

Project No: F3065

The design of intelligent fishbowl ——based on the Motorola HC908Q series MCU

Keywords: Feed Fish, Automatic, Water temperature, sensor

Abstract:

This article describes the design of an intelligent fishbowl, which is based on the the Motorola HC908Q series MCU.

The intelligent fishbowl has some new functions which are very useful but havn't been adopted before, such as temperature display and control, automatic feeding. The temperature control makes the fish can exist in any weather, regardless of how cold the weather is. It is convenience for people to protect the fish. Besides it, the device can feed the fish automatic. Many people are busy, laving no time to feed the fish everyday. So this function can solve the problem. You can even set the times that feed the fish in one day time. The device also has color lights to beautify the circumstance.

This device is composed of temperature sensor, heater, HC908Q MCU, LED display, setting key and feed trough. It also has color light, music and some other circuit to make the fishbowl more lively. The system has a great future because of its' easy principle, simple structure, low cost and wildly demand.

The whole device is controlled by a piece of MCU-- motorola MC68HC908 QT2, which has 16 pins. It makes use of the source of the MCU sufficiently. Many modules in MCU are used,including Time interface module,Anolog-to-Digital Converter, keyboard interrupt module,oscillator module and so on. The IO ports are also fully used. The function of automatic feeding is achieved by the timer1,which is contained in the MCU. And the temperature control is mainly accomplish by the AD module in the MCU. The temperature sensor collects the temperature information and sends it the MCU. Then decide whether the temperature is fit for fish. If not, the heater will heat the water automatic, until the temperature is higher than the setting value.

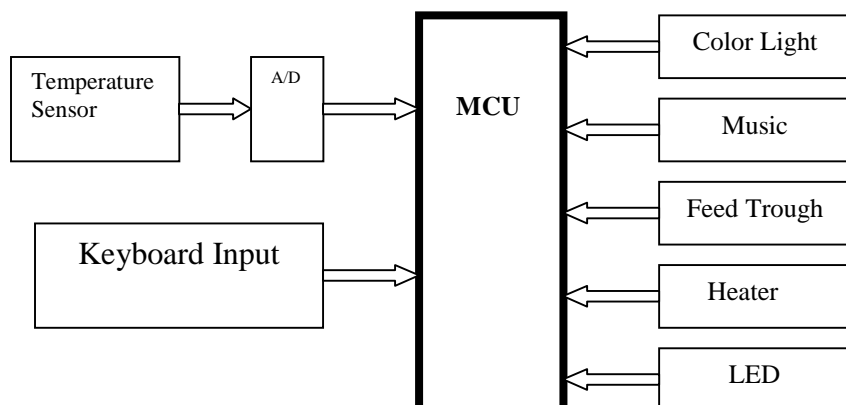
All the functions are operated by the software. The program is composed by three main part: the Initialization part,work mode setting part ,feeding and temperature display part. The program is written in c language.

The summary of the design:

Adopt MOTOROLA MC68HC908 QT2 MCU to control the system, temperature sensor AD590 to check the water temperature. Additional operate-amplifier change the temperature to voltage which will be dealt with by MCU then.

Hardware description:

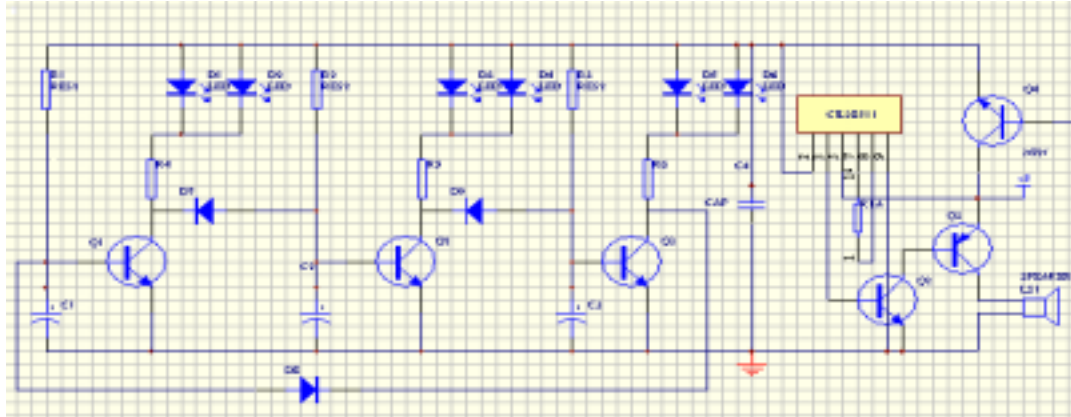
The whole part of hardware is composed of a MCU and some peripheral circuit. All the peripheral circuit can be debugged easily, for each of them is independent. MCU compares the temperature we set with the data collected from the sensor timed, and will drive the heater to heat up the water when the temperature is lower then the data, or stop the heater when higher. For this, MCU can keep the water in a certain temperature. At the same time, the LED will display the temperature. In the control of MCU, the feed trough feed fish in a certain method setup by the keyboard; moreover, the color light and the music make the whole system more interesting. The block diagram of system is shown as Figure 1,



