## AQua: An Energy-Efficient Water Quality Monitoring and Recording System

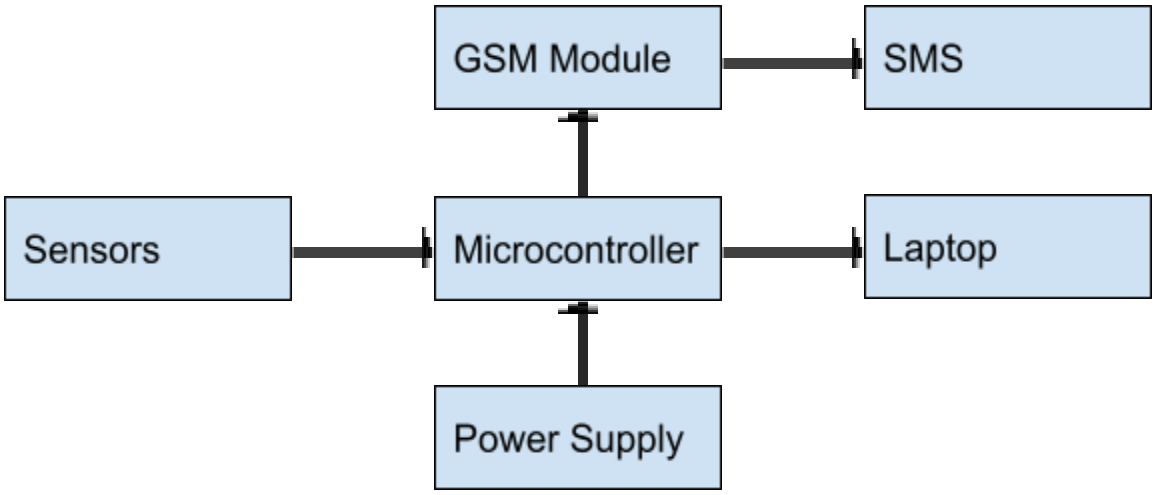


Figure 1. Proposed System Diagram for AQua Device

Figure 1 shows the whole block diagram of the study. The power supply, solar panels, gives power to the Arduino, sensors, and gsm module. The sensors are comprised of the pH sensor, temperature, dissolved oxygen sensor, TDS sensor, oxidation reduction potential sensor and turbidity sensor. Data acquired using the sensors is brought to the microcontroller, which interprets the data. The data, along with an analysis, are recorded to the excel sheet using PLX-DAQ software and then sent to the aquaculturists and local officials through an SMS. A warning message will be sent if the parameters exceed the acceptable levels and if the power supply has a low battery (20%).

## MedPenser: An Arduino-based Over-the-Counter Medicine Dispenser

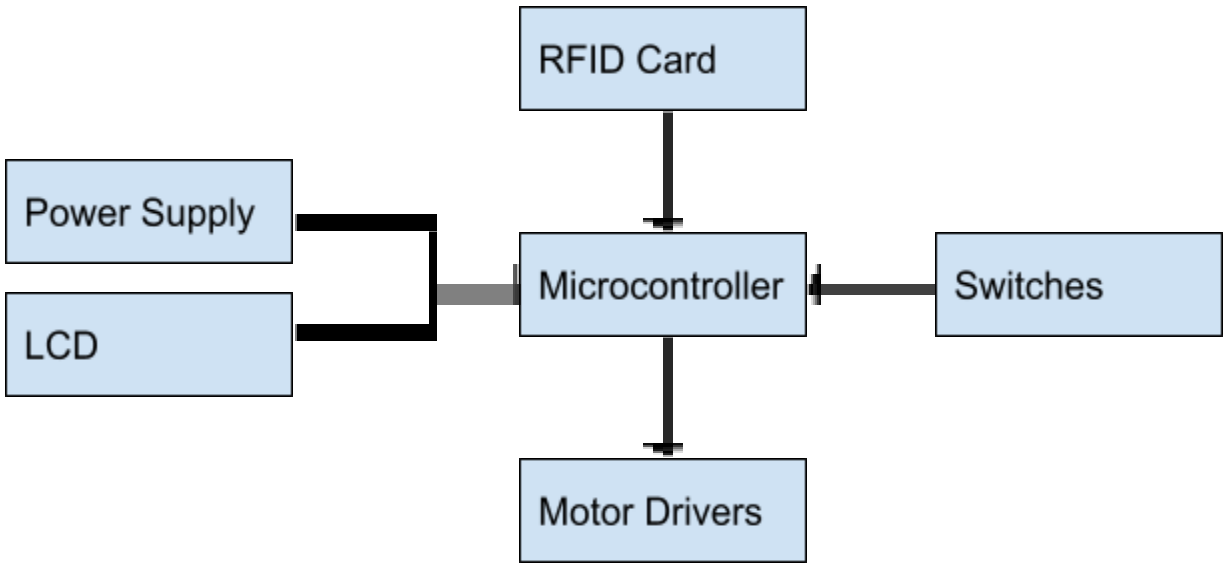


Figure 2. Proposed System Diagram for MedPenser Machine

An RFID Card is used as an input sensor. The user's input through the buttons is then transmitted to the microcontroller for further processing. The microprocessor, in conjunction with the motor drivers, dispenses the medicine that the user needs. The rotation of the motor is controlled by these motor drivers. The spring that is attached to the motor revolves. The medicine then falls and lands at the outlet at the same time. Because no human intervention is necessary, the entire process is automated.

