Food Dispensary Customization as per User Requirement

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Abstract

The Chicken poultry industry is an important industry for sustainable food supply in our country. The development of an automatic chicken feeding machine can be very useful to the growth of the poultry industry. In existing system, the chickens need a presence of manpower to manually give the food to the chickens. The use of proposed system can replace the worker for feeding the chicken thus overcome the labour problems in the industry and introduce a semi-automatic process in the poultry industry. The system will be capable of moving from one point to another within a deep litter poultry house, as well as dispense both solid and liquid feed to poultry birds at specific time intervals. The successful development of the anticipated intelligent poultry feeding system is expected to reduce human intervention, increase yield and profit as well as provides high return on investment in poultry farming.

Keywords: *Microcontroller, IoT,ATmega328,Arduino*

1.Introduction

Chicken should be properly raised in order to achieve such qualities so that they are ready be slaughtered. Feeding management is one of the factors that should be undertaken in order to raise healthy chicken. They should be given with the proper commercial feeds and a clean, adequate water supply. But nowadays, the development of technology was used to the conventional method of feeding chicken, which is by filling containers with grains, feeds, and water manually. The main problem by doing this method is the need to continuously provide the food, to be alert and to be conscious on the food remaining in cages. The sufficient amount of the food provided also cannot be determined clearly. Growers also find it difficult to manage their businesses effectively because they need to be around the cages every now and then to monitor the poultry.

2.Methodology

A. Proposed Methodology

The study and implementation of this device would be significant and useful in many aspects. Firstly, the device is equipped with technology that was capable of providing a uniform time in feeding the chicken (or in other words, providing the chicken with the regulated amount of food and water based on the parameters being set). With this, regulated amount of food and water being fed by the system to the chicken saved and/ or reduced wasted feeds due to leftovers and/ or driven out by the mechanism. Also, because the device can dispense feeds at any set time without even monitoring at feeding time, the chicken raiser's time of monitoring the chicken would be lessened.

3. Components Used

A. Arduino

Arduino Mega 2560 is a Microcontroller board based on Atmega2560. It comes with more memory space and I/O pins as compared to other boards available in the market. There are 54 digital I/O pins and 16 analog pins

incorporated on the board that make this device unique and stand out from others. Out of 54 digital I/O, 15 are used for PWM (pulse width modulation). A crystal oscillator of 16MHz frequency is added on the board. This board comes with USB cable port that is used to connect and transfer code from computer to the board. DC power jack is coupled with the board that is used to power the board. This board comes with two voltage regulator i.e. 5V and 3.3V which provides the flexibility to regulate the voltage as per requirements as compared to Arduino Pro Mini which comes with only one voltage regulator. There is no much difference between Arduino Uno and Arduino Mega except later comes with more memory space, bigger size and more I/O pins. Arduino software called Arduino IDE is used to program the board which is a common software used for all boards belonged to Arduino family. Availability of Atmega16 on the board makes it different than Arduino Pro Mini which uses USB to serial converter to program the board. There is a reset button and 4 hardware serial port called USART which produces a maximum speed for setting up communication.

B. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

C. Relay

Relays are most commonly used switching device in electronics. One is the Trigger Voltage, this is the voltage required to turn on the relay that is to change the contact from Common->NC to Common->NO. Our relay here has 5V trigger voltage, but you can also find relays of values 3V, 6V and even 12V so select one based on the available voltage in your project. Since the relay has 5V trigger voltage we have used a +5V DC supply to one end of the coil and the other end to ground through a switch. This switch can be anything from a small transistor to a microcontroller or a microprocessor which can perform switching operating. The purpose of the Fly back diode is to protect the switch from high voltage spike that can produced by the relay coil.

D. Transformer

A centre-tapped transformer also known as two phase three wire transformer is normally used for rectifier circuits. When a digital project has to work with AC mains a Transformer is used to step-down the voltage (in our case, to 24V or 12V) and then convert it to DC by using a rectifier circuit. In a center-tapped transformer the peak inverse voltage is twice as in bridge rectifier hence this transformer is commonly used in full wave rectifier circuits. A primary voltage will be induced in the primary coil (I1 and I3) and due to magnetic induction the voltage will be transferred to the secondary coil. Here in the secondary coil of a centre tapped transformer, there will be an additional wire (T2) which will be placed exactly at the center of the secondary coil, hence the voltage here will always be zero. If we combine this zero potential wire (T2) with either T1 or T2, we will get a voltage of 12V AC. If this wire is ignored and voltage across T1 and T2 is considered then we will get a voltage of 24V AC. This feature is very useful for the function of a full wave rectifier.

