OBJECTIVE:

To implement the concepts of Electronic Circuit Design in constructing an Overhead Water Tank System.

COMPONENTS:

The hardware components are as follow:

- DC Battery (9V)
- Switch (SPST)
- Capacitor (100µF)
- Resistors (10kΩ, 10kΩ, 1.2kΩ, 1kΩ, 1kΩ)
- Operational Amplifier (741)
- NPN Transistor (T1BC547)
- Rectifier Diode (1N4007)
- LEDs (Green, Red)
- Relay
- Float Sensor
- DC Motor (5V Water Pump)
- Pipe (2ft)
- Two Buckets
- Connecting Wires
- Soldering Iron
- Soldering Wire
- Veroboard

The software part required only one software i.e., Ki-Cad which was used to construct circuit diagram of the project.

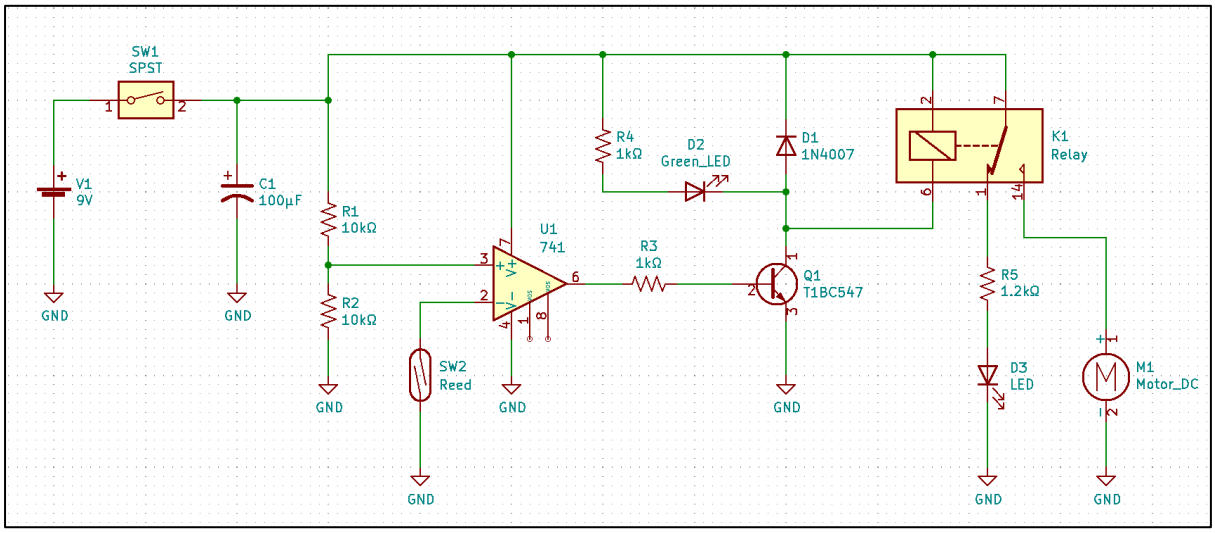
THEORY:

Generally, majority of the houses depends upon the overhead tanks as the main source of water. People generally switch on the motor when their taps go dry and switch off the motor when the tank starts overflowing. This results in unnecessary wastage of water and sometimes non-availability of water in emergency. This phenomenon is commonly seen in both urban and rural areas and this needs to control by monitoring water level in the tank. Here we need a mechanism capable of switching off the motor when the water level in the tank reaches maximum level.

EXPLANATION:

Operational amplifier or Op-amp is the main component in the entire project that is controlling the switching of motor. Op-amp is used as a comparator which compares the reference voltage with the voltage obtained by the float sensor. The float sensor is dependent on the water level with works on the principle somewhat related to reed switch, here magnet is replaced by water. The dc motor that is used pumps the water out of the pipe only if it is sank in the water. After comparison, the output is then provided to the transistor that does that switching of the relay. The use of diode is to block the path of the circuit while switching. The relay which is in parallel to the diode performs the switching when got excited. A switch is also used for enabling purposes.

CIRCUIT DIAGRAM:



PROCEDURE:

- Take 9V DC battery and declare its positive terminal as dc supply and negative terminal as ground.
- Connect the capacitor parallel with the battery separated by switch.
- Make a voltage divider connection with both 10kΩ resistances and join them parallel with the capacitor.
- Take op-amp and provide its 7th pin 9V dc supply and its 4th pin ground.
- Connect the voltage divider connection with the 3rd pin of op-amp in such a way that the junction between the two resistors is taken as input at the non-inverting input pin of op-amp.
- Connect a 1kΩ resistor in series with the output pin of op-amp and base pin of NPN transistor.
- Make the emitter pin of NPN transistor ground.
- Connect the positive terminal of rectifier diode with the collector pin of the NPN transistor and its negative terminal with the dc supply.
- Connect another 1kΩ resistor's one end with the dc supply and other end with the positive terminal of green LED and connect the negative terminal of this green LED with the positive terminal of rectifier diode in such a way that the branch of resistor and LED becomes parallel to the diode.
- Connect the relay in parallel with the diode in such a way that the dc terminals of relay must be connected with both end of diode.
- Provide the common pin (C) of relay with dc supply.
- Join a branch of 1.2kΩ resistor and red LED with normally closed pin (NC) of relay and other end of LED with ground.
- Connect motor's one end with normally open pin (NO) of relay and other end with ground.
- Connect sensor's one end with 2nd pin of op-amp (inverting input) and other end with ground.

COSTING AND BUDGETING:

Serial #	Components	Unit Price (PKR)	Quantity	Total Price (PKR)
1	Veroboard	50.00	1	50.00
2	9V Battery with Cap	60.00	1	60.00
3	Float Sensor	220.00	1	220.00
4	5V DC Pump	250.00	1	250.00
5	Pipe 2ft	20.00	2	40.00
6	Op-Amp 741 with Base	25.00	1	25.00
7	NPN Transistor T1BC547	7.50	2	15.00
8	Rectifier Diode 1N4007	10.00	2	20.00
9	Relay	35.00	1	35.00
10	3x1 Screw Terminals	10.00	1	10.00
11	Push Switch	5.00	1	5.00
12	Green LED	0.00	2	0.00
13	Red LED	0.00	2	0.00
14	10kΩ Resistor	0.00	2	0.00
15	1kΩ Resistor	0.00	2	0.00
16	1.2kΩ Resistor	0.00	1	0.00
17	100µF Capacitor	0.00	1	0.00
18	Connecting Wires	15.00	2	30.00
19	Potentiometer 100kΩ	20.00	1	20.00
20	Soldering Iron	0.00	1	0.00
21	Soldering Wire	0.00	1	0.00
22	Buckets	0.00	2	0.00
		Overall Cost (PKR)		**780.00**

GROUP MEMBERS:

Name	Roll Number
Ammar Bin Amir	19B-004-EE
Maaz Siddiqui	19B-008-EE
Zain Ali	19B-020-EE
Syed Sohaib Shere	19B-024-EE
Khallil Rehman	19B-028-EE

CONCLUSION:

Water is one of the most important basic needs for all living beings. But unfortunately, a huge amount of water is being wasted by uncontrolled usage. Some other automated water level monitoring system is also offered so far but most of the method has some shortness in practice. We tried to overcome these problems and implemented an efficient automated water tank monitoring and control system with digital display. Our intension of this research work was to establish a flexible, economical, easy configurable system and displayable device, which can solve our water losing problem.