An inadvertent and self regulating process of supplying water

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***Abstract*— Water is life. We can't live a single day without it. In urban areas, we generally use water by turning on the water tap. Most of the water tap are manual where user has to turn it on or off by himself. In this case, there is a chances of waste of water & also it is a little bit difficult for babies & old age people to turn it on manually. Again sometimes we want our bucket to be full of water. So we open the tap & leave it to be full and often forget to turn off the tap which creates overflow. To overcome this problem, therefore we want to introduced an automatic water tap system which will detect the hand or any obstacle under it at a certain distance & turn it on automatically. There will be another feature if anybody wants to fill the bucket then they will use the manual mode instead of automatic system. When the water reach a certain level it will give a warning sound for the user to come in front of the tap & turn it off. But in any case if user can't able to become then it will turn it off automatically after reaching the next level. Thus it will reduce the wastage of water because every drop of water matters.**

***Index Terms*—automatic,manual, water sensor, LDR sensor**

I. Introduction

IF we look in our day to day life, we can see that a lots of water is wasted because of carelessness. People often do their household chores like washing clothes and utensils, taking shower, cooking etc. They often open the tap to full the bucket and then forget to off the tap as they are busy in other work. In every house this phenomenon are very common and this causes a lots of wastage of water both in cities and towns.

Again the old people who are weak & young children sometimes feel difficulties to turn on the tap & was their hands before and after having meals. Even children play outside & often make their hands, even whole body dirty & if they use their hands to turn on the tap then the germs & dirt come from outside will be affixed to that tap which will be unhygienic and dirty for other family members.

After observing that much of waste of water into our day to day life, we have thought to make such an automatic tap which will work both in automatic mode & manual mode. This automatic water tap will sense any obstacle under the tap and only then it will turn on or otherwise not in automatic mode. If the tap is in the manual mode to fill the bucket in the absence of the user then after reaching a certain level of water in the bucket it will generate a buzzer to notify the user that the bucket is about to be filled but again if the user is unable to reach the bathroom to turn off the tap then after sometime another buzzer will generate and turn off the tap automatically.

II. Literature Review

We have studied different paper which helps to reduce the complexity of manual water tap system & also prevent the wastage of water.

In this paper [1] , we have learnt that IR detector & IR emitter had been used to detect the obstacle. The IR reflection at a certain distance had been used to determine whether the obstacle is near by the sensor or not. This method removes the complexity of manual calibration. Because here obstacle is detected if the IR detector can't find any rays from IR emitter because infrared rays can't reflect through solid object.

Hands free faucet mainly work in residential area in such a way so that it can turn on or off the tap without the help of hands & this experiments need valves. In this paper [2] , we have learnt that in a certain area which they named detection zone, any obstacle is found ,it will activate the water flow in the sub zone of detection zone, named trigger zone. But if any obstacle is found in the extended zone, then it won't activate the water flow.

In this paper [3] , we have learnt that any sensor like IR sensor or any diode or any ultrasonic sound would be used to identify the obstacle under the tap & there must be some distance between the obstacle & the tap. The project will run with the help of a controller which helps the sensor to implement its desired function. Here also temperature of water varies from different distance between tap and the obstacle.

III. Experimental Environment

For this experiment we need different types of hardware & software. We are giving a list of all these in this part.

A. Arduino Software IDE 1.6.5 version

Our experimental platform consists of of intel core-i5 1.7GHz processor running on Windows 10 operating system of 64bit that communicates via Arduino IDE 1.6.5 version. All our experiments access code is uploaded via arduino IDE.

B. Arduino Uno R3

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures micro-controller kits for building digital devices and interactive objects that can sense and control objects in the physical world. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with

sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. We also connect our water sensor, LDR , buzzer , servo motor in different pins of arduino to operate this devices according to our code. The picture of Arduino Uno R3 is given in Figure 1.

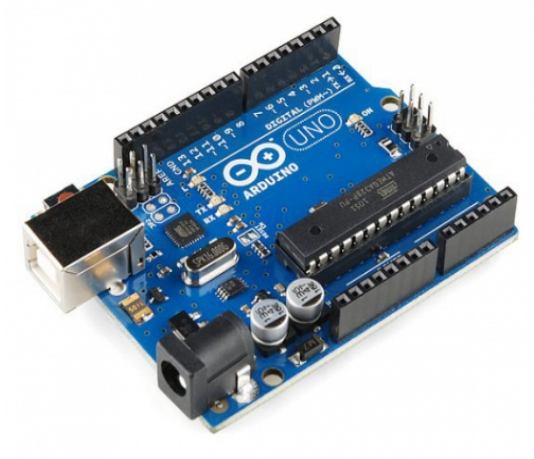

Fig. 1: Arduino Uno R3

C. Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. The motor is paired with some type of encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero and the motor stops. In general, servo motor gives a rotation of 180 degree. In our experiment it helps us to turn on our tap in automatic mode when it detects any obstacle & to turn off the tap when it detects the second buzzer which indicates the signal of overflow. The picture of servo motor is given in Figure 2.

