GITHUB LINK:

The following is the repository link of the same:
https://github.com/Ci-Daniels/GSM-ann-dertank-system

INTRODUCTION

The SIM800L GSM/GPRS module can be used to control your household appliances remotely. This expands from wanting to monitor your house or listen to what is happening to your house when you are miles away or want to turn off your lights, pump, or even activate your sprinkler just ith a silent call or a text message; this module serves as a solid launching point for you to get started with IoT.

I want to use the module to control an underground tank to receive the level of water in the tank remotely from my phone through a text message to and from the system.

SIM800L GSM/GPRS module is a miniature GSM modem that can be integrated into many IoT projects. It requires up to 5V of power supply to function. You can use this module to accomplish almost anything a normal cell phone can; SMS text messages, make or receive phone calls, connecting to the internet through GPRS, TCP/IP, and more! To top it off, the module supports quad-band GSM/GPRS network, meaning it works pretty much anywhere in the world.

LED NETWORK STATUS INDICATORS ON THE GSM

- Blink every 1 second

  -The module is running but hasn't made the connection to the cellular network yet.

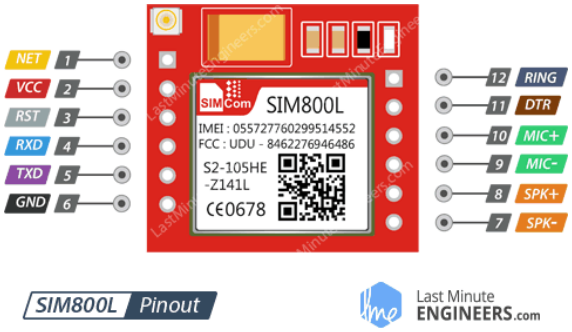
- Blink every 2 seconds

-The GPRS data requested is active

❖ Blink every3 seconds

-The module has made contact with the cellular network and can send/ receive SMS and calls.

PINOUT



PIN	FUNCTION
1	Where you can solder or connect the antenna
2	Connect the power supply;3.3 to 5v
3	Hard resets the module
4	Used for serial communication it acts as the receiver
5	Used for serial communication used as the transmitter.
6	It is ground the module
7	It is a differential speaker
8	It is a differential speaker

9	It is a differential microphone
10	It is a differential microphone
11	It activates and deactivates the sleep mode -pulling it HIGH it will put the module to sleep mode -pulling it LOW will wake the module
12	It is the ring indicator or the interrupt

GSM COMMANDS

COMMAND	FUNCTION
AT	-Initialises the handshake and will return okay to show that the module understands you. -It also initializes the auto-baud'er -Once initialized, it allows you to send and receive commands to and from the module.
AT+CSQ	-checks for signal strength
AT+CCID	-checks for the sim card number
AT+CREG?	-check whether the sim card is in a registered network. 1 for a home network. 5 for a roaming network
ATI	-Gets the module name and version
AT+COPS?	-Checks that you are connected to the network
AT+COPS=?	-Return the list operators in the network

