# Automatic Water Pumping System with Overflow Control

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*Course : Design and simulation of circuits and embedded systems.*

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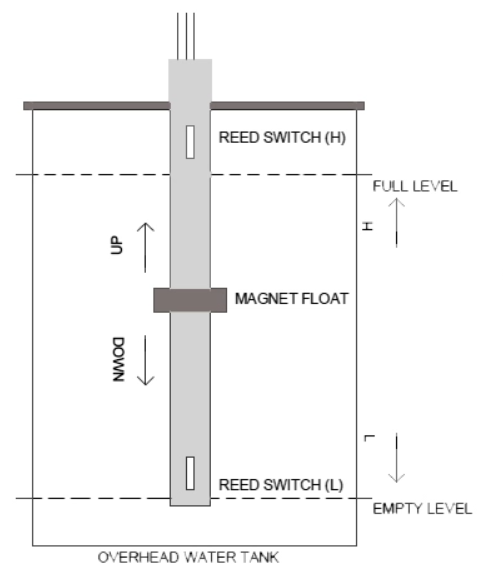
# 1. About automatic Water pumping system with overflow control

## 1.1 Abstract

* In our daily life, we observe lots of wastage of natural resource such as water one of the major area where the wastage of water is seen is overhead tanks at our homes. Whenever the water in the tank gets empty, we switch on the water pump to fill up the tank. Once the water in the tank fills up, it starts to overflow without any indication to us. In addition, we need to manually switch on/off the water pump in a timely manner. So in order to prevent the overflow of the tank and make the whole process of pumping up the water automated an Automatic Water Pumping System with Overflow and Water Level Indicator can be great solution.

## Description

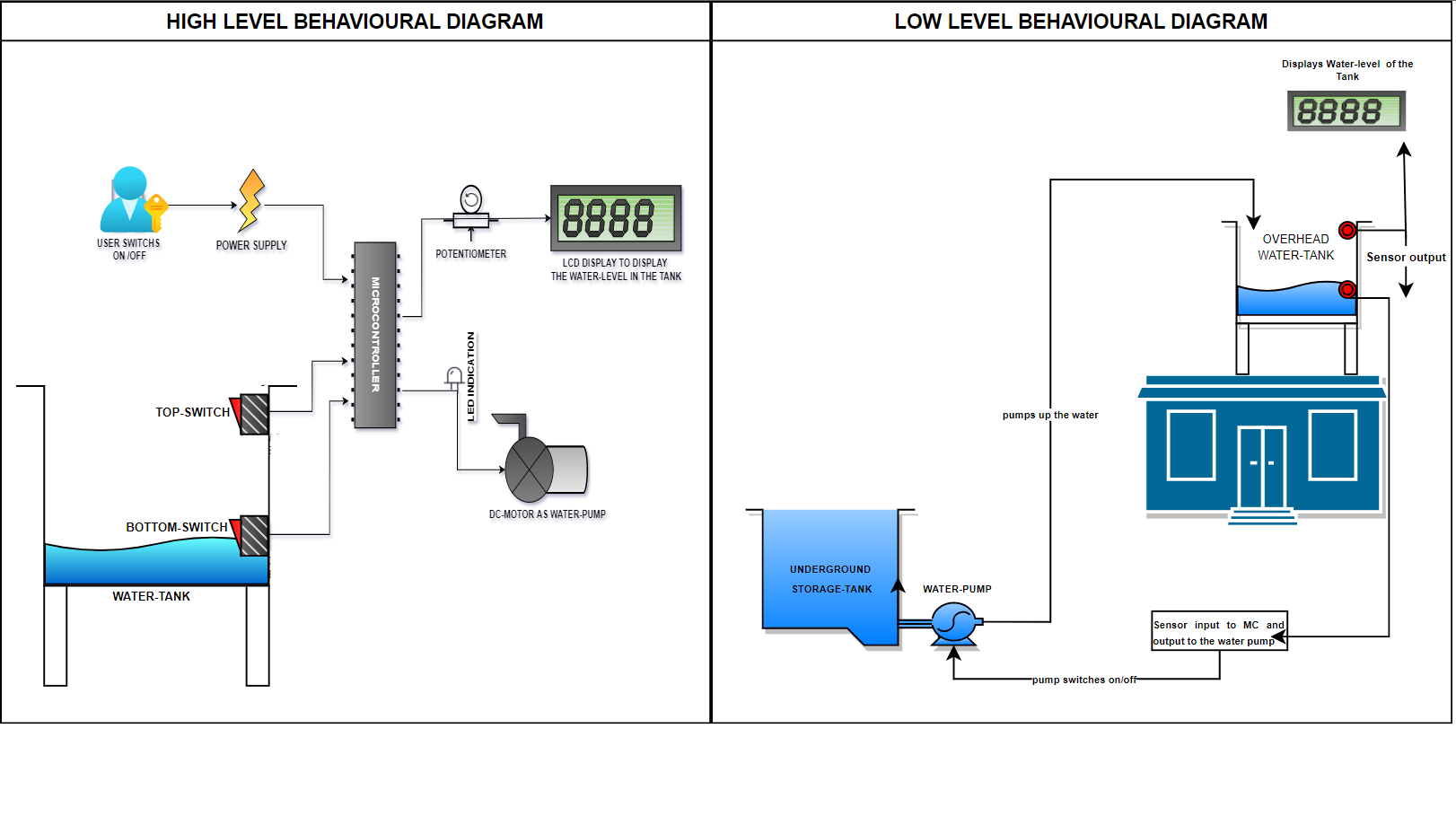
* This automated system has two water level sensor, which is to be attached at top x1 and bottom x1 surface of the water tank, which detects the water level in the tank and switches on/off the water pump and displays the water level. To read the water level of the overhead water tank there are two reed sensors, one for low level (L) and the other for high level (H). A magnetic float switch that activates two reed sensors so that the magnetic float travels from low level (L) to high level (H) and vice-versa according to water level in the water tank. If the L reed sensor triggers its microcontroller input, the water pump is activated with indicator LED on. When H level is reached, ie the H reed sensor triggers its microcontroller input, water pump is deactivated with indicator LED off. Water pump is reactivated only when water drops back to L level.