D. Light-Dependent Resistor (LDR)

A light-dependent resistor, alternatively called an LDR, photo resistor, is a variable resistor whose value decreases with increasing incident light intensity. An LDR is made

Fig. 2: Servo Motor

of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. In our experiment we use it to detect any obstacle under the tap in automatic mode. The picture of LDR is given in Figure 3.

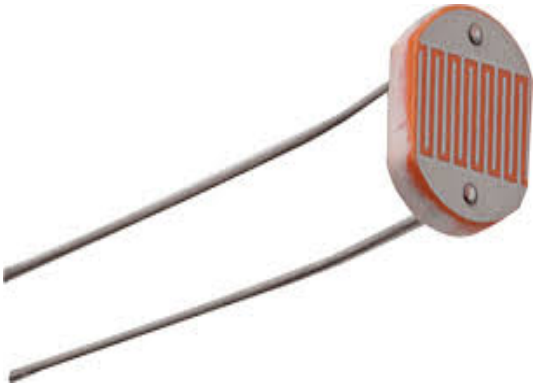

Fig. 3: Light-Dependent Resistor (LDR)

E. Grove- Water Sensor

The Water Sensor module is part of the Grove system. It indicates whether the sensor is dry, damp or completely immersed in water by measuring conductivity. The sensor traces have a weak pull-up resistor of 1 M. The resistor will pull the sensor trace value high until a drop of water shorts the sensor trace to the grounded trace. Believe it or not this circuit will work with the digital I/O pins of your Arduino or you can use it with the analog pins to detect the amount of water induced contact between the grounded and sensor traces. In our experiment, we use it to detect the water level in manual mode in the bucket. After the water level rise a certain level, it gives a buzzer which is the warning for the user that the bucket is about to be filled but if the user fails to come then it will generate a second buzzer after a certain level & this time the tap is turned off which helps to prevent the overflow.

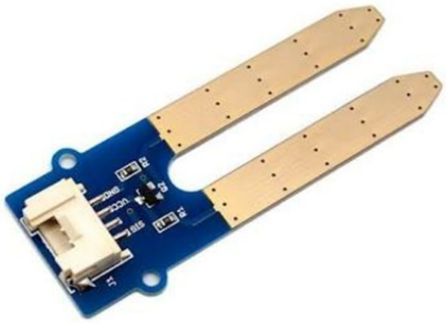

Fig. 4: Grove-Water Sensor

Fig. 6: Jumper Wires

F. Breadboard

A breadboard is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. In the 1970s the solderless breadboard (AKA plugboard, a terminal array board) became available and nowadays the term ”breadboard” is commonly used to refer to these. There are several rows of holes for components in a breadboard. The holes on the breadboard are separated by 0.1-inch spaces, and are organized in many short rows in the center, and in two long rows down each side of the board. The short horizontal rows in the middle are separated by a center divider. We use breadboard to put components and make connection between them.

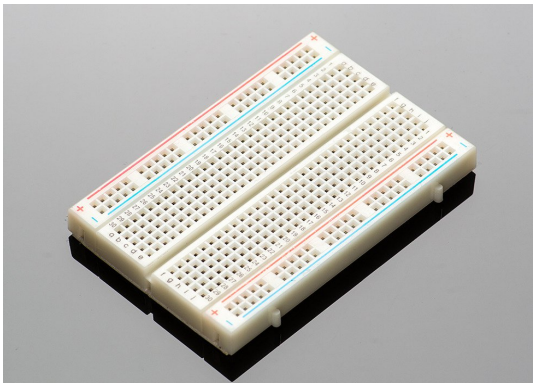

Fig. 5: Breadboard

G. Jumper Wires

A jumper wire (also known as jumper, jump wire, jumper cable, DuPont wire, or DuPont cable named for one manufacturer of them) is an electrical wire or group of them in a cable with a connector or pin at each end (or sometimes without them simply ”tinned”), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. We have used a lots of jumper wires to complete our experiment. Jumper wires are three types. Male-male, male-female & female-female. We have used male-male & male-female for our experiment.

H. Buzzer

A buzzer or beeper is an audio signaling device. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. For our artificial intelligence project, We use buzzer to warn the user that the bucket is about to flow & again if the user fails to come then the second buzzer helps to turn off the tap thus prevents overflow and wastage of water.

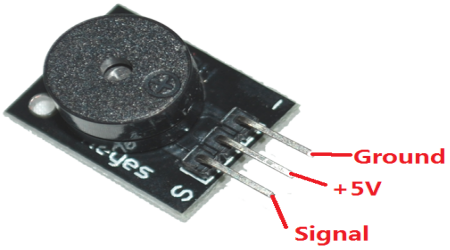

Fig. 7: Buzzer

I. Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of

various compounds and forms. Resistors are also implemented within integrated circuits.

