PET AUTOMATIC FEEDER

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Ich bin hunger, Gib mir mein Essen!

Available on Market

POSITIVE SIDES

- EASY TO USE
- WELL DESIGNED
- COMPACT
- WORKS WITH BATTERY

NEGATIVE SIDES

- NOT RESISTANT IN HARD WEATHER CONDITIONS
- LOW CAPACITY OF FOOD
- NO WATER SUPPLY
- DOESN'T HAVE REMOTE CONTROL

food container volume calculation

$S_1 = \frac{1}{2}\pi R_1^2 n \sin\frac{360}{n}$ - First pyramid bottom area

$S_2 = \frac{1}{2}\pi R_2^2 n \sin\frac{360}{n}$ - Second pyramid bottom area

$V_1 = \frac{1}{3} S_1 \, h_1$ - First pyramid volume

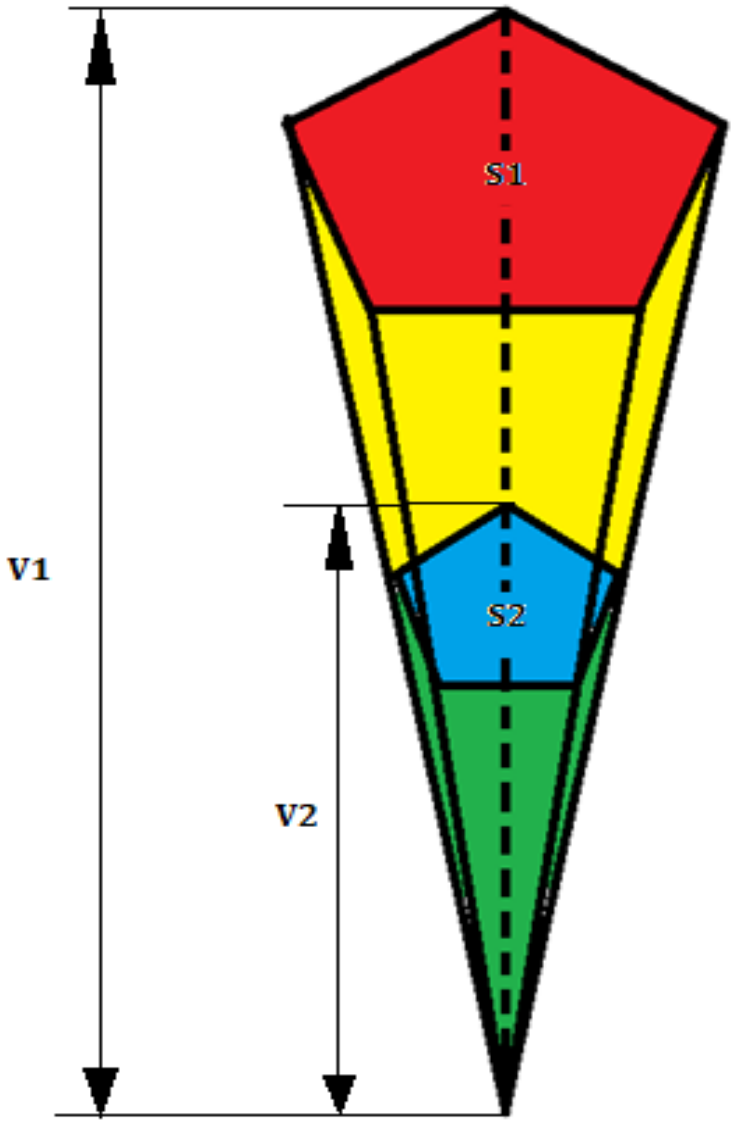
$V_2 = \frac{1}{3} S_2 \, h_2$ - Second pyramid Volume