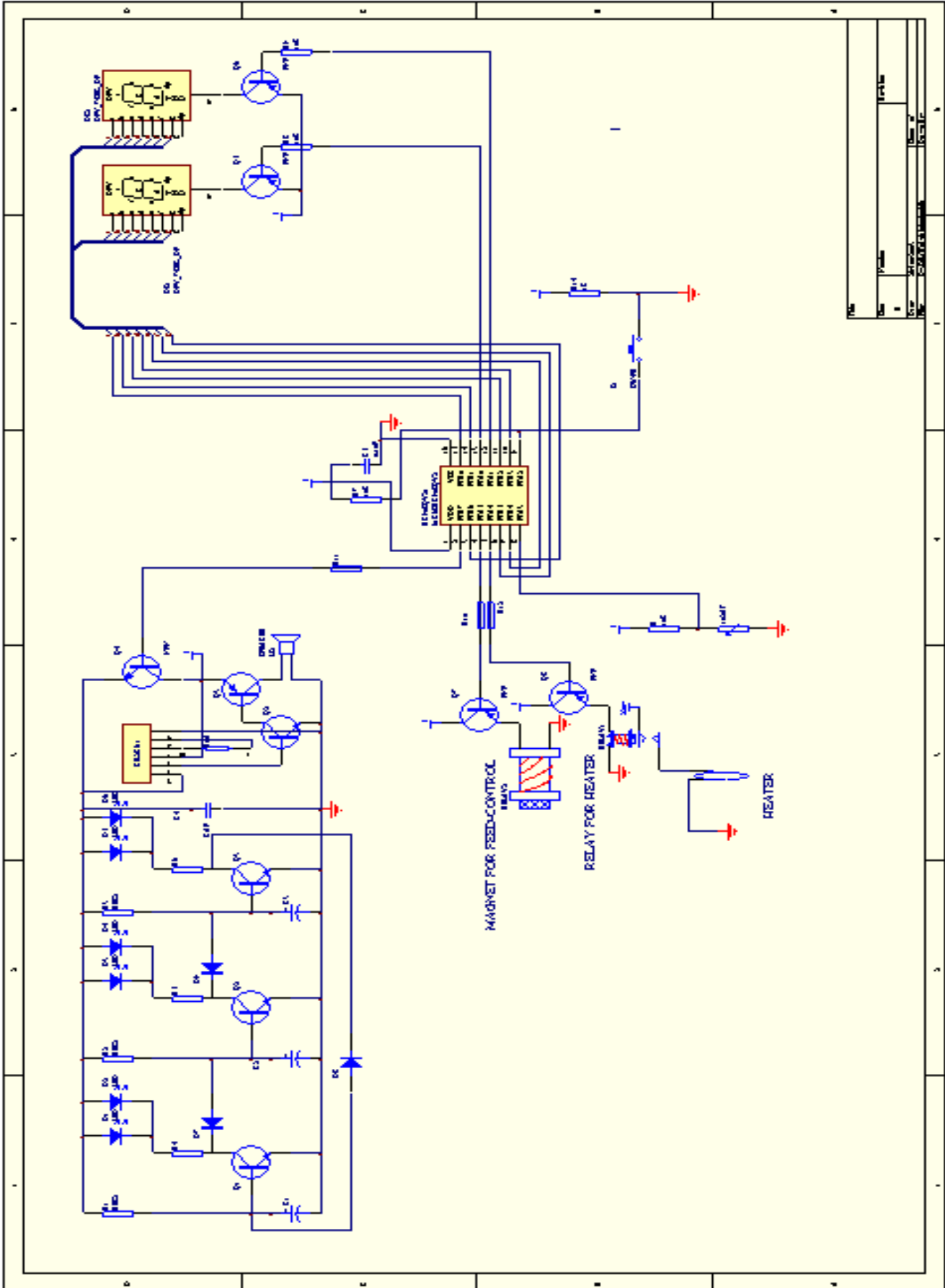
The block diagram of system

The color light circuit

This part uses a flowing-light circuit. When the MCU sends the control signal, the lights will flash. It uses diodes, transistors and an IC-CIL28511 to compose the circuit. The circuit is as the figure 4 shows.



The whole system circuit:



Rev	1	Y	1
Rev	2	Y	1
Rev	3	Y	1
Rev	4	Y	1
Rev	5	Y	1
Rev	6	Y	1
Rev	7	Y	1
Rev	8	Y	1
Rev	9	Y	1
Rev	10	Y	1
Rev	11	Y	1
Rev	12	Y	1
Rev	13	Y	1
Rev	14	Y	1
Rev	15	Y	1
Rev	16	Y	1
Rev	17	Y	1
Rev	18	Y	1
Rev	19	Y	1
Rev	20	Y	1
Rev	21	Y	1
Rev	22	Y	1
Rev	23	Y	1
Rev	24	Y	1
Rev	25	Y	1
Rev	26	Y	1
Rev	27	Y	1
Rev	28	Y	1
Rev	29	Y	1
Rev	30	Y	1
Rev	31	Y	1
Rev	32	Y	1
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Rev	36	Y	1
Rev	37	Y	1
Rev	38	Y	1
Rev	39	Y	1
Rev	40	Y	1
Rev	41	Y	1
Rev	42	Y	1
Rev	43	Y	1
Rev	44	Y	1
Rev	45	Y	1
Rev	46	Y	1
Rev	47	Y	1
Rev	48	Y	1
Rev	49	Y	1
Rev	50	Y	1
Rev	51	Y	1
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Rev	69	Y	1
Rev	70	Y	1
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Rev	92	Y	1
Rev	93	Y	1
Rev	94	Y	1
Rev	95	Y	1
Rev	96	Y	1
Rev	97	Y	1
Rev	98	Y	1
Rev	99	Y	1
Rev	100	Y	1