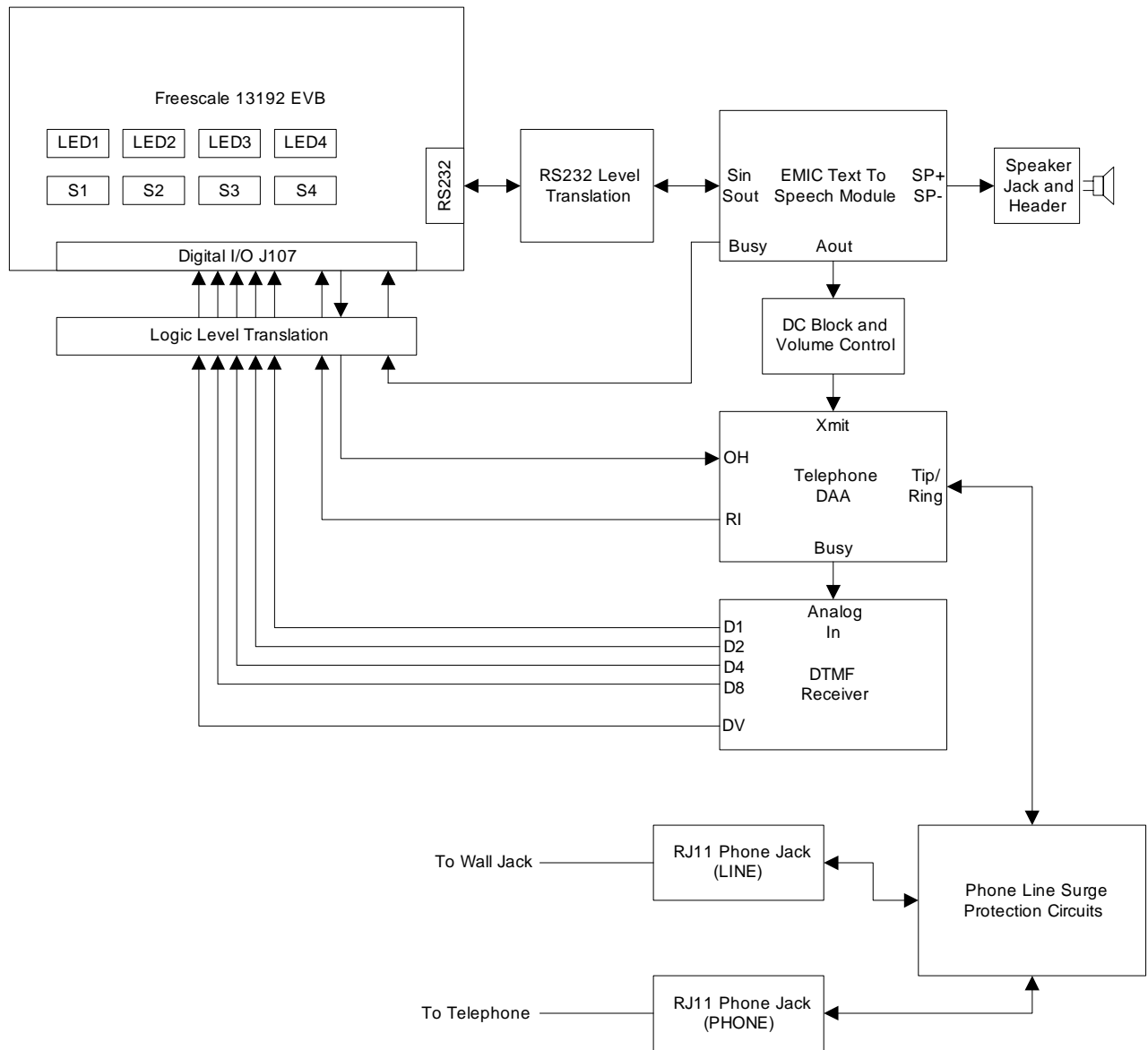
Water Level Detection Module: The water level detection module, of course, monitors water level, periodically transmitting the result to the base station, and sending an error if the level is above the calibrated trip point. It uses a flexible clear vinyl tube to detect the water level. The

tube can be placed in a sump pump hole to detect rising water due to the sump pump failing, or could be used in a bath tub to warn of an impending overflow that could cause water damage.