[](https://user-images.githubusercontent.com/42509490/156889253-3e715b80-4885-4445-9ca1-6a24c87a6dd9.png)

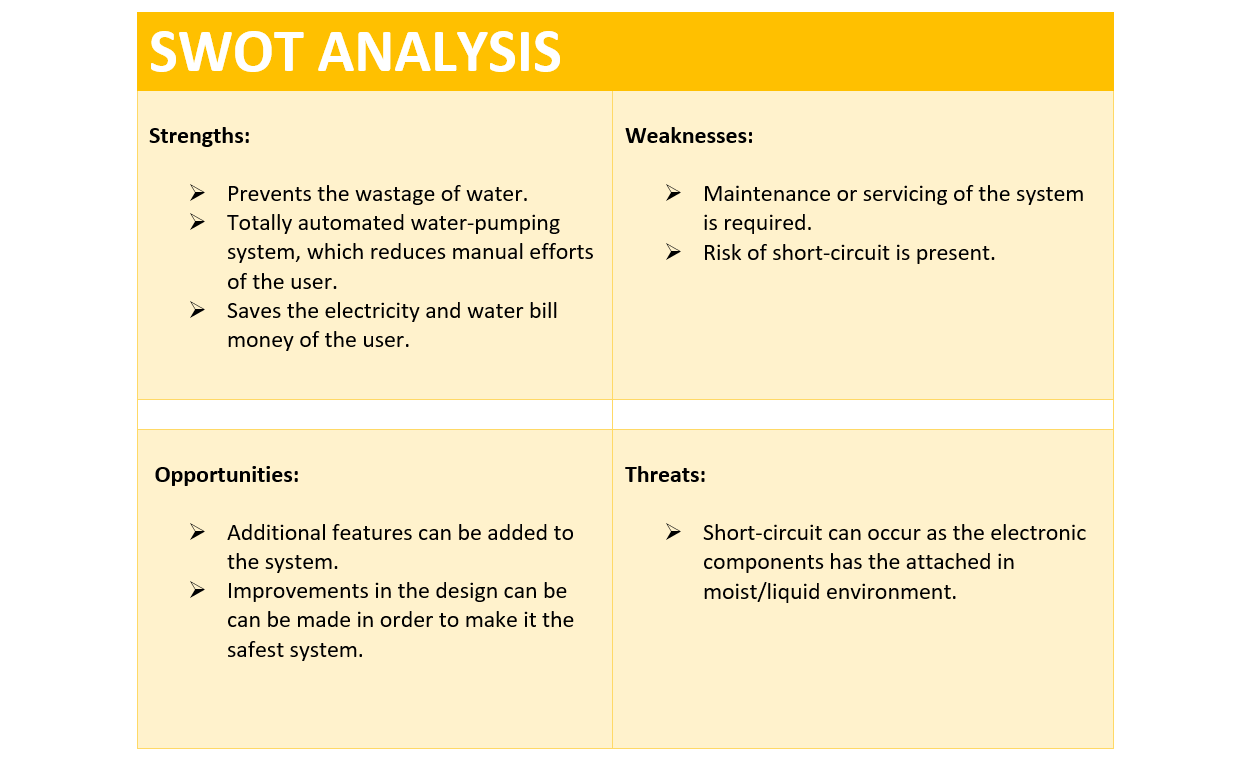
## 1.3 Identifyng features

* It must detect the water level and display the water level.
* It must detect the low water-level and start the water-pump immediately with an indication.
* It must detect the high water-level and stop the water-pump immediately with an indication.