## IoT-based Flood Monitoring and Drainage Management System

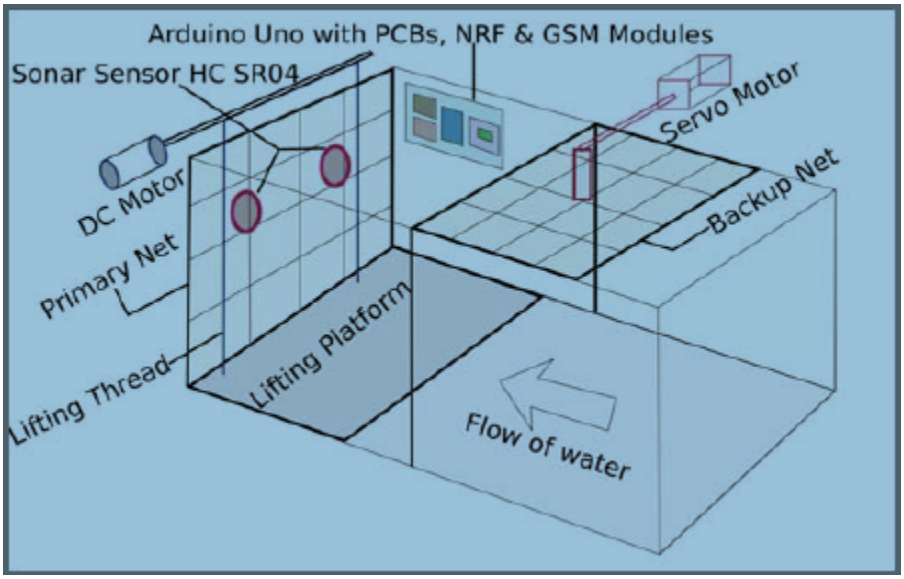


Figure 3. Existing System Diagram for Drainage System

For the drainage system, the device's mechanical body is made up of a primary net for filtering the waste materials that come with the drain water, a lifting platform for storing and removing the waste materials, and a backup net to keep the waste materials from passing through while the lifting platform is busy removing the waste materials that have already accumulated. The principal net is suspended vertically above the ground, with a waterproof ultrasonic sensor attached at the proper height for trash accumulation. The lifting platform is positioned in the ground horizontally, at a 90-degree angle to the primary net. A servo motor is used to connect the backup net horizontally above the ground. The lifting platform is coupled to a pair of lifting threads that are responsible for moving the platform upwards and downwards using a DC motor. Above the ground, an Arduino Uno board with PCBs, an NRF module, and a GSM module work to automate the system.

