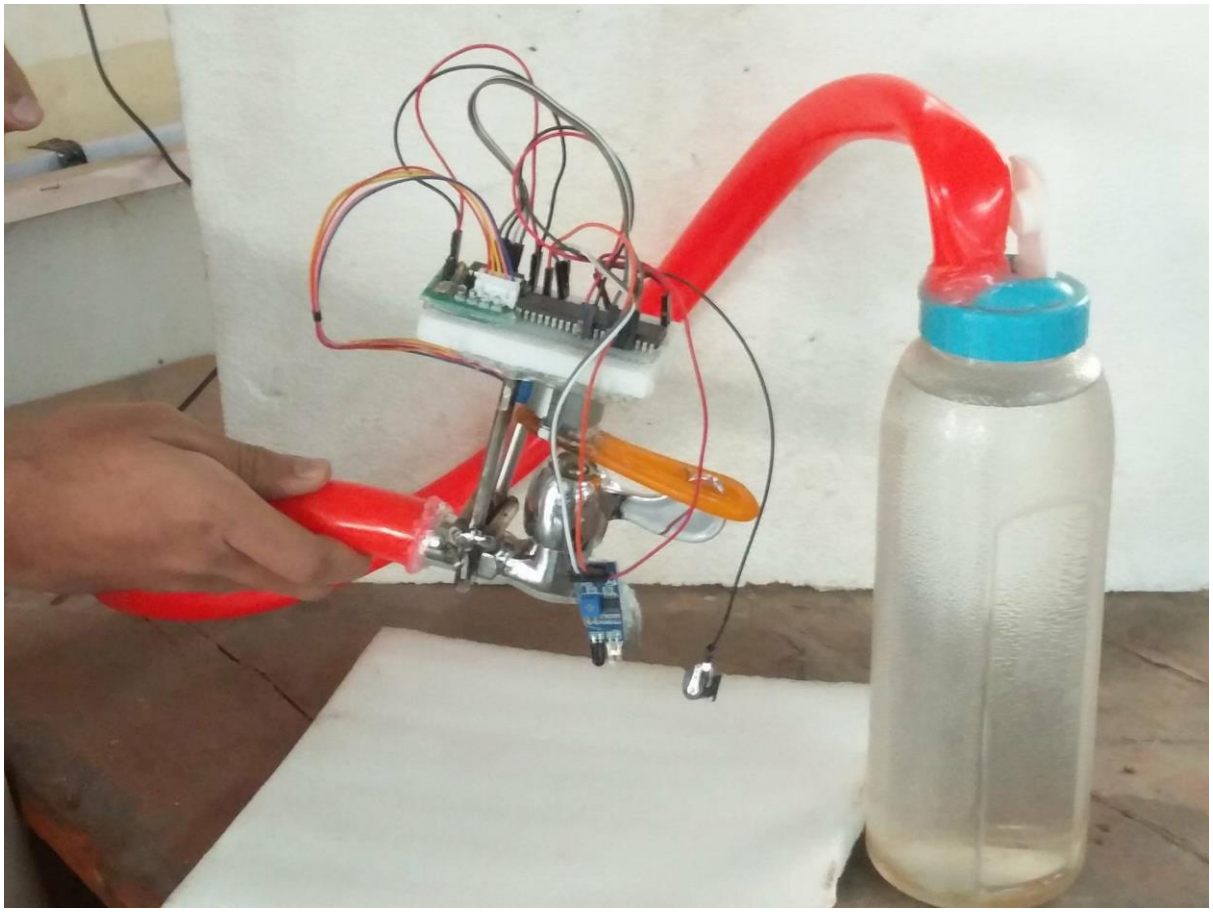
CSE 316

Microprocessor and Microcontroller Sessional

AUTOMATIC WATER TAP USING IR SENSOR

SHAHRIAR AHMED ASHRAFI (1405047)

MUNIF MUTASIM (1405058)



Introduction:

This is a sensor controlled water tap, where a sensor detects any obstacle in a certain range. An ATmega32 microcontroller has been interfaced with IR sensor and stepper motor. In presence of any obstacle, sensor notifies ATmega32 and it consequently command the motor to turn on the tap. In absence of obstacle, sensor notifies ATmega32 and it then command the motor to turn off the tap.