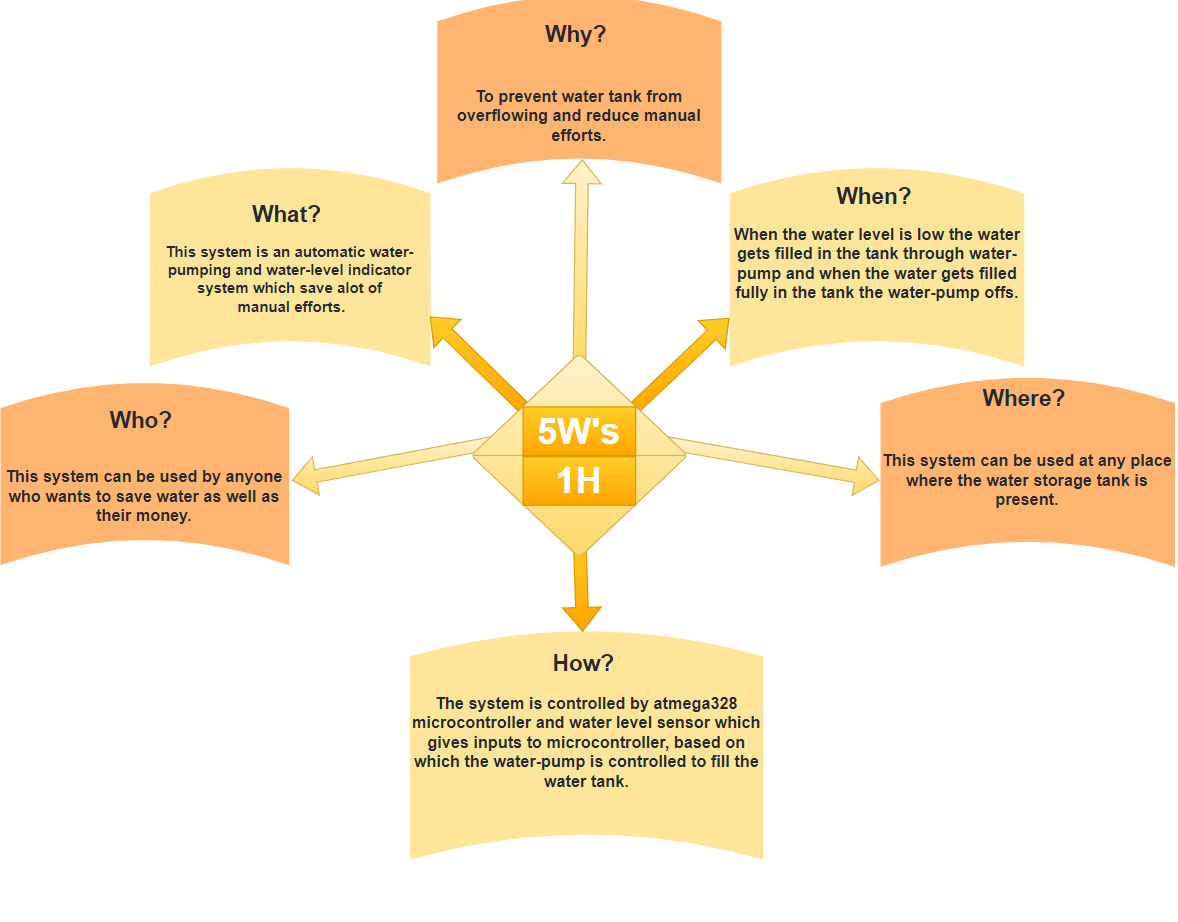
## 1.4 Block Diagram



## 1.5 SWOT analysis

[](https://user-images.githubusercontent.com/42509490/155770217-7c11c6d5-c1c7-49fe-ad25-791606eb5779.png)