$V = V_1 - V_2$ - Food container Volume

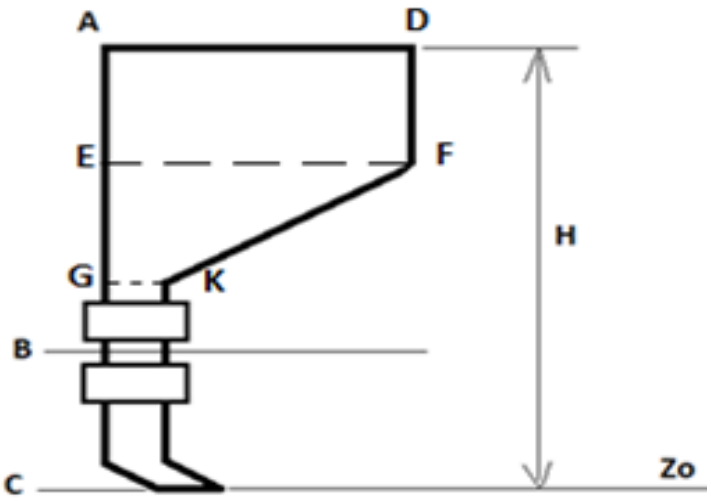
$V = 0{,}0277 m^3$

$\rho_{food} \approx 238{,}7 \, {}^{kg}/_{m^3}$ - Average density of dog food (pedigree)

$m = V\rho_{food} = 6{,}6kg$ - Mass of dog food (pedigree)



CALCULATION OF OUTCOMING WATER SPEED AND ITS EXPENSE PER SECOND



$$H = \frac{V_c^2 - V_a^2}{2g}$$

$$V_a = 0$$

$$V_c^2 = 2gH$$

$$V_c = \sqrt{2gH}$$

$$V_c = 3{,}1\ ^{m}/_{sec}$$

Bernoulli equation

$$Z_a + \frac{P_0}{\rho g} + \frac{V_a^2}{2g} = Z_c + \frac{P_0 + P_H}{\rho g} + \frac{V_c^2}{2g}$$

$$Q = const.$$

$$Q = V\omega$$

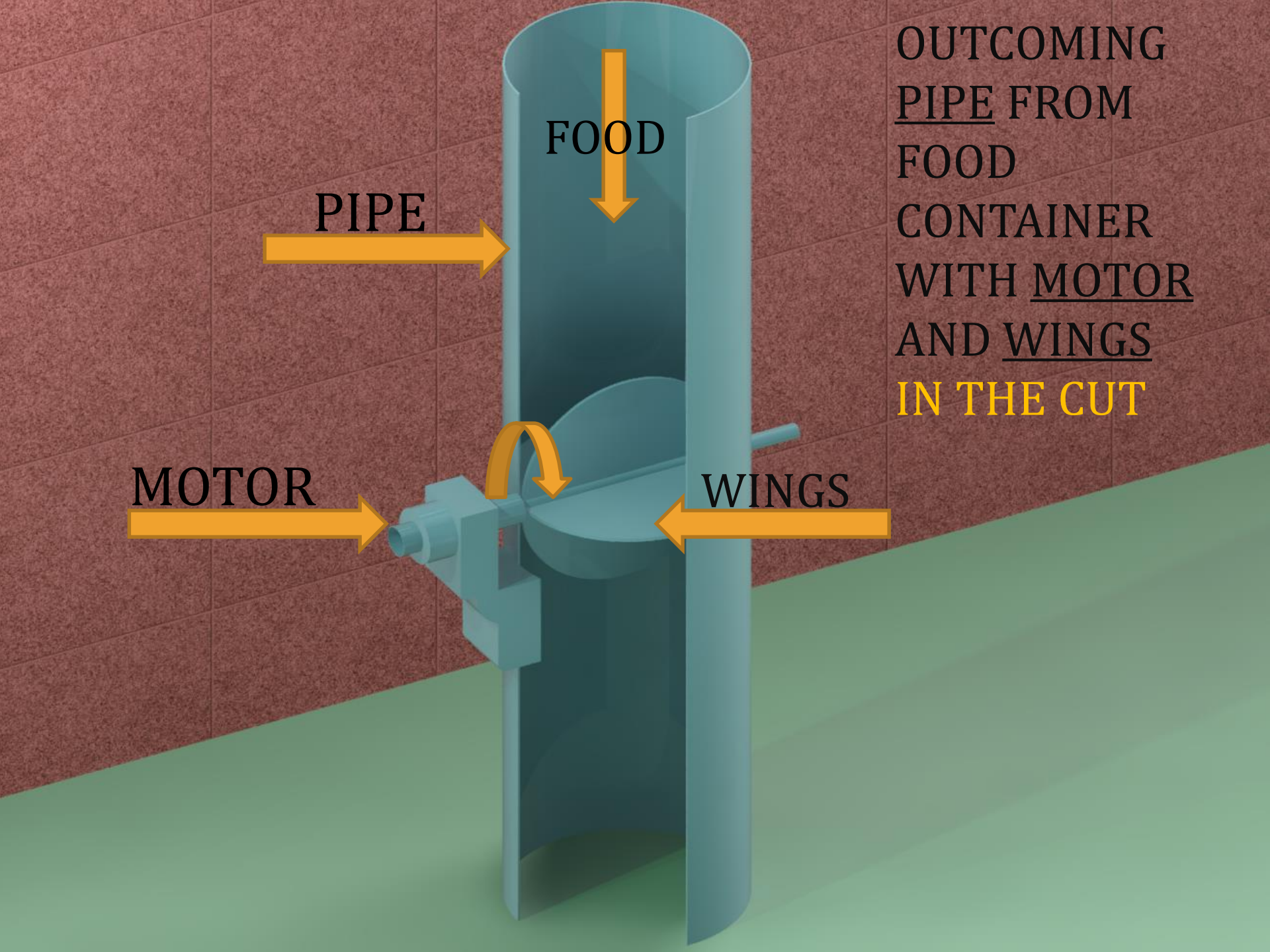
$$V_c\omega_{gk} = V_a \times \frac{\omega_{ad} + \omega_{gk} + \frac{\omega_{ef} + \omega_{gk}}{2}}{3}$$