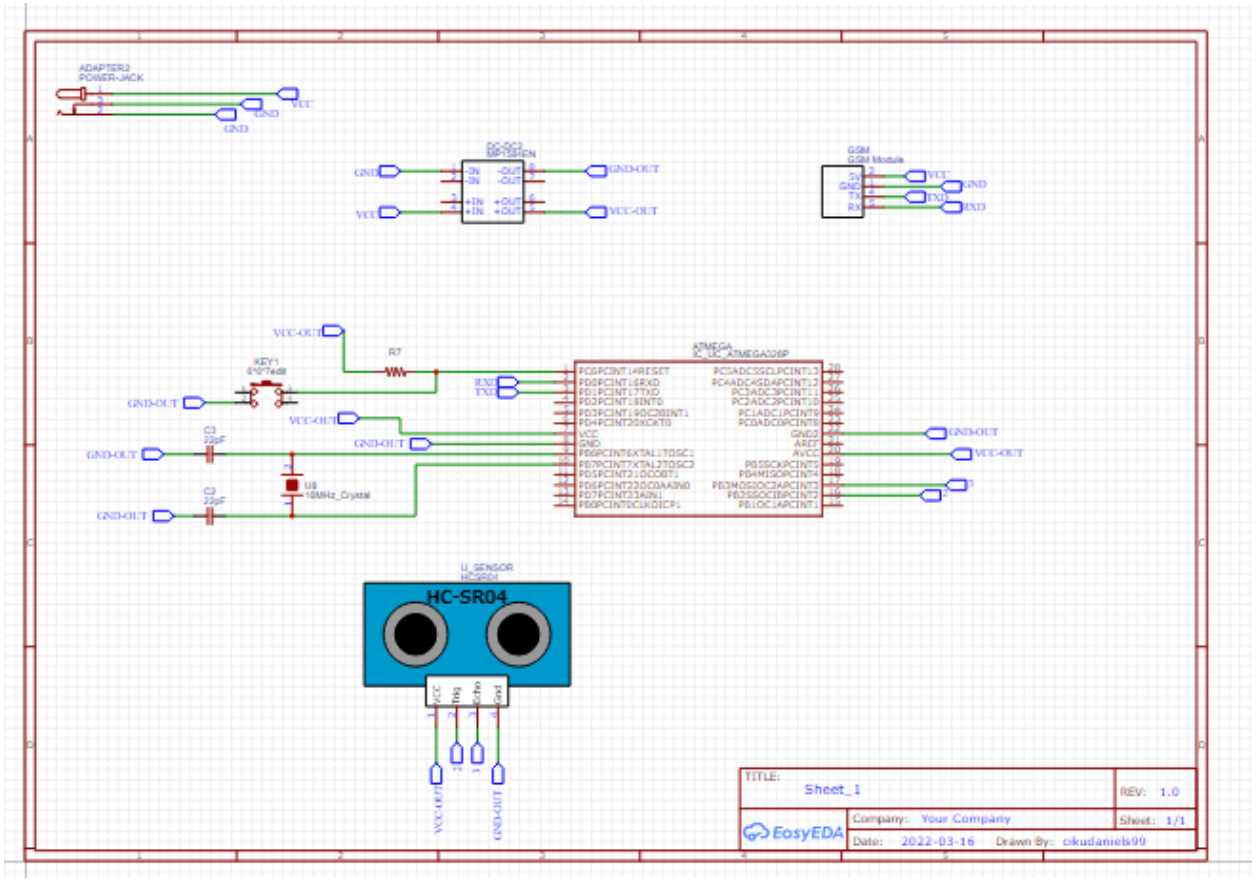
AT+CBC	-Return the lipo battery state.(0,90,4V) The second number is the % full (in this case its 90%) and the third number is the actual voltage in mV (in this case, 4 V)
SENDING AN SMS; sends SMS to the phone	
COMMAND	FUNCTION
AT+CMGF=1	Selects SMS message format as TEXT
AT+CMGS=+ZZxxx	Send SMS to the phone number identified where ZZ represents the country code and xxx represents the specific phone number
READING SMS; read incoming messages from the phone	
AT+CNMI=1,2,0,0,0	-Specifies how newly received messages should be handled. -You can tell the SIM800L module either to forward newly arrived SMS messages directly to the PC, or to save them in message storage and then notify the PC about their locations in message storage. -The first field is phone number. The second field is the name of the person sending SMS. The third field is a timestamp while fourth field is the actual message.
MAKE A CALL	
COMMAND	FUNCTION
ATD+ +ZZxxxxxx;	-Dials the number that is specified (;)modifier separates the dial string into multiple dial commands; all but the last must end with a semicolon
ATH	-Hangs up the call
RECEIVE A CALL	
ATA	-Accepts incoming calls