Temperature Module: The temperature module measures the current temperature periodically, comparing the temperature to an upper and lower limit set by the user. If the temperature is outside those limits it transmits an error to the base station, otherwise it transmits a non-error condition. The temperature reading is also transmitted to the base station. It is useful for monitoring proper operation of a heating or air conditioning system, or could be placed near water pipes to warn of freezing temperatures that could cause the water pipes to break.

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Block Diagram - Base Unit Hardware
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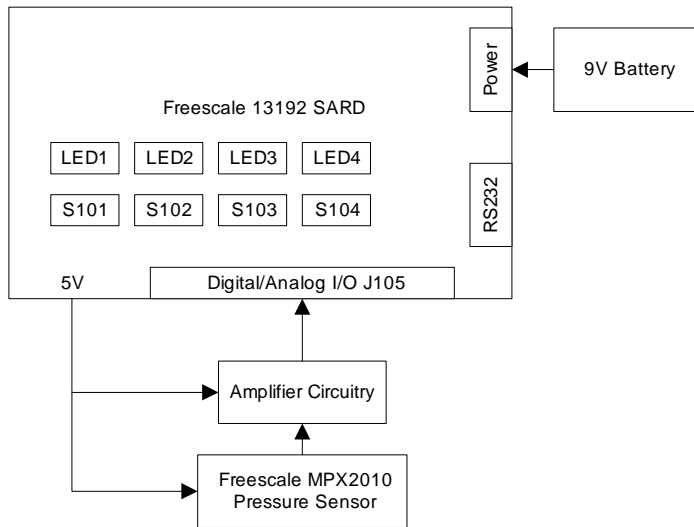


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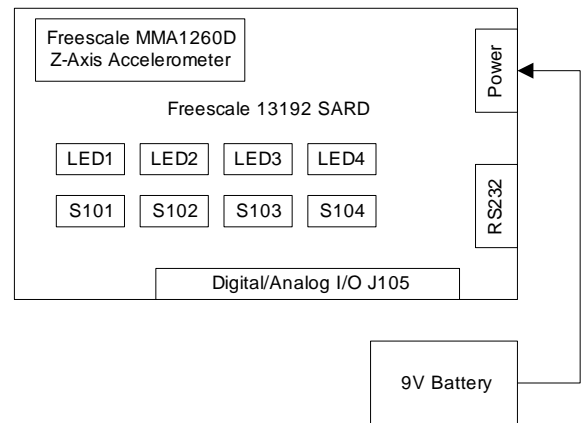


Block Diagram - Remote Sensors
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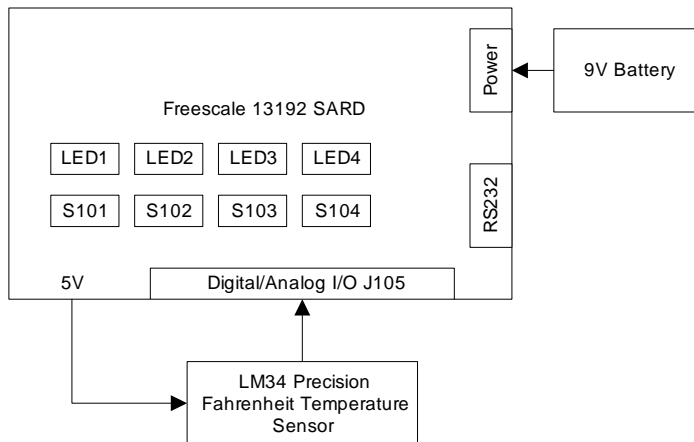
Block Diagram - Water Level Sensor