$$V_a = \frac{3V_c\omega_{gk}}{\omega_{ad} + \omega_{gk} + \frac{\omega_{ef} + \omega_{gk}}{2}}$$

$$Z_a + \frac{P_0}{\rho g} + \frac{\left(\frac{3V_c\omega_{gk}}{\omega_{ad} + \omega_{gk} + \frac{\omega_{ef} + \omega_{gk}}{2}}\right)^2}{2g} = Z_c + \frac{P_0 + P_H}{\rho g} + \frac{V_c^2}{2g}$$

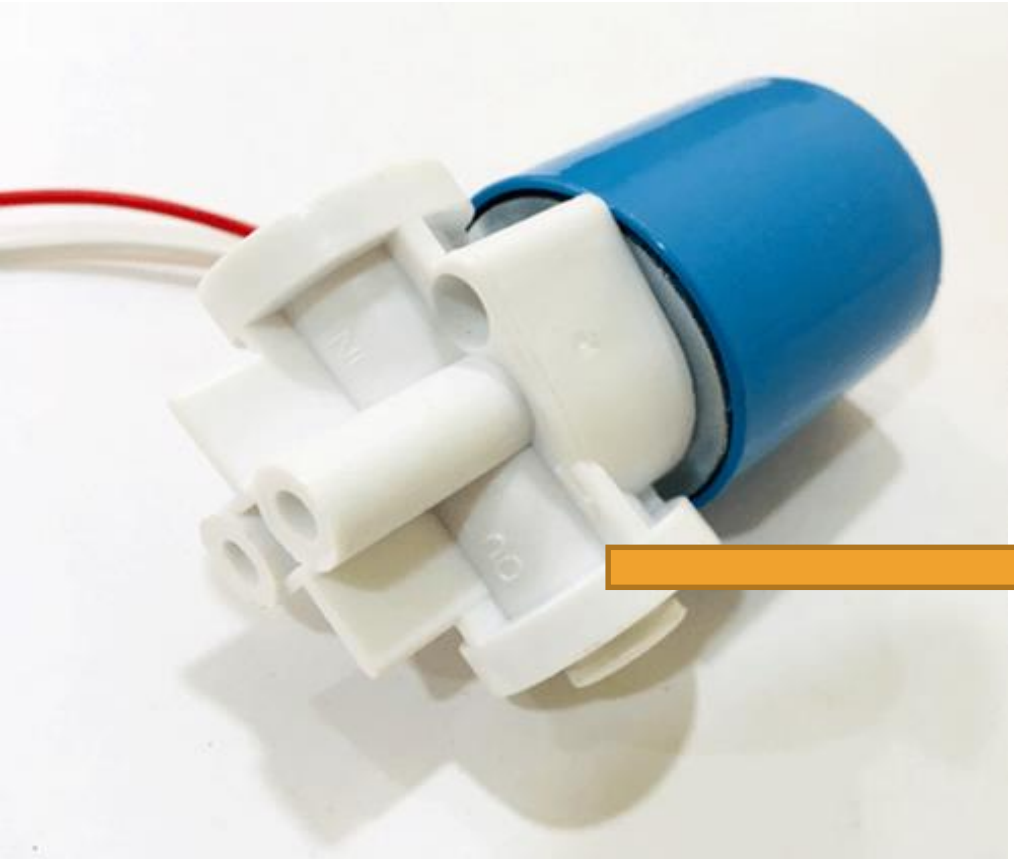
$$V_c = \sqrt{\frac{Z_a + \frac{P_0}{\rho g} + \frac{\left(\frac{3V_c\omega_{gk}}{\omega_{ad} + \omega_{gk} + \frac{\omega_{ef} + \omega_{gk}}{2}}\right)^2}{2g} - Z_c - \frac{P_0 + P_H}{\rho g}}{2g}}$$