E. Darlington Transistor array

The ULN2803A is a high-voltage, high-current Darlington transistor array. The device consists of eight npn Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may be connected in parallel for higher current

capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers,line drivers, and logic buffers. The ULN2803A has a 2.7-kΩ series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS devices. Pin number from 1 to 8 is a Channel 1 through 8 Darlington base input while pin number from 11 to 18 is Channel 1 through 8 Darlington base output. Similarly, 9 and 10 pins are ground and common cathode node (Vcc) respectively. It is important to note that common emitter is shared by all the channels.

F. Voltage Regulator

i) 7805

7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. n our case the 7805 IC is an iconic regulator IC that finds its application in most of the projects. The name 7805 signifies two meaning, “78” means that it is a positive voltage regulator and “05” means that it provides 5V as output. So our 7805 will provide a +5V output voltage. The output current of this IC can go up to 1.5A. But, the IC suffers from heavy heat loss hence a Heat sink is recommended for projects that consume more current.

ii) 7812

7812 is a 12V Voltage Regulator that restricts the voltage output to 12V and draws 12V regulated power supply. The 7812 is the most common, as its regulated 12-volt supply provides a convenient power source for most TTL components.7812 is a series of 78XX voltage regulators. For ICs within the family, the xx is replaced with two digits, indicating the output voltage (for example, the 7805 has a 5-volt output, while the 7812 produces 12 volts). The IC 7812 is a positive voltage regulator which means that it generates the positive voltage with respect to the common ground. In case if both the positive and negative voltage supply is needed in the same circuit

G. Load cell:

A transducer that was used to create an electrical signal whose magnitude was directly proportional to the force being measured. In this study, the load cell weighs the feeds to be dispensed.

H. 3x4 Keypad

A set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. In this study, it was a numeric keypad.

4. Software Used

A. Arduino Software (IDE)

The Arduino Integrated Development Environment (IDE) is an computer application and is basically written in two languages i.e. C and C++.With the help of this software we can easily upload the required program code on the Arduino board. There are wide varieties of Arduinos but here we have used ATmega328. The board consists of digital and analog pins out of which 6 are analog and the remaining are digital. The power to the board is given through the USB cable. The software consists of the text editor where the program code is written and it consists of various inbuilt functions. The programs are then uploaded to the Arduino uno with the help of USB cable. The programs written in this software must be saved with .ino extension. After the program is written it is first of all verified and then uploaded on the board. If there is any error in the code then it displays it on the screen and thus the user can correct the code. The output can be seen on the serial monitor provided by the software.

5. Result and Explanation

Figure shows the conceptual framework for the food dispensary customization showing the processes of feeding. To add, a power source is needed for the microcontroller unit (MCU i.e. Arduino mega) to perform the necessary tasks. In terms of feeding, the motors that were in the Dispensing Mechanism and Drive System were required for transporting and delivering of feeds from the silo all the way to the pan feeders. The dispensing mechanism consists of weighing of the food

items through the load cell and dispensing it into the silo. In feeding the chicken, the load cell is only capable of weighing up to 80 grams of feeds. However, it can be upgraded into a better load cell that can carry a larger amount of feeds for a higher number of chickens in the cage. The same goes with the "silo" and the driving motor, wherein they can be scaled up to accommodate the increase in the population of chicken. Through the keypad we can define the maximum weight for the food items.

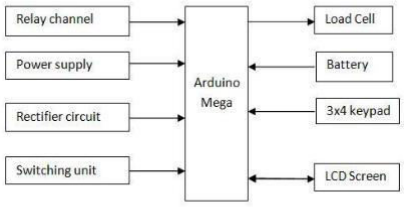

fig: System Architecture for the proposed system

6. Future work

- Alarm System when the device failed to dispense and/or to deliver feeds.
- Automatic chicken manure cleaning and water sanitization as well as placement of light sensor for automatic lighting.
- Removing the flip container and making the silo move instead to speed up the delivery of feeds.
- Installation of a mini-circuit breaker and electrical conduits for safety purposes.
- Mounting of a fixed water reservoir and enlargement of the water trough.
- This system is fully an automatic system to monitor and control the environmental changes such as temperature, water level and food feeding with less human intervention. This paper can be extended by automating the disposal of waste and automatically detecting the diseases of birds by monitoring the weight of the bird.

7. Conclusion

This is a low cost system as it reduces the cost of hiring labours. Since all the operations are automated it is a easy to use the system. It is also a flexible system as it can be integrated into small and medium sized poultry farms with minimal modifications. Currently this system also provides many options which are user friendly enabling the farmer to manage all the necessary farming factors resulting in increased number of population and food. This system has distance coverage of 30 miles.

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