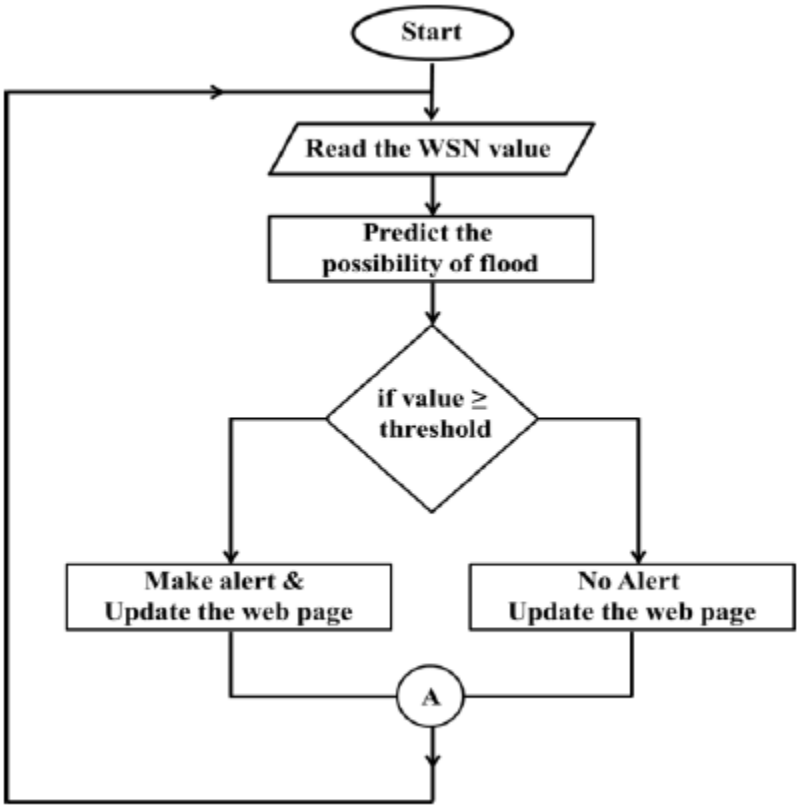


Figure 4. Existing System Diagram for Flood Monitoring

The Arduino Uno controller, which is positioned in the center of the block diagram and regulates all of the system's functions, is the project's heart. All of the actions taking place inside the microcontroller are displayed on an LCD. Figure 3 depicts the existing system's process flow diagram. Wireless sensors are utilized to measure various factors such as temperature (T), humidity level (H), wind speed (W), rainfall (R), and air pressure (R) in this system designed for flood forecasting (P). The microcontroller is connected to all of the sensors, and the state of the sensors is communicated to the control section every three minutes.

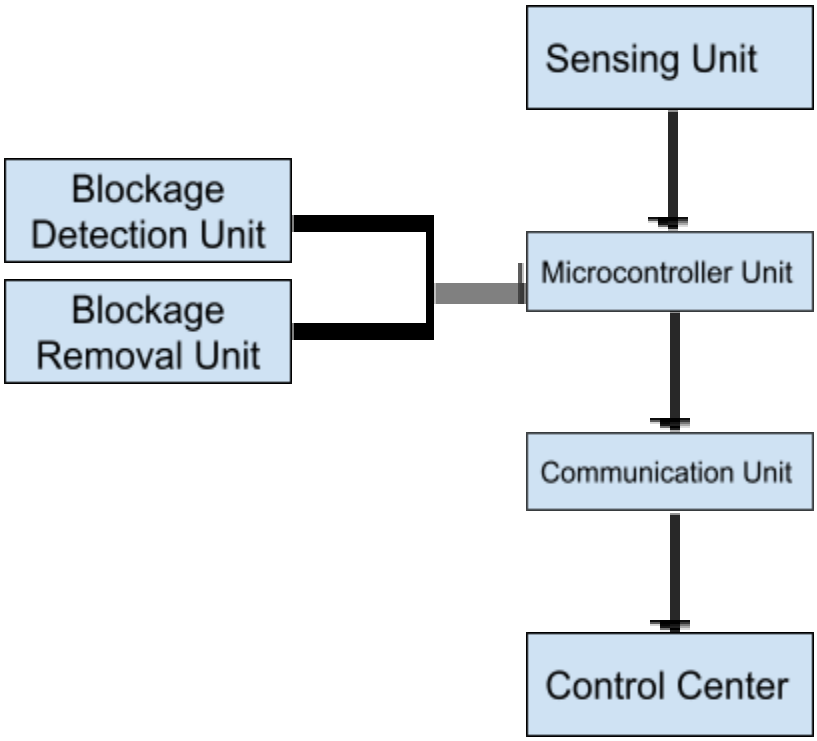


Figure 5. Proposed System Diagram for Flood Monitoring and Drainage Management System

The sensing unit in this system has temperature, rainfall, and humidity sensors, and this unit passes the sensor value to the microcontroller units, which then send the signal to the communication unit based on the threshold value. ESP 8266 is used by the communication unit to update information from internet sources. The values of the parameters that were gathered from the flood monitoring system are locally displayed through the internet. These variables can be utilized as inputs for mathematical models that estimate flood risk. This data can also be combined with data from a sensor node, which examines data such as water level and speed at a specific location, such as drainage, canals,or sewers, to improve the accuracy of the prediction result. This technology uses an IoT-based system though ESP8266 wifi module to monitor and regulate the environment. All of the sensor data values gathered will be posted to the cloud.

The blockage detection system is made up of an Arduino Uno board, an NRF module, an ultrasonic sensor, and a servo motor, as well as their power supplies. The waste water runs via the drain, accumulating the waste elements that come with it in the lifting platform. The ultrasonic sensor is mounted at a threshold height on the primary net and uses pulse-echo techniques to estimate the distance of the item in front of it in virtually real time. The ultrasonic sensor detects the waste obstacle as it piles up and crosses a particular height, triggering the NRF module and the servo motor. The NRF module then sends the blockage data to the blockage removal system, while the servo motor positions the backup net vertically to keep more waste off the lifting platform. The backup net is pulled back to its original horizontal position when the platform removes the waste, reopening the flow stream.

A GSM module and a DC motor make up the blockage removal system. When waste material piles up and crosses a specific height, the blockage detecting circuit gets data from the NRF module. With the help of a lifting thread, the DC motor lifts the platform containing waste materials to ground level and dumps the

garbage into a waste container outside the drain. After the waste has been removed, the lifting platform is returned to its original position. Finally, the GSM module sends a text message to the control center telling them of the removal of a garbage pile.

The city authority's employees work in the control center, which receives the text messages supplied by the GSM module and the cloud. The city corporation's personnel are subsequently notified, and they collect and remove the waste products from the waste receptacle when the flood monitoring system’s value is out of the normal level.