Hardwire Requirements:

Product Name	Price (Taka)
ATmega32 Microcontroller	170/=
USB ASP Burner	300/=
FC-51 IR Obstacle Sensor	80/=
28BYJ-48 5V Stepper Motor	250/=
ULN2003 Motor Driver	
Wire	120/=
5V 1A Supply	70/=
Power Jack to DC Port	10/=
Water Tap	150/=

Software Requirements:

1. ATmel Studio 7 (to compile .c code and build .hex file)
2. eXtreme Burner - AVR (to load .hex file onto ATmega32)
3. Proteus 8 Professional (for circuit design)

Flow Chart:

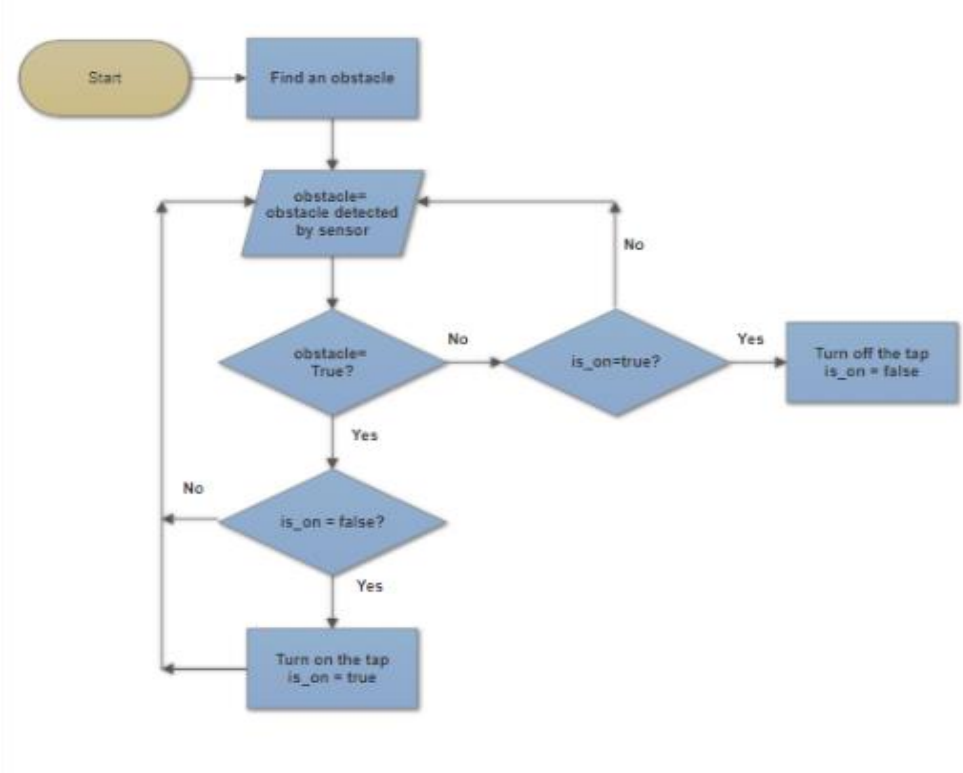


Fig: Flow Chart of working flow

Circuit Diagram:

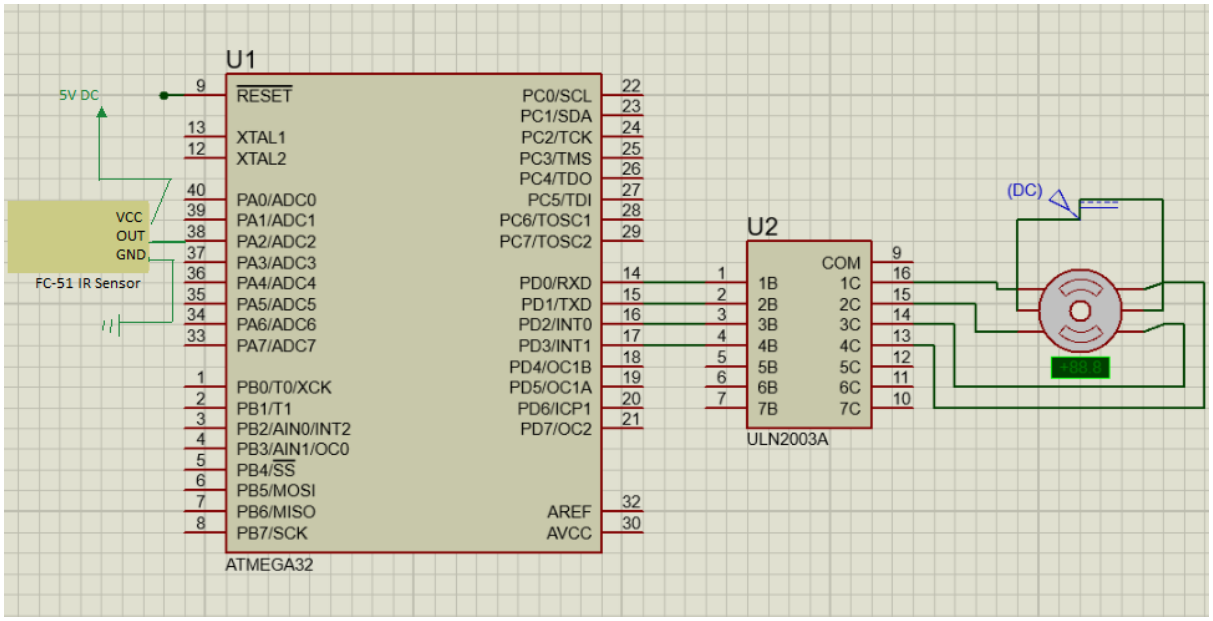
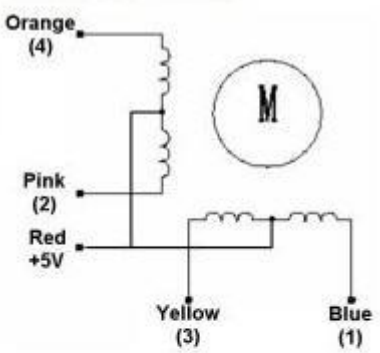


Fig: Circuit Diagram of our project

Basic Working Principle:

1. First we have interfaced the stepper motor with ATmega32. We have configured (D0-D4) as



Half-Step Switching Sequence

Lead Wire Color	---> CW Direction (1-2 Phase)							
	1	2	3	4	5	6	7	8
4 Orange	-	-						-
3 Yellow		-	-	-				
2 Pink				-	-	-		
1 Blue						-	-	-

Fig: Circuit Diagram of stepper motor

Output pin. Then we connected (D0-D4) to (IN1-IN4) of the ULN2003 motor driver. Then we connected the 4 wire of the stepper motor according to the fig. a.

2. Then we have output in D port of the ATmega32 accordingly 0x09, 0x01, 0x03, 0x02, 0x06, 0x04, 0x0c, 0x08 with a very small delay. It rotates the motor 0.65 degree.
3. Then we have output in D port of the ATmega32 in the reverse order in such a way 0x08, 0x0c, 0x04, 0x06, 0x02 0x03, 0x01, 0x09 with a very small delay. It rotates the motor 0.65 degree in the opposite direction.
4. Then we have interfaced IR obstacle sensor with ATmega32. It has 3 pin. Two of them are VCC and GND. The left one is the output pin. If there is an obstacle, then it output 0 otherwise it will output 1.

Fig: IR obstacle sensor

5. Then we have written code to turn on and off the tap.

Problem Faced:

1. At first the F_CPU was defined to 2000000Hz. For this the motor was running too slow. We set the F_CPU to 125000Hz. Then the problem was solved.
2. We connected the motor with a 9V battery. Though the voltage was high the current was low. So the motor was not capable to rotate the handle. Then we connected 2 9V battery in series but that doesn't work. Then we bought a 12V 2A power adapter. Then it was working but overheating. Then we connected this to 5V 1A adapter. Then it started working decently.
3. Our water tap is capable of electric conduction. When we connected our IR sensor with tap, then short circuit was built and it damaged the adapter. Then we insulated the sensor using glue gun.

Acknowledgements:

1. http://www.electronicwings.com/avr-atmega/stepper-motor-interfacing-with-atmega32
2. http://42bots.com/tutorials/28byj-48-stepper-motor-with-uln2003-driver-and-arduino-uno