

Coin Operated Water Dispenser

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Abstract - This paper presents the description of Coin Operated Water Dispenser. The water dispensing machine dispenses water on the detection of the right coin (correct denomination). The dispenser is designed using Atmega controller. It can be used in public places like Roads, Railway stations, shopping Malls etc. It can prove to be of great use and comfort for people.

Key Words: Microcontroller, LCD, Water pump, Coin Sensor, IR Sensor

1. INTRODUCTION

With the advancement of technology the 'Coin Operated Water Dispenser' provides comfort and it fits well for its users in the era of modernization.

Regulated power supply is designed to provide system with constant supply of 5 volts. The dispenser will dispense water only when the correct coin is inserted as well as with the placement of glass below the nozzle. The correctness of coin is detected by the coin sensor and the object detection is done by an IR sensor. If both the conditions are satisfied then a signal is given to the microcontroller and accordingly water pump gets activated and water will be dispensed.

1.1 Block Diagram

The block diagram for Coin operated water dispenser is shown in fig.1:

The first three blocks- transformer, rectifier and regulator are used for getting a regulated power supply. The four blocks- Display, water pump, IR sensor, Coin sensor are interfaced with Arduino/ATmega328.

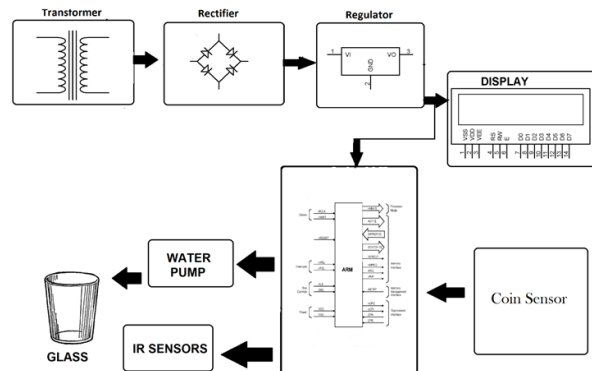


Fig -1: Block diagram

1.2 Hardware and Software Description

- a. Arduino/ATmega 328
- b. Transformer
- c. Rectifier
- d. Regulator
- e. IR Sensor
- f. LCD
- g. Coin sensor
- h. Water pump
- i. C language programming in arduino

Arduino/ATmega 328

ATmega 328 is a single chip microcontroller created by Atmel in the mega AVR family. It is a RISC based microcontroller that has 32 KB ISP flash memory. This chip is implemented on the popular platform called as Arduino development platform, Arduino Uno or Nano models. ATmega 328 of Atmel is an 8 bit processor in 28 pin DIP package. It works on 5 volts power supply. It has 14 digital input/output pins and 6 analog inputs. ATmega 328 has 2 KB of SRAM and 1KB of EEPROM. Arduino can be powered via USB connection. The 14 digital pins on UNO can be used as input and output pins using 'Pin Mode()', 'digital Write()', and digital Read() functions. The 6 analog inputs are labeled from A0 to A5. A reset pin is there to reset the microcontroller. It provides UART serial communication with computer.

Arduino with ATmega 328 is shown in the figure below. Connections and pin configuration can be clearly understood by the picture.

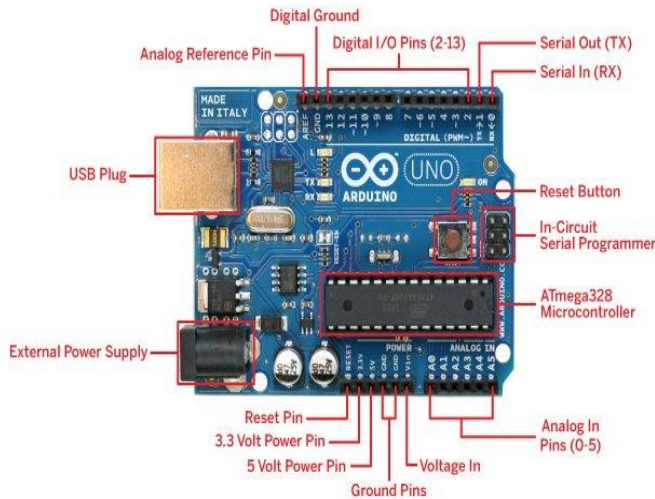


Fig -2: Arduino pin description

Transformer

It is one of the components used for obtaining the regulated power supply. It is based on the principle of electromagnetic induction. It has primary and a secondary coil, primary is connected to the main power supply and secondary is connected to the circuit .So a step down transformer of 12 volts is used.

Rectifier

It is used to convert alternating current to direct current. Bridge rectifier which consists of four diodes is used. On one side AC voltage is given and the rectified DC output is obtained on the other side.

Regulator

Voltage regulator is used to get a constant voltage level. IC 7805 is used as a voltage regulator. It is a member of fixed series of 78xx linear voltage regulator. It is used to maintain a regulated voltage of 5V DC.

IR Sensor

An infrared sensor is an electronic device that emits in order to sense an object in its path. IR sensor is the combination of IR LED and an IR photodiode. IR LED is the emitter and the photodiode is the detector. IR photodiode is sensitive to IR light of same wavelength as emitted by the IR LED. IR sensor is used in the water dispenser to check whether the glass is placed or not.

Whenever the glass is placed below the nozzle or in front of an IR sensor, then the light emitted by IR LED will fall on the glass(it acts like an object.) and the reflected light will be detected by the photodiode. A signal is sent to the controller which consequently drives the water pump.

