International Journal of Multidisciplinary Engineering in Current Research - IJMEC
Volume 8, Issue 11, November-2023, http://ijmec.com/, ISSN: 2456-4265

AUTOMATIC DAM GATE CONTROL SYSTEM WITH CAUTION ALARM

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Abstract: Water level in a dam needs to be maintained effectively to avoid complications. This is generally performed manually which requires full time supervision by the operators & have fairly large staff complements. Moreover, the quantity of water released is hardly ever correct resulting in wastage of water & it is impossible for a man to precisely control the gates without the knowledge of exact water level and water inflow rate. The main objective of this project is to develop a mechatronics based system, which will detect the level of water and estimate the water inflow rate in a dam and thereby control the movement of gates automatically in a real-time basis which offers more flexibility. This system consists of a set of sensors connected to AC/DC motor through a microcontroller. This microcontroller operates the relay and switches the AC motor ON/OFF depending on the level of water.. The water level and rate of inflow is detected based on the feedback from the sensors used. Based on this data, the water level of dam gate can be automatically controlled using an AC motor. This project uses two power supplies, one is regulated 5V for modules and other one for Arduino. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

1. INTRODUCTION

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player, DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement. The embedded software is also called “firm ware”. The desktop/laptop computer is a general purpose computer. You can use it for a variety of applications such as playing games, *word* processing, accounting, software development and so on. In contrast, the software in the embedded systems is always fixed listed below:

· Embedded systems do a very specific task, they cannot be programmed to do different things. . Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe-loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems operate through a battery, the power consumption has to be very low.

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/11.2023-14759541

· Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.

2. LITERATURE REVIEW

[1] proposes a dam monitoring system which takes safety and water management as parameters describing those as extremely important both conditions like water scarcity and excess of water , basic idea of that project describes the IoT in Dam water management and system concentrates storing and retrieving the information from and to the cloud , it employs vibration sensor and ultrasonic sensor to find abnormal changes in the dam and reports the same. [2] gives an outline for development of an information system based on the existing systems with utilization of sensors and IoT, it also proposes an idea of collecting and sharing real-time information about the water levels to administrator of the dam, based on the data administrator could take a call to open or close the gates. [3] Based on ASP.NET technology, this paper puts forward a design idea of integrated monitoring platform for water and builds the overall architecture of water monitoring platform, and realizes the whole architecture of water monitoring platform. A reservoir dam monitoring platform has been designed in this project to enhance emergency response capability. The system includes Web management system, data acquisition system and database.[4], the project proposes a basic idea is to describe possibilities of IoT applications in Dam Safety and water management. Here the entire dam and the main pipeline is sensed 24x7 through various sensors. The wireless sensor nodes connected with each other and transmits the data to a gateway. Common storage space as a database stores and provides on line information to the observer.[5] gives an idea for the implementation of an information system based on the traditional systems with the utilization of some sensors and IoT. In this paper they have introduced an automatic system where the dam water level is raised above a threshold value, messages will be send to the mobile numbers [6] focus on to reduce the problems faced by Dam authorities of manual operation of gates ,concept of this system is to develop a web portal which will monitor and give authentic time parameters related to Dam and weather conditions like water level, rain fall, gate position, temperature, humidity etc. This system proposes a GUI Software which will provide two types of facility for operating of the software i.e. Autopilot mode and Manual data mode. At back end of the software it takes parameter information from the related sensors then loaded to database, The database is then retrieved on web-portal and further decision making based on data could be taken by authorities.

3. OBJECTIVES

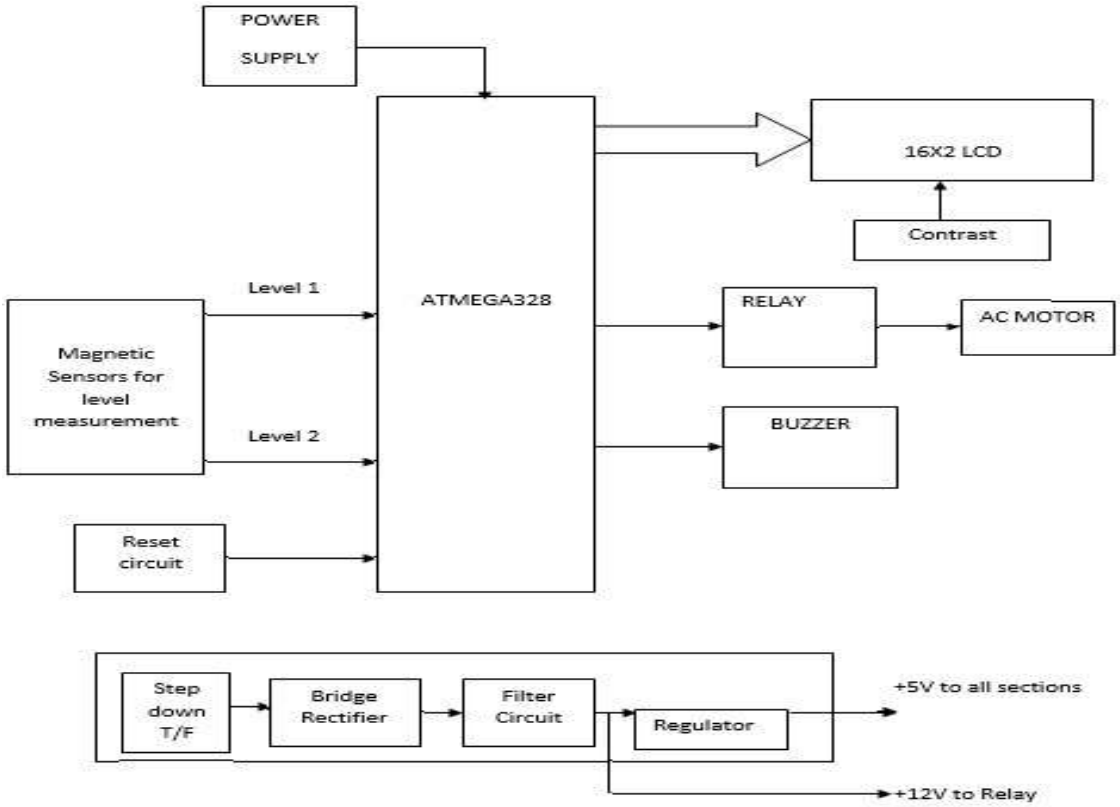
To control the operation of releasing the water of Dam gate using the microcontroller and to design it using AC motor.