$$V_c = 2{,}82\ ^{m}/_{sec}$$

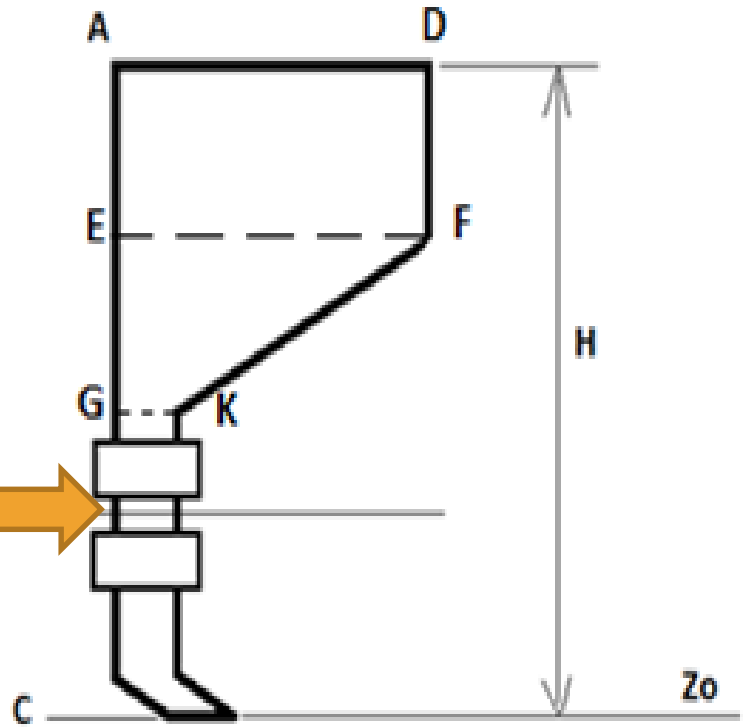

FOOD
PIPE
MOTOR
WINGS
OUTCOMING PIPE FROM FOOD CONTAINER WITH MOTOR AND WINGS IN THE CUT

SOLENOID VALVE FOR WATER CONTAINER

SOLENOID VALVE

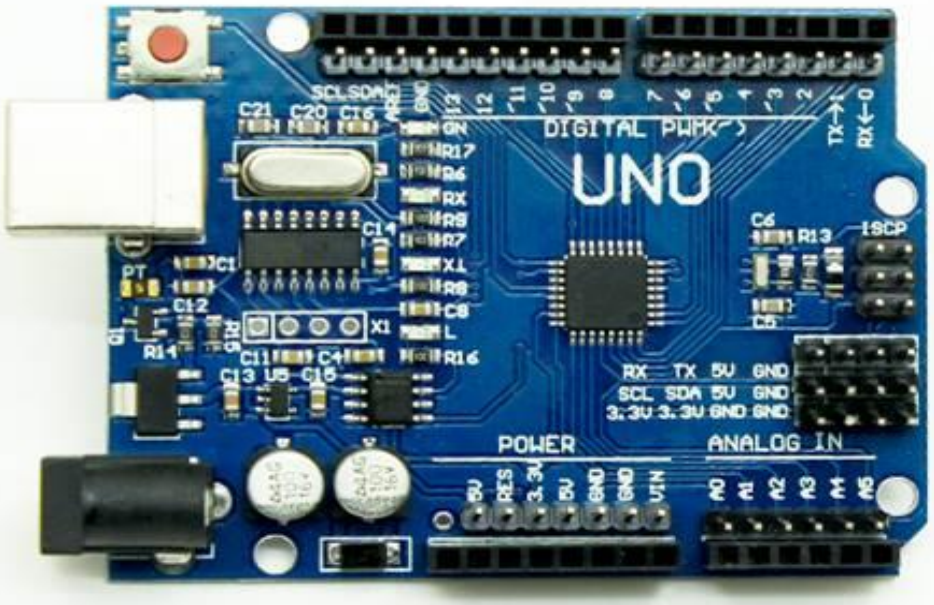


WATER CONTAINER



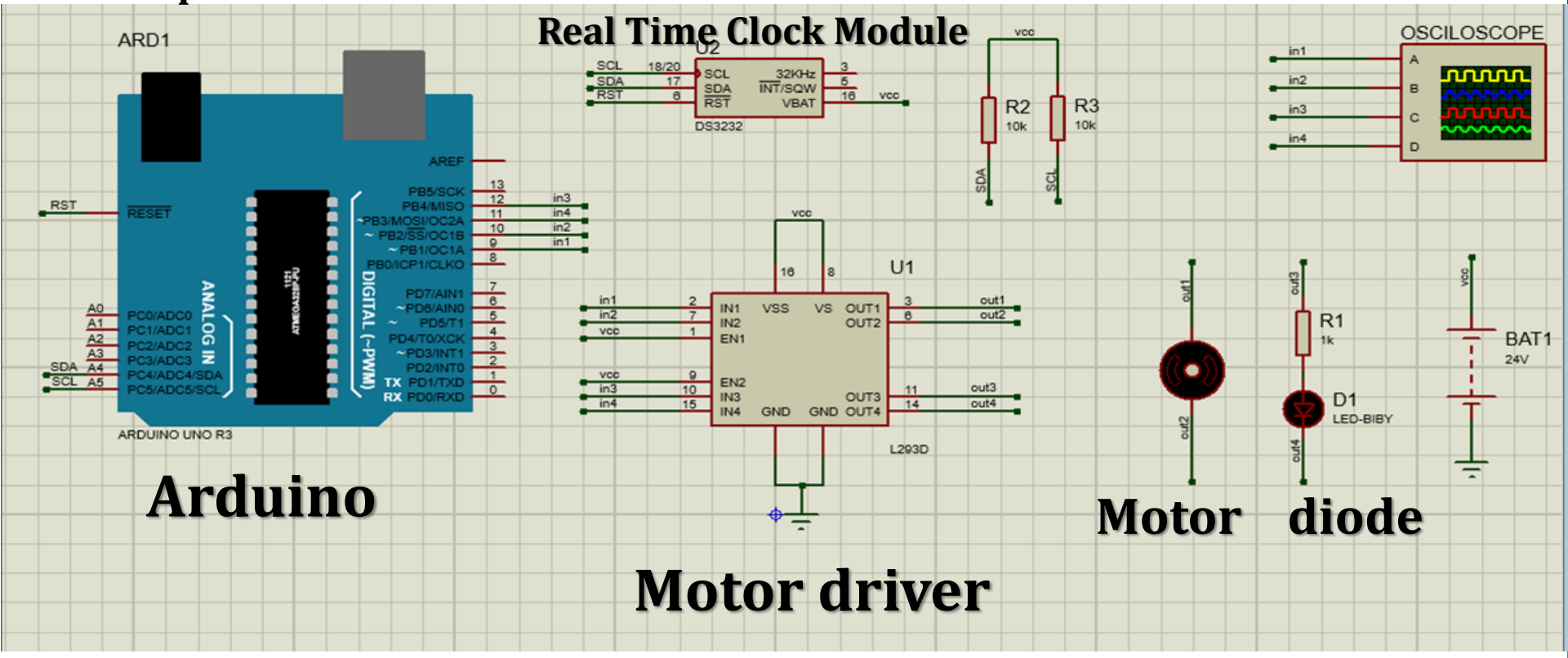
ARDUINO R3 UNO

Arduino Is A Microcontroller-based Open Source Electronic Prototyping Board Which Can