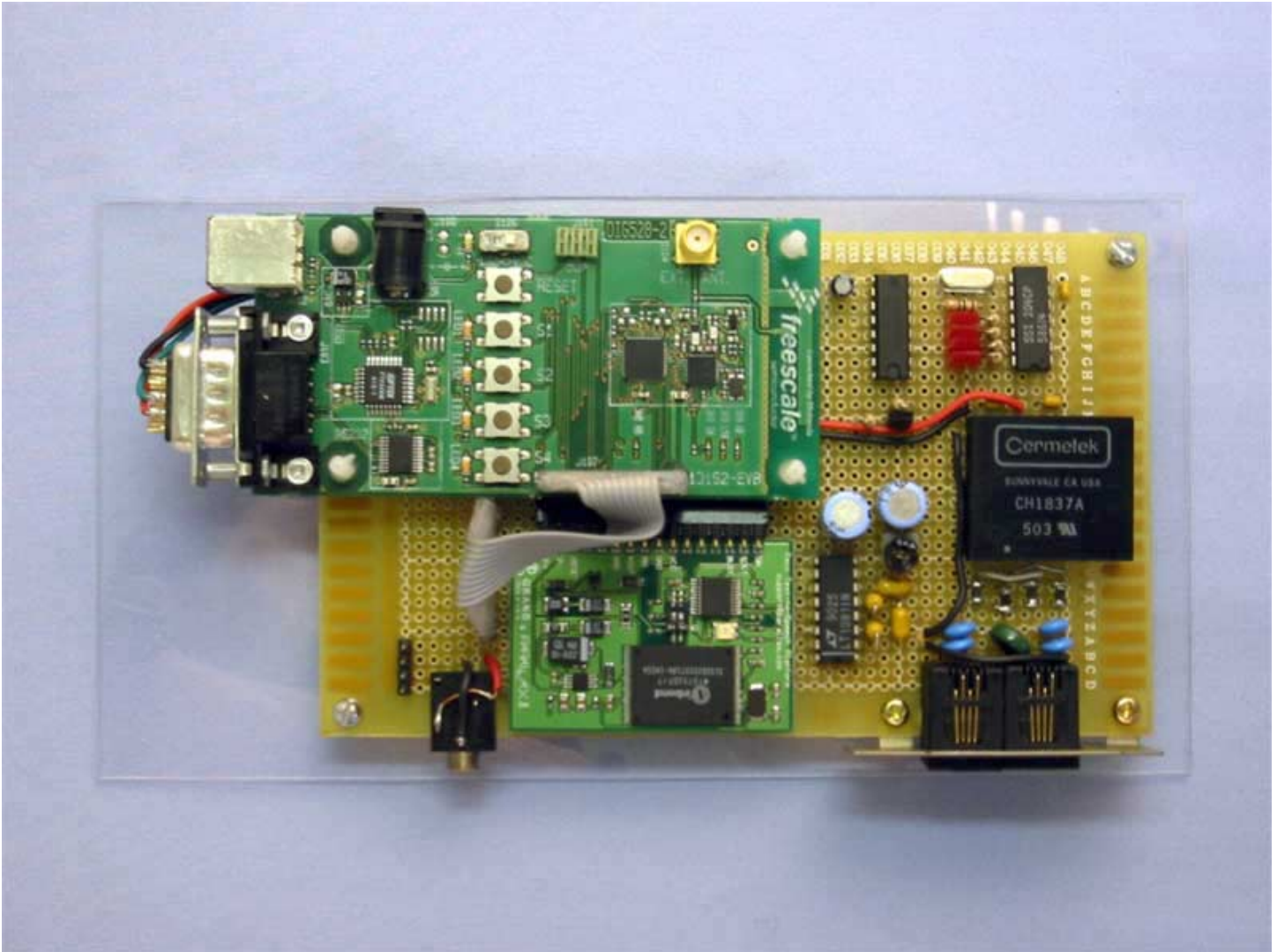


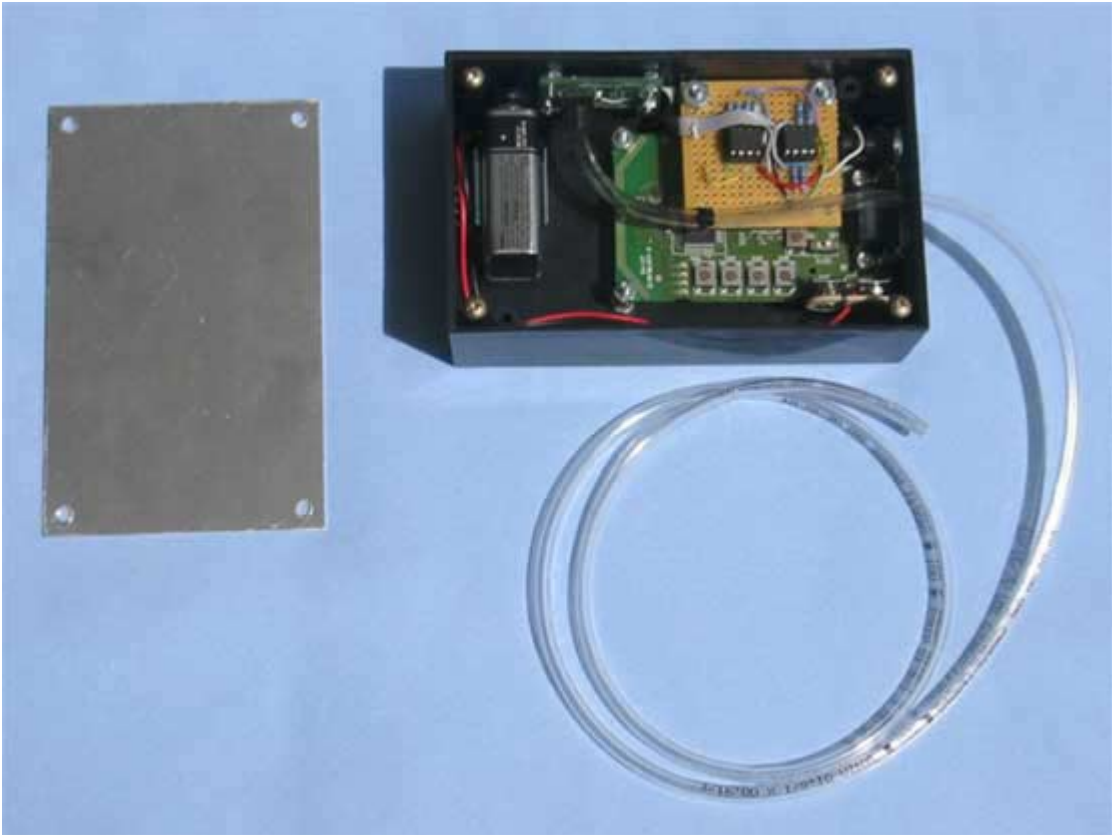
Block Diagram - Garage Door Sensor



Block Diagram - Temperature Sensor