We use 10k resistors for our experiment.

Fig. 8: Resistors

IV. METHODOLOGY

A. *Problem definition*

We want to make a water tap which will work in two different modes, automatic & manual. When the switch is off it will work in automatic mode there it can detect hands or any obstacle under the tap and turn on the tap and when there is no obstacle found it will turn off. When the switch in on, it will work in manual mode where without the presence of user the tap would start to fill the bucket. After reaching a certain level of water it will generate a buzzer to warn the user that the bucket is about to full. But if the user fails to come to the spot then after reaching another level of water, it will generate second buzzer & turn off the tap to prevent overflow. We are going to solve this two problems combinedly .

B. *System Architecture*

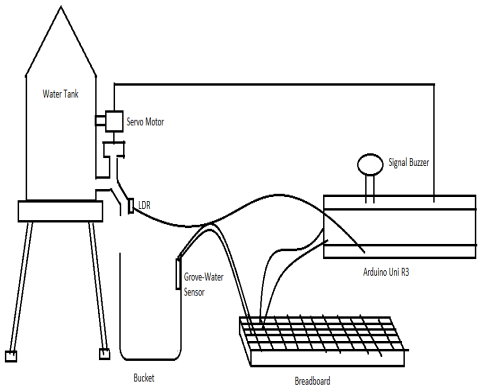

Fig. 9: Our whole project

C. *Model*

There are five logics that we implement in our artificial intelligence project. In the following part we are describing it.

Logic-1 Depending on the value of switch we determine whether to go for automatic state or not .If we get the value LOW we go to the automatic state.

Logic-2 When the system works in automatic mode,if the reflection value is higher than the calibration value of light ,it means there is an obstacle ,which is in this case hand . So it makes the servo motor to rotate 180 degree and let the water to flow.

Logic-3 When the value of the switch is HIGH,it determines that the system is in manual mode and the overflow problem is taken care of.

Logic-4 As long as the water sensor is not sensing its value below 850 it will not do any operation.Once it's less than 850 the buzzer will be generated.

Logic-5 As long as the water sensor is not sensing its value below 650 it will keep the water flowing. Once the landmark is achieved it will turn off the tap automatically.

In the following flow chart, we will show you in a flow chart how our project exactly works.

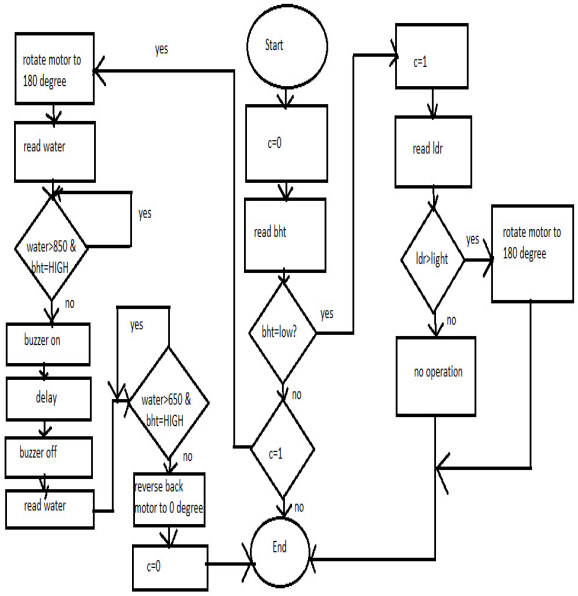

Fig. 10: Flow Chart

here,
c=water tap in auto or manual mode
bht=arduinos reading whether HIGH or LOW
ldr = reflective value of sensor
water = water sensors reading value
light = value read after calibration

V. CONCLUSION

Nothing is perfect in this world. So, everything has some limitations. Our project also have some limitations. Due to make it cost efficient we use servo motor SG91R which can rotate only 180 degree but to make more efficient we need to use Servo Motor(RB-65CS) . But it is quite expensive.

Water is an essential element in our day to day life. As the population is increasing day by day , it become very arduous

for us to meet the high demand of water this days. Again, water level of underground is getting lower day by day . So there is no alternative to reduce the wastage of water. Again to minimize the complexity of turning on or off a tap for old age people and babies, there is no substitute of an automatic water tap. To overcome this two important problem, we hope that our automatic water tap system project will help us a lot in near future.

VI. Future Expansion

In near future we want to add some new features & update the current feature. For updating the current feature we want to use voice detector to control the switching mechanism from automatic mode to manual mode . Again , for adding some new feature we have thought that the power needed to start the servo motor will be generated from the flow of water with the help of a hydro generator. The hydro generator generally produce 8-12 volt electricity which will be used to rotate the servo motor. We have already started working on it. Hopefully, in near future we will be succeeded.

VII. Acknowledgment

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