## 1.6 5W’s and 1H



# 2. Requirements

## 2.1 High Level Requirements

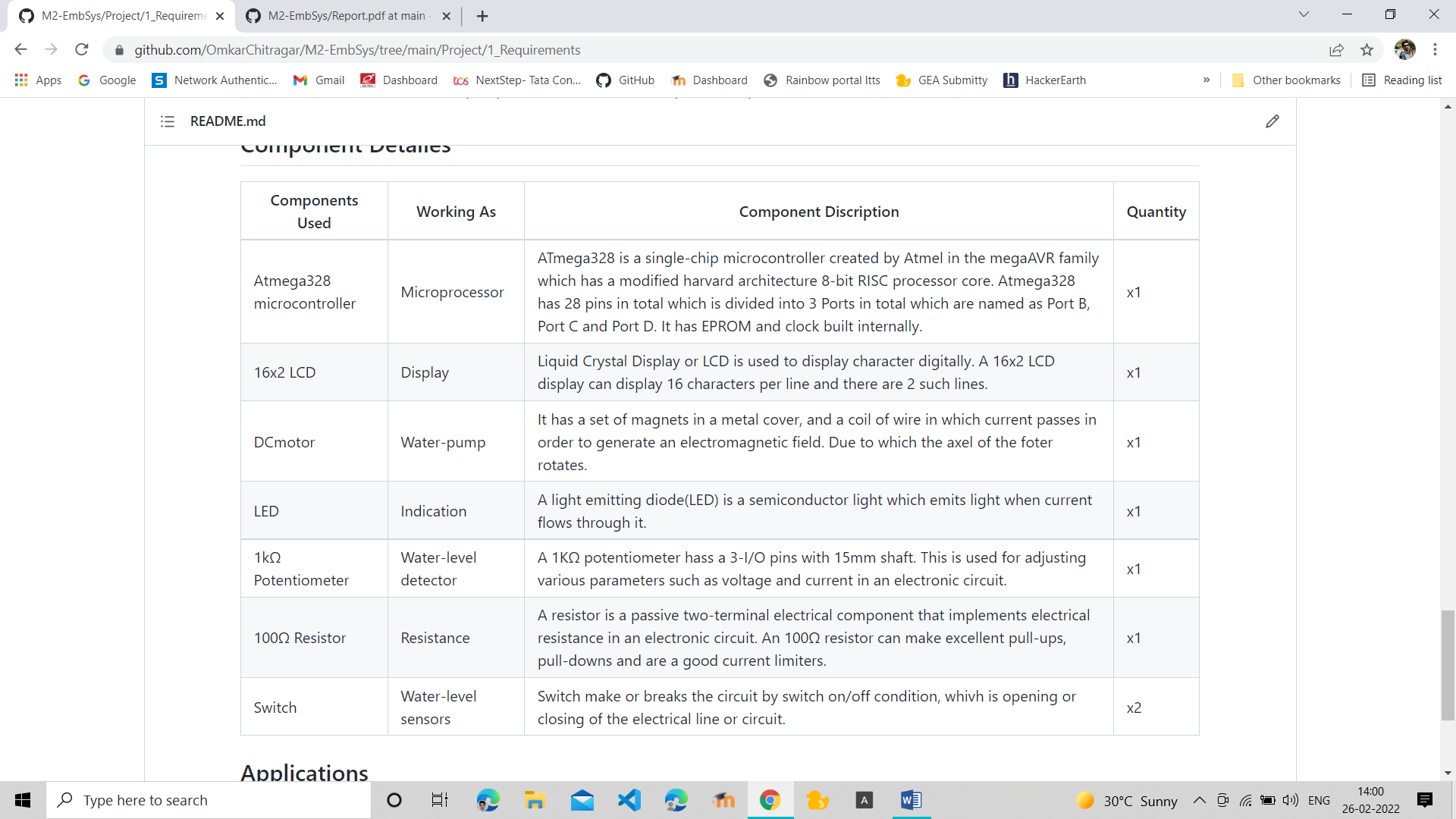
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| --- |