Be Programmed With An Arduino IDE, Arduino Consists Of Both A Physical Programmable Circuit Board And A Pierce Of Software, Or IDE. The Arduino IDE Uses A Simplified Version Of C++. Arduino operates command impulses.



Simulation of the Mechanism in Action

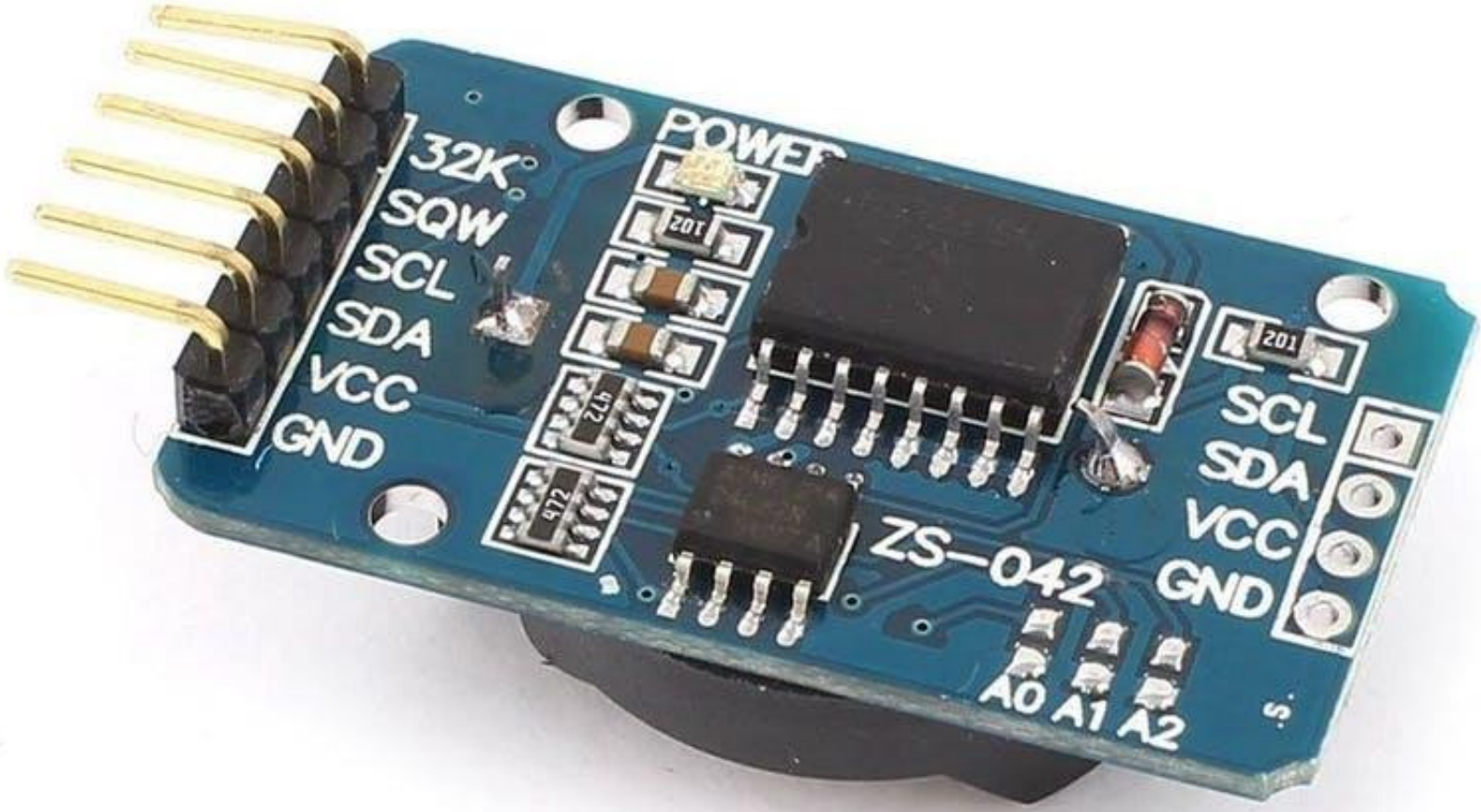
- The Motor Driver is a module for motors that allows us to control the working speed and direction of the motor, Motor driver intensify the capacity of motor
- Real Time Clock Module (RTC) helps us to detect the accurate time in any kind of electronic device (future plan);
- We used Arduino for these devices to run motor. Motor starts working and rotates the wings which push the food down. Diode Bulb will immediately light up when electric power passes to it from Arduino and then Solenoid Valve will open and let water pour down.