4. METHODOLOGY

This is a simple project which is easy to build and also cheap, as all the parts are readily available on the market. With average background in engineering the model can be made easily and can be implemented.

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/11.2023-14759541



Hardware Description

ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

The board has the following new features:

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

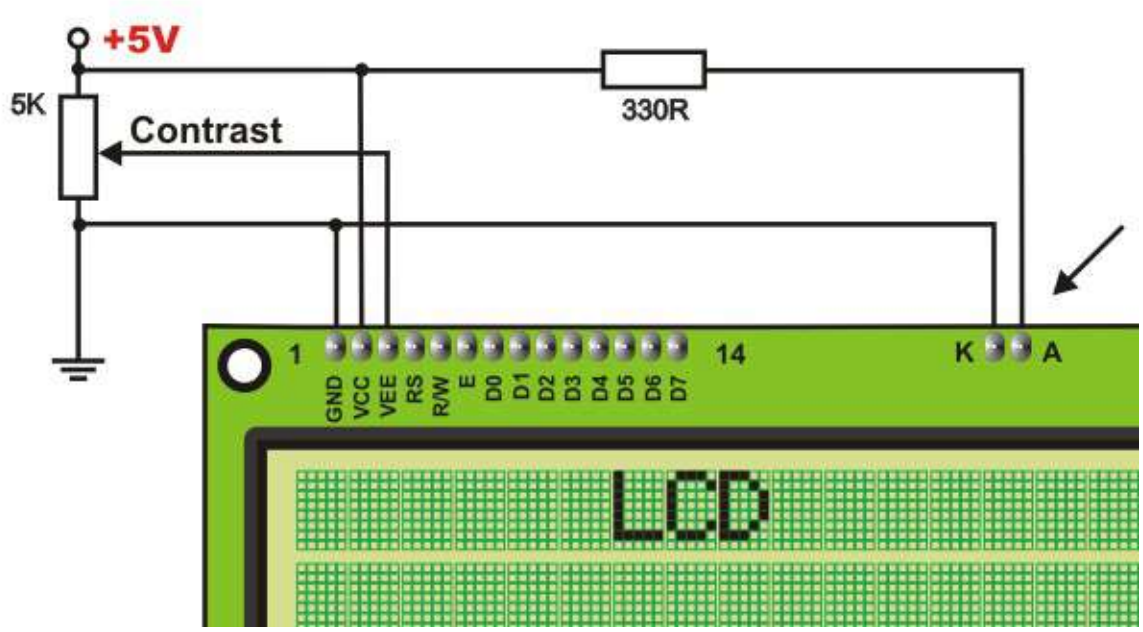
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards,

and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

LCD screen:

LCD screen consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-Vdd is applied on pin marked as Vee. Trimmer potentiometer is usually used for that purpose. Some versions of displays have built in backlight (blue or green diodes). When used during operating, a resistor for current limitation should be used (like with any LE diode).



RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays were used extensively in telephone exchanges and early computers to perform logical operations.A type of relay that can handle the high power required to directly drive an electric motor is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overloadfaults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

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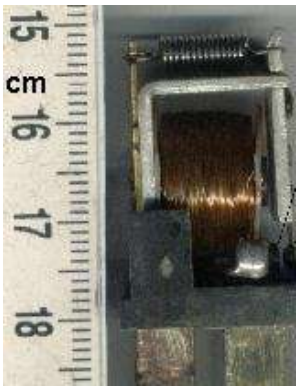

Fig : Automotive-style miniature relay, dust cover is taken off

5. SOFTWARE TOOLS

Arduino software

The Arduino Uno can be programmed with the Arduino software. Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board).For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preburned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).We can also bypass the boot loader and programs the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with a DFU boot loader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, an .information file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes aWire library to simplify use of the I2C bus.

6. CONCLUSION:

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/11.2023-14759541

In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of Automatic Dam Gate Control system with Caution Alarm. The micro controller is used for controlling the water levels without the aid of any manpower. LCD would display the corresponding three levels when the corresponding switch is connected. In a nutshell, the project is based on two levels one is overflow and another is falling level. In the overflow level, whenever the water level reaches to overflow level, the buzzer generates the alarm.

FUTURE WORK

RF modem can be used for applications that need two way wireless data transmission. It features high data rate (adjustable baud rate) and longer transmission distance. The communication protocol is self-controlled and completely transparent to user interface. The module can be embedded to your current design so that wireless communication can be set up easily. This module works in half-duplex mode. Means it can either transmit or receive but not both at same time. After each transmission, module will be switched to receiver mode automatically. The LED for TX and RX indicates whether IC is currently receiving or transmitting data. The data sent is checked for CRC error if any. If chip is transmitting and any data is input to transmit, it will be kept in buffer for next transmission cycle. It has internal 64 bytes of buffer for incoming data.

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