## 2.2 Low Level Requirements

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| --- |
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# 3. component detailes

## 3.1 table of components



|  |
| --- |
| 4. Architecture |
| 4.1 Black Box [Screenshot (228)](https://user-images.githubusercontent.com/42509490/155834819-0c1687c7-6275-4996-bb24-75e96938209d.png) 4.2 Block Diagram  4.3 Behavioural Diagram  4.4 Structural Diagram/ Flowchart  4.5 Best method followed  * The best of the best diagrams are considered. * With the use of all the diagrams code is built. * Low-level and high-level requirements is implemented.  5. circuit design and simulation [Screenshot (270)](https://user-images.githubusercontent.com/42509490/156945816-b9fd09e7-f1f6-4c83-9bc0-3b56b717efa4.png)   * The circuit is designed in Simul-IDE software. * The simulation is carried out using .hex file. * The code for simulation is designed in VS-studio code using Platform.io extension.      * The .hex file was generated after successfully building and running of the code. * The generated .hex file is the loaded in the Atmega328 microcontroller and the simulation was carried out successfully.  6. Test plan and output6.1 High Level test plan  6.2 low Level Test plan  6.3 tESTPLAN OUTPUT IMAGES Displaying the water-level present in the tank in terms of litres based on potentiometer input :  [Screenshot (260)](https://user-images.githubusercontent.com/42509490/156940142-4311cf53-ac34-46e8-90e5-e8f98572b3e1.png)  Switches on the water-pump when both the water-level sensors are open :  [Screenshot (265)](https://user-images.githubusercontent.com/42509490/156939971-4db63506-5411-478d-bb88-d34ab07b1cf9.png)  Switches on the water-pump when bottom sensor is closed and top sensors is open :  [Screenshot (266)](https://user-images.githubusercontent.com/42509490/156940006-7e43caf1-6ed2-477c-842f-60c28ae68d95.png)  Switches off the water-pump when both the water-level sensors are closed :  [Screenshot (268)](https://user-images.githubusercontent.com/42509490/156940026-44b248db-9d3b-46c4-9b53-62685a50a1f6.png) |

# 7. Applications

* This system can be used in overhead water tanks in house.
* This system can be used in offices and industries.
* This system can be used in other liquid tanks such as oil, milk. .etc, other than water.

# 8. learnings

* Learnt to design circuits effectively in simul-IDE software.
* Learnt to code embedded-c in platform.io in visual studio code.
* Conducted researches on case study.

# 9. challenges faced

* Due to limitations of sensors in simul-IDE software it was bit difficult to design a circuit and build code. The challenge was overcome by replacing the water-level sensor with on/off switch and water-level indicator sensor with potentiometer.

Thank You!