The simulation platform can also be utilized for experiments using physical AR Drones, providing a bridge between simulation and real-world scenarios. By conducting a large number of simulation and physical experiments, it becomes possible to determine optimal parameters for specific search scenarios, including the number of quadcopters and the type of cameras to be used.

In conclusion, our proposed multi-agent search strategy, supported by the experimental setup and simulation platform, offers a practical approach for efficient and effective search operations. By bridging theory and experimentation, our work contributes to the advancement of multi-robotic systems in real-world applications.

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AUTOMATED WATER TREATMENT FACILITIES FOR FISHERY COMPLEX

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Water management in ponds is crucial for various purposes such as aquaculture, irrigation, and environmental conservation. However, manual water pumping and treatment processes can be laborintensive, time-consuming, and prone to errors.

The sensor network consists of input devices, controller, and output devices. This sensor network was used to sense pH, temperature, and turbidity of the water so as to ensure good water quality in order to achieve a healthy environment for the fishes. The block diagram in Figure 1.1 briefly shows these parts.

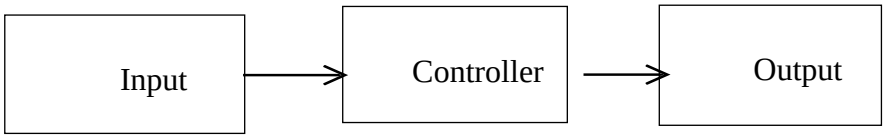

Figure 1.1: Block diagram of the Sensor Network

A wireless actuator was needed to open the vent of the hopper that contains the fish feeds. To achieve this, a DC servo motor was used and it was interfaced with a decoder, 433MHz receiver, and then the Arduino Mega controller.

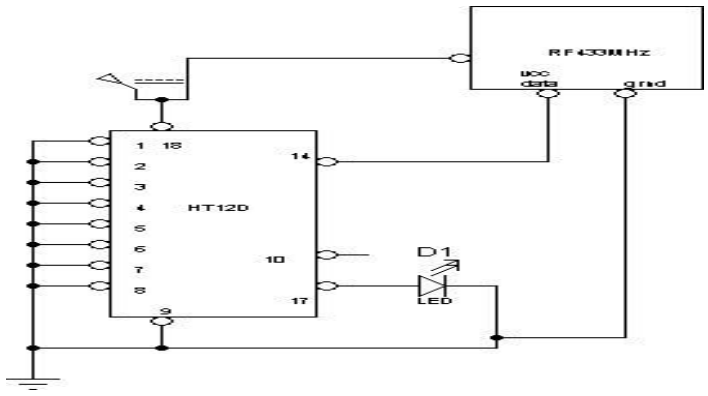

Figure 1.2: Circuit diagram of RF433MHz Module with decoder

The GSM module was used in this system to alert the farmer whenever the pH value of the pond water was out of the set range (6.8 – 8.5). To achieve this, sim800L was used. However, this device requires 4.3V to power it as specified in its data sheet. To achieve this voltage from the 5V generated by the voltage regulators, a diode was used to drop the voltage. Equation shows this.

$$Voltage\ to\ be\ cut\ off = Vcc - voltage\ needed$$
$$= 5 - 4.3$$
$$= 0.7V$$

The system then reads the temperature, pH and turbidity through the various sensors. The system then checks if the pH is out of the set range. If so, it sends an SMS through the GSM module to the farmer. Else, it goes back to read the parameters again.

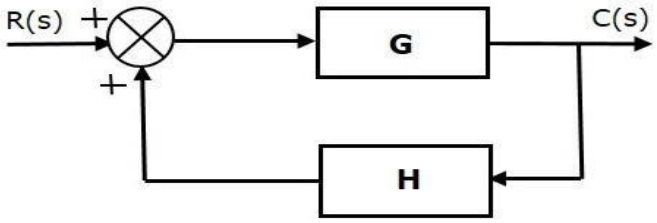

Figure 1.3: Matlab feedback for sensing network in water

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AUTOMATED PROCESS CONTROL SYSTEM MILK PASTEURIZATION

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General Concepts and research motivation methods of pasteurization

Milk can be defined as the lacteal secretion practically free of colostrum. However, the contamination of milk from the udder and teat surface, as well as soil bedding, manure, feed, milking equipment, milk handlers invariably lead to the introduction of psychotropic and mesophilic bacteria at reasonably high numbers. To ensure the increase in shelf life of the bovine milk, thermal treatment with three generic techniques have been evolved in dairy industries.

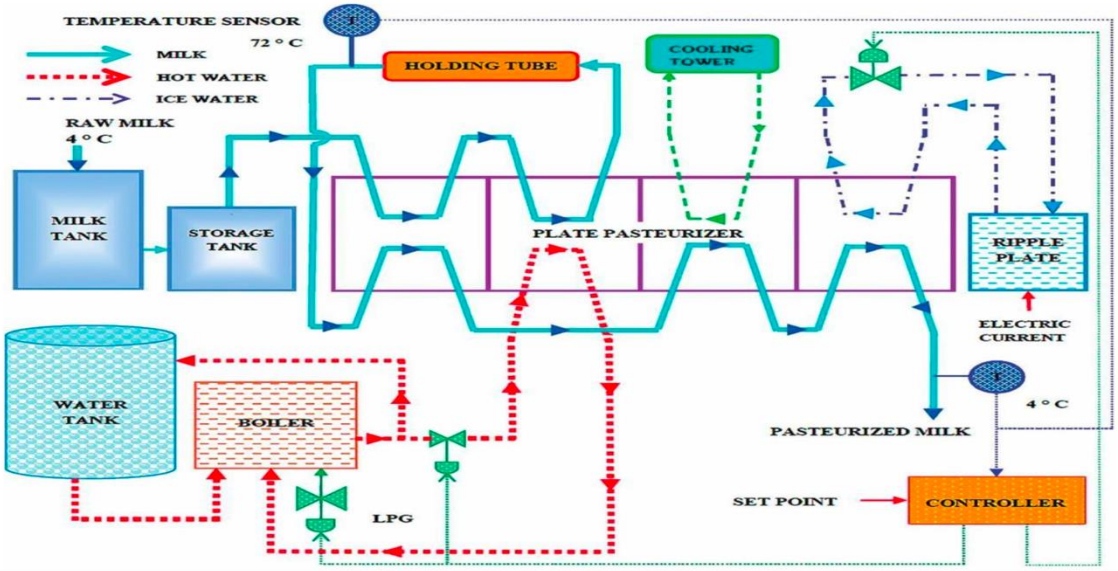

Figure 1 The schematic diagram of the HTST milk pasteurization process

Pasteurization is a nonlinear and multivariable interacting process of heating the raw milk from 6°C to 70°C, holding it for a period of 15 seconds in the holding tube and cooling it down for upto 2-4°C depending upon the setpoint in the controller. It is difficult to control this system by the conventional on–off controllers

$$G_C(s) = K_P + \left(\frac{K_I}{S}\right) + K_D S^{\mu}$$