PROBLEM

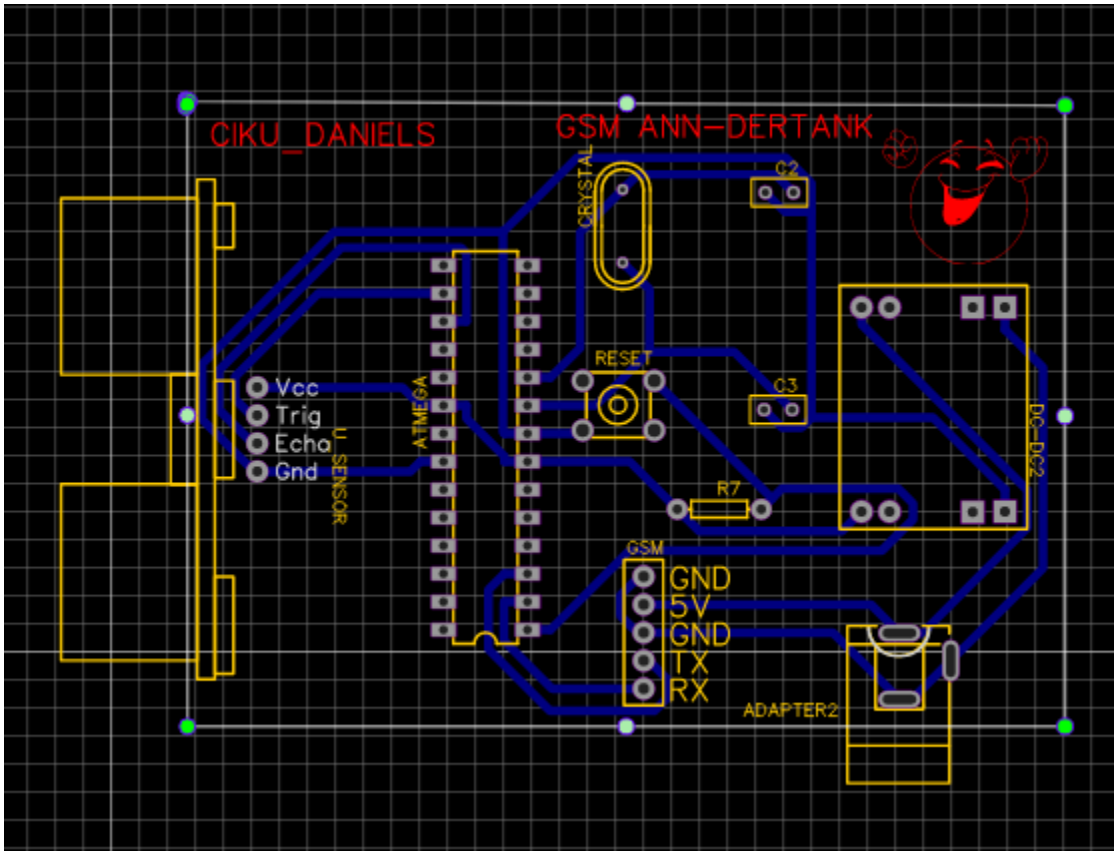
The GSM could not send or receive messages from my phone because it did not connect to my network. As such I could not use it in my water monitoring system. Reported the issue; still waiting for the replacement of the GSM; in the meantime, I have taken the approach of a telegram bot to send and receive commands to and from the system.