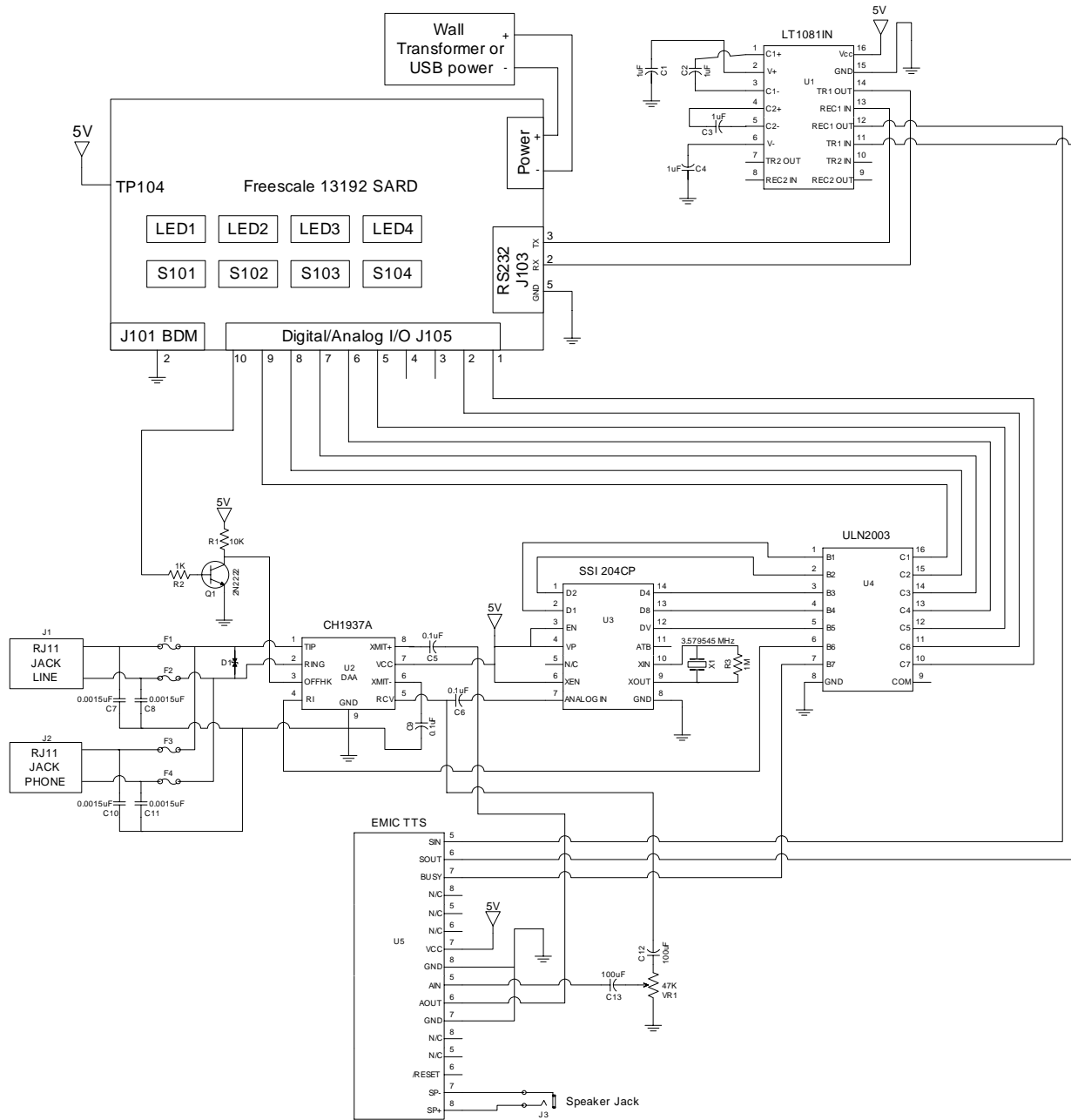






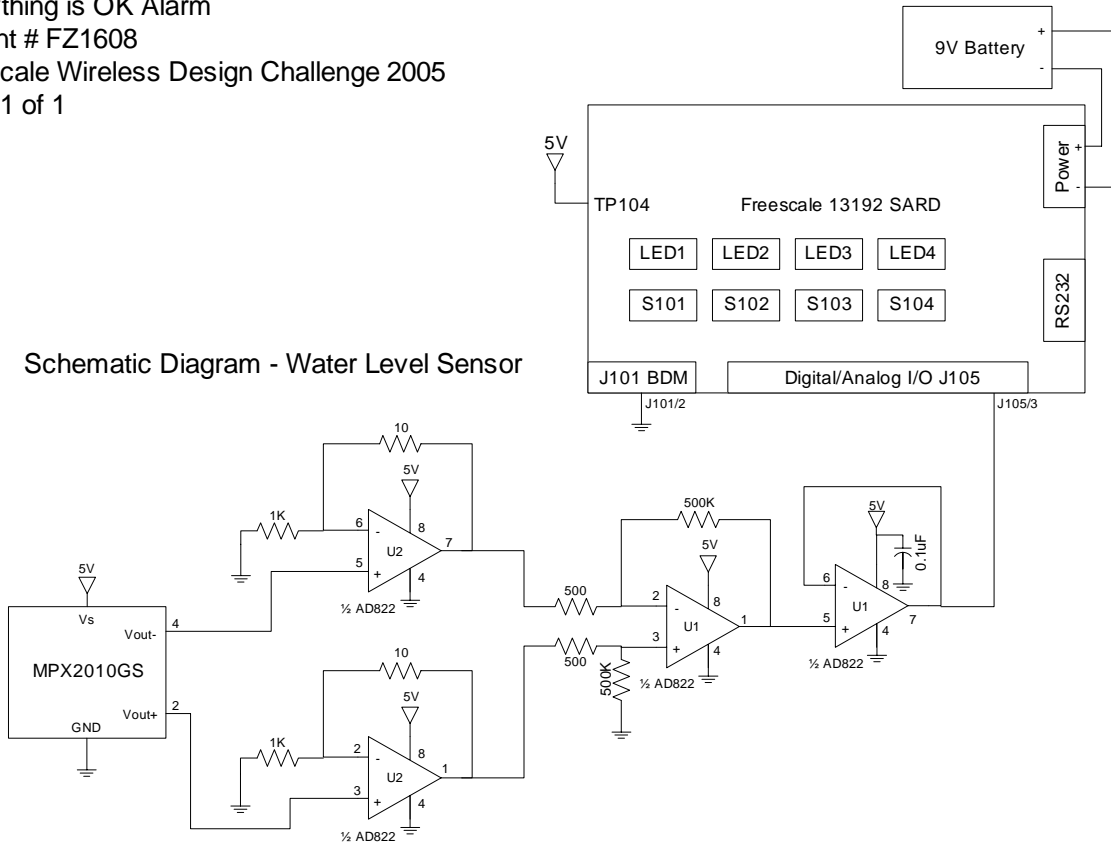


Schematic Diagram - Base Unit
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