REAL TIME CLOCK MODULE (RTC)

Measures the passage of time.

RTCs are present in almost any electronic device which needs to keep accurate time



CODE WRITTEN IN ARDUINO IDE

sketch_nov13a

```
int motor = 9;
int motor_gnd = 10;
int emagnet = 11;
int emagnet_gnd = 12;

void setup()   {
  pinMode(motor, OUTPUT);
  pinMode(motor_gnd, OUTPUT);
  pinMode(emagnet, OUTPUT);
  pinMode(emagnet_gnd, OUTPUT);
}

void loop(){
  //DELAY PERCEIVES SECONDS AS MILLISECONDS. FOR EXAMPLE: "DELAY(500)" MEANS 0.5 SECONDS DELAY.
  digitalWrite(motor, HIGH);
  digitalWrite(motor_gnd, LOW);
  digitalWrite(emagnet, LOW);
  digitalWrite(emagnet_gnd, LOW);
  delay(500);           // MOTOR ROTATES FOR 0.5 SECONDS, THEN STOPS AND DIODE STARTS WORKING
  digitalWrite(motor, LOW);
  digitalWrite(emagnet, HIGH);
  delay(200);           // DIODE LIGHTS UP FOR 0.2 SECONDS,THIS MEANS ELECTRIC VALVE OPENS FOR 0.2 SECONDS. THEN CLOSES AND THE CYCLE IS DONE.
  digitalWrite(emagnet, LOW);
  delay(21600000);      // THIS CYCLE WORKS TWICE A DAY, SO, AFTER 6 HOURS, MOTOR STARTED WORKING AGAIN.
  digitalWrite(motor, HIGH);
  delay(500);           // WE DON'T NEED SOLENOID VALVE TO OPEN TWICE A DAY, BECAUSE THE DOG HAS ALREADY WATERFILLED BOWL. APPROXIMATELY 1 L.
  digitalWrite(motor, LOW);
  delay(64800000);     // AFTER THE 18 HOUR DELAY, ON THE NEXT DAY, THE CYCLE STARTS WORKING AGAIN.
  }
```

Our Product

POSITIVE SIDES

- HIGH CAPACITY OF FOOD
- WATER SUPPLY
- RESISTANT IN ROUGH ENVIROMENT
- REMOTE CONTROL WITH MICRO CONTROLLER
- EASY TO USE

NEGATIVE SIDES

- NEEDS INSTALLATION
- NO BATTERY,
  NEEDS TO PLUG IN (220V)

CONCLUSION

- Optimally designed product for both outdoor and indoor use
- Simple to use - easily controlled automated system

FUTURE PLANS

- Add remote control by mobile phone
  + Real Time Clock Module

- Improve product design
  - make it more compact
  - simple assembling - disassembling

- Test the reliability and durability

THANK YOU FOR ATTENTION