SCHEMATICS AND PCB DESIGNS

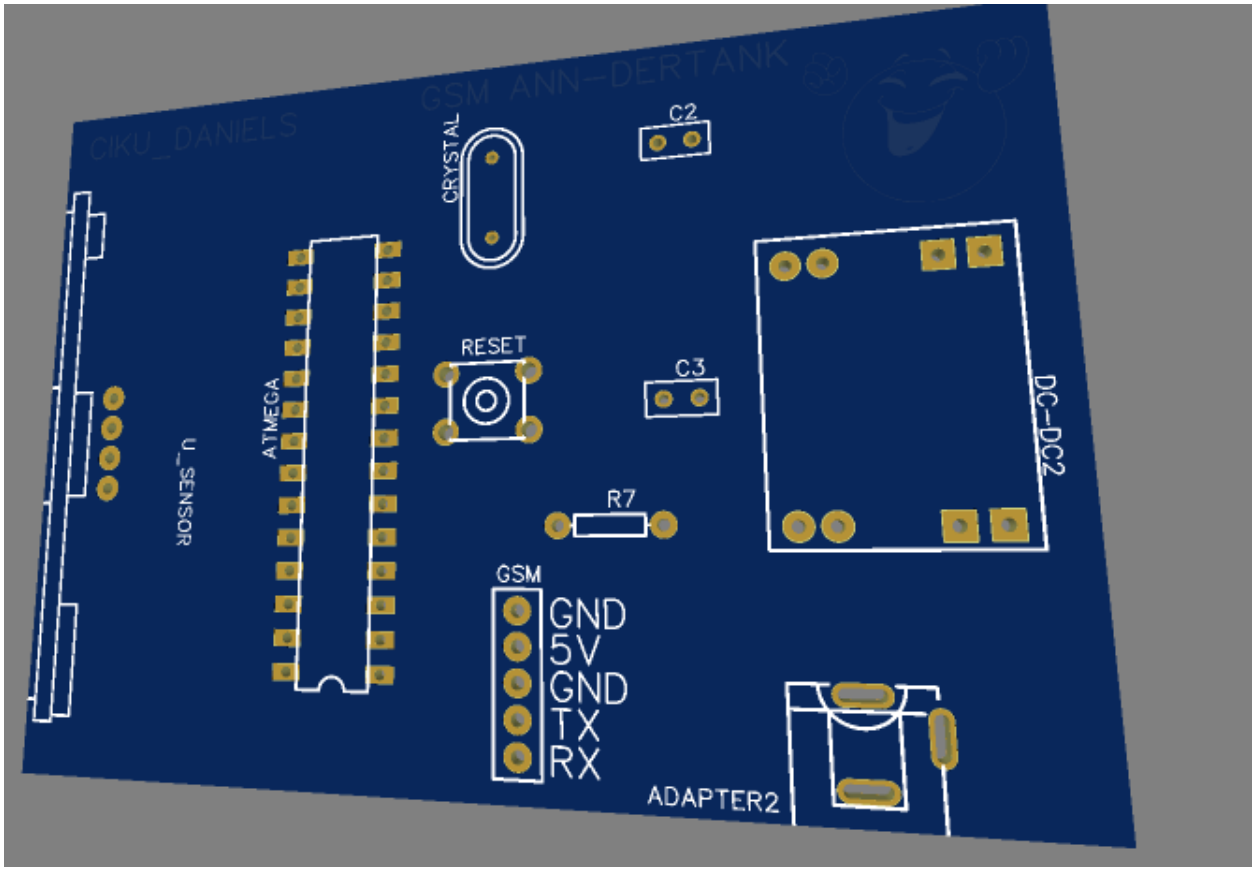
SCHEMATICS



PCB DESIGN


CIKU_DANIELS
GSM ANN-DERTANK
CRYSTAL
C2
RESET
C3
Vcc
Trig
Echo
Gnd
U SENSOR
ATMEGA
R7
DC-DC2
GSM
GND
5V
GND
TX
RX
ADAPTER2

3D PCB DESIGN



ADVANTAGES

1. Money Saver

A water level system helps save money by limiting the waste of water and electricity. These devices accurately regulate how much energy is used to protect against any unnecessary water/electricity usage. Over time, the money saved is quite substantial.

2. Automatic

Another notable advantage of this device is that they regulate on their own. By eliminating manual operations with a timer switch, the frustrations of manual monitoring water tanks are minimized. Water levels are maintained at the appropriate levels thanks to the automatic operations of these devices.

3. Efficient

One can monitor the water levels in their tanks remotely without having to go check every single time whether the system is working or not. This is a very efficient way since the system will notify you from wherever how much water is remaining in the tank, if there is an overflow, you will be able to turn off the pump; while in the case of low levels of water, you are notified to turn on the pump or contact your water supplier to come and refill your tanks.

DISADVANTAGES

1. Closed-mindedness; People are yet to adapt to the industry 4.0 revolution of home automation and automated system.
2. Maintenance of the system can be quite a task.
3. The security of the system could be at a risk, especially from hackers and/or physical theft.

CONCLUSION

The water level monitoring system scopes the problem of having to always go to your underground water tank to check whether there is enough water. It could also solve the problem of over flooding of river banks in some areas. It could also address the problem of overflow in tanks. The system checks the level of water and remotely alerts or notifies the owners in real-time. It uses the basics of GSM and GPRS to do real-time communication remotely.

This system has addressed its main objective, which was to notify the owner when there are minimal levels of water in the tank wirelessly, without the need of going to the tank physically.