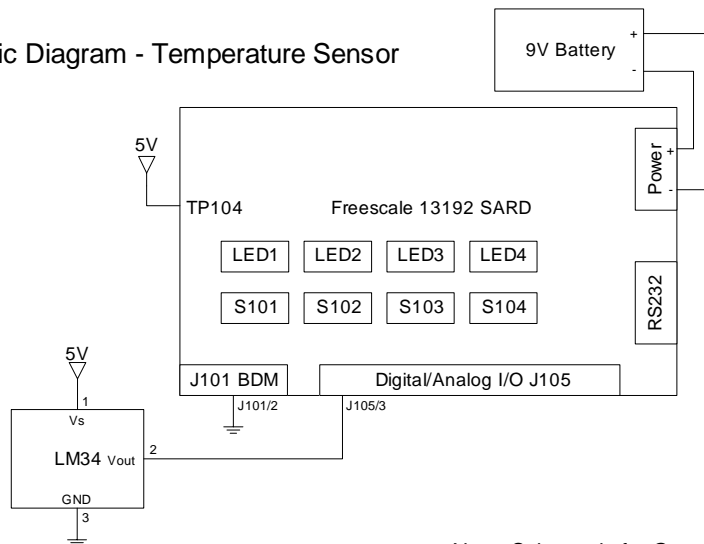


Schematic Diagram - Remote Sensors
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Schematic Diagram - Water Level Sensor



Schematic Diagram - Temperature Sensor



Note: Schematic for Garage Door Sensor is not included since it was implemented with just a 13129 SARD PCB with no external circuitry.