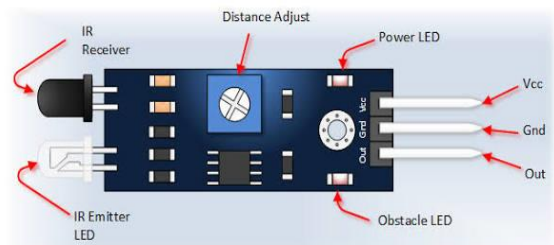


Fig -3: IR Sensor

LCD

A liquid crystal display is the user interface which is a thin panel that can either let light go through it or can block it. There are total 16 pins with which it can be interfaced with Arduino/ATmega328. Command is given to the LCD through controller and accordingly it displays.

Coin Sensor

Coin sensor is the device which is used to detect the correct coin (for which it is programmed). Coin sensor module is separately programmed for a single coin. It is connected to Arduino through pin 2. When the correct coin is detected, it passes the signal to the controller (that the correct coin is accepted). The command is given to the LCD and it displays "correct coin" ..

When both the conditions are satisfied (coin is correct and the glass is present) then the water will be pumped out.



Fig -4: Coin Sensor

Water pump

Pumping of water is done by a device called DC submersible water pump. It moves water by mechanical action. Rotary or reciprocating mechanism is basically involved in its operation. It operates on DC power supply of 12 volts.

Water pump can be driven with the help of a transistor. Controller passes the signal to the water pump to start its operation when the two conditions are satisfied(glass is present and coin is detected).

Software Description

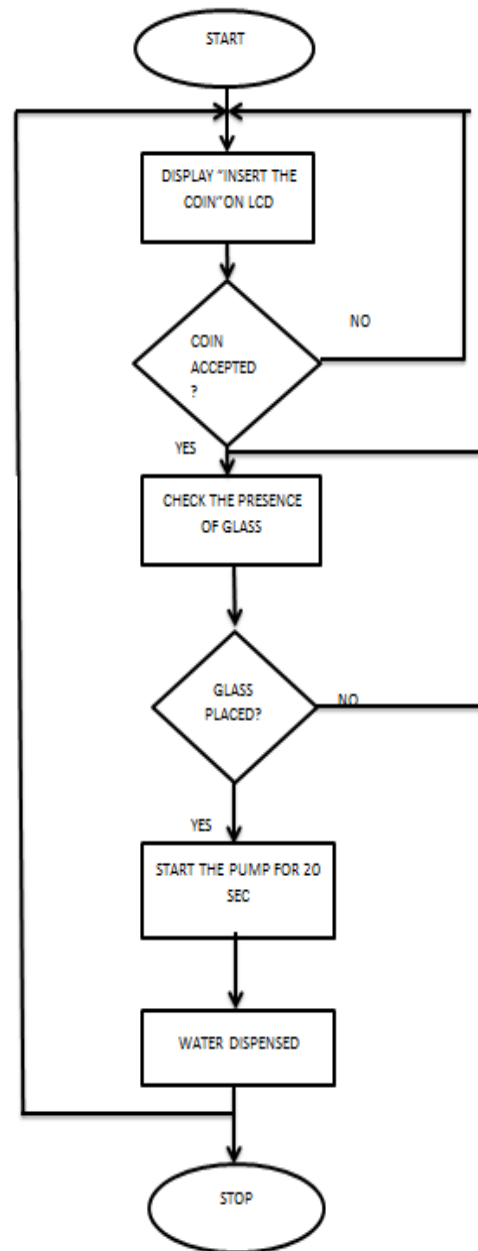
The programming is done on Arduino with the help of Arduino integrated development environment called as arduino software(IDE).

SR. No.	Requirement	Specification
1.	Power supply	5 volts
2.	Coin sensor	12 volts
3.	IR sensor	5 volts
4.	Water pump	5 volts
5.	Dispensing duration	Less than 25 seconds
6.	Software	Arduino IDE

Table -1: Hardware Specifications

2. WORKING

Coin operated water dispenser works on the principle of detection and dispensing water. The four interfacing units (IR Sensor, LCD, Water Pump, Coin Sensor) are separately programmed in Arduino IDE .Program is executed in a sequence . The coin sensor has four colored wires- white, Black, Red and Grey .White colored wire is connected to Arduino board pin no. 2 , red and black wire is connected to Vcc and Ground respectively. Coin sensor is a single coin acceptor, so it is programmed for a single coin. When the coin inserted is correct the program jumps to check for the presence of an object(here it is a glass). IR sensor has a separate driver circuit where a LED is connected at the output , When the object is placed in its path , the LED starts glowing which indicates that the output at this state is positive(glass is present) .Indication is given to a water pump and it starts pumping out water.



3. CONCLUSIONS

This research paper introduces a water dispensing machine which operates on coin. Various devices like a regulated power supply, IR sensor, coin sensor water pump etc., are embodied to design an efficient dispensing system.

The system can be programed for different types of coin (also for more than one coin with the help of multi coin acceptor) and for certain duration with the help of algorithm and programming in Arduino. The dispenser can be installed on roads (highways), railway stations and other public places to provide water to people at low cost.

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REFERENCES

- [1] Grierson, Philip, Numismatics, Oxford: Oxford University Press, M.Banzi Getting Started with arduinoP.Pradeepa, T. Sudhalavanya, K. Suganthi, N. Suganthi, M. Menagadevi [2013], "Design and Implementation of vending machine using Verilog HDL", International Journal of Advanced Engineering Technology.
- [2] Arduino Microcontroller processing for everyone,Morgan and claypool by steven Barrett,
- [3] .
- [4] R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.
- [5] K. Elissa, "Title of paper if known," unpublished.