Implementation of Automatic Poultry Feeding and Egg Collecting System

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***Abstract*- Today in this present area where technological advances are at its vertex, Major problem in poultry form is poultry egg collecting and fodder maintaining. This work is hard and time-consuming is more, so automatic collection is needed. To overcome this problem, we designed the robot. The main objective of the robot is to separate the eggs in tray according to the size and fodder maintaining. It is an alternate idea for egg carrying conveyor belt used in large poultry form. It will play a vital role in small scale egg poultry production. Reduction of manual work and rate of production is in large scale. A problem in loose housing systems for laying hens is the laying of eggs on the layer poultry; these eggs need manual collection. This job is heavy and time-consuming and automated collection is desired. For collection using a robot, a collection path is required. A novel path planning algorithm is introduced for non-uniform repetitive area coverage paths and evaluated based on information about layer poultry egg distribution probability. Firstly, a spatial map was developed that describes the potential for layer poultry eggs at each location in a poultry house.**

***Index terms*- IR sensor, Buzzer, Arduino, Motor Drive, Gear motor, Weight Sensor, Battery**

INTRODUCTION

A problem in loose housing systems for laying hens is the laying of eggs on the poultry house; these eggs need manual collection. This job is heavy and time-consuming and automated collection is desired. For collection using a robot, a collection path is required. A novel path planning algorithm is introduced for non-uniform repetitive area coverage (NURAC) paths and evaluated based on information about egg distribution probability. Firstly, a spatial map was developed that describes the potential for floor eggs at each location in a poultry house. Next, paths for floor egg collection are planned with a dynamic programming approach that covers the house floor area and frequently revisits locations with a high potential on floor eggs. Poultry farmers spend one to two hours a day on collecting eggs which is physically demanding and an unhealthy work.

To automate the manual collection of eggs in modern poultry houses, a suitable collection mechanism is required. This paper presents the design and evaluation of a novel device for this collection task. A literature study showed that different eggs, the interior of a laying house and the floor type and litter have to be taken into account in the development of such a device. It was concluded that currently available collection methods are not suitable for this task and a novel device was developed. This device consists of a helical spring. When rolling this spring over the floor, contact with an egg will open the spring and let the egg in. Collected eggs can be unloaded to the side of the device, facilitated by the rotary movement of the spring. Design parameters were optimized systematically by maximizing the success rate of collection. The optimized device was able to collect 96.8% of all poultry eggs. Success was high for eggs lying in open space and along walls, but the design still needs to be improved in order to successfully collect grouped eggs and eggs in corners.

For commercial egg production, poultry producers around the world usually used to feed their bird commercially prepared pellet layer poultry feed. This type of commercial poultry feed contain proper ratio of required feed ingredients, Vitamins, Minerals and other nutrients. You can just purchase and start feeding your birds. Indoor feeding of young or adult poultry, places full responsibility on the attendant to

supply these same requirements in some form or another and in adequate but not excessive amounts. Frequently, however, a full grain bin means careless or indifferent feeding because no attempt is made to balance this ration properly. One must include all the essential nutrients in order to obtain a profitable rate of growth or egg production. Manual collection tables (without drive) are mainly used for small units or if several houses are planned but not finished yet. In this case a manual collection table is used until it can be replaced by a cross collection with farm packer. Results revealed that the major idiosyncratic risks faced by the farmers were death of birds, high costs of inputs and low poultry production. On the other hand, the major types of covariate risks faced by the poultry farmers include outbreak of diseases, rainfall shocks and hard economic times.

HARDWARE IMPLEMENTATION

The most advanced robotic systems may incorporate some form of artificial intelligence, aided by computer vision capability. One or more cameras provide digital images to the robot's computer which processes the information, using it to make decisions. As part of a recent Poultry CRC proof of concept project on 'computer vision', a robotic system was developed that can scan the egg collection belt for potential blockages. The robot's software could differentiate between eggs and non-egg objects with 95% accuracy.

PROPOSED WORK

BLOCK DIAGRAM

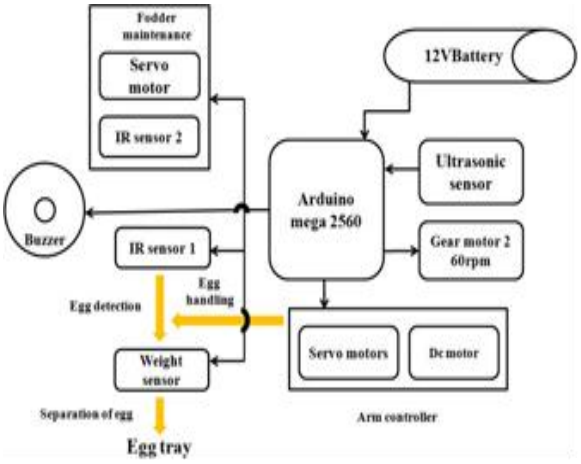

Fig.1. Block Diagram

During the design of the robotic arm, we considered several design problems that ranged from the choice of mechanical hardware components to the design of the arm and the associated trajectory planning and arm control. The arm's components would need to include components for the joints as well as the links of the arm. First, we considered possible joint mechanisms. As different configurations of the arm produce different amounts of torque, the joint mechanisms must move variable amounts of torque accurately and precisely. The two possible solutions that we discovered were to use either servos or DC motors to act as joints of the robotic arm. DC motors can act as powerful and cheap actuators for the robotic arm that increases mechanical power with an increase of DC voltage.

However, these DC motors lack feedback to determine how far the motor has actually turned. Due to this lack of feedback, the joints will have difficulty determining how to reach specific positions or hold positions. Servos are a more expensive option that allow for movement to a specific position based on the length of a pulse signal that is sent every 20 ms. Servos can be controlled with precision to rotate to certain points and hold that position, which provides much more precision and accuracy than DC motors. However, most servos can only rotate a maximum of 180° with mechanical hard stops at 0° and 180°, though it is possible to modify servos so that they are continuous and can rotate for 360°.

MICROCONTROLLER

The Arduino Mega2560 can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall- wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gad and Vin pin headers of the power connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable.

IR SENSOR

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. These types of sensors measures only infrared radiation, rather than emitting.

WIGHT SENSOR

This Electronic Arduino Weight Sensor is able to detect 1kg weight. It based on HX711, a precision 24-bit analog-to-digital converter designed for weight scale and industrial control applications to interface directly with a bridge sensor. This Electronic arduino weight sensor lowers the cost of the electronic scale, and at the same time improving the performance and reliability. The interface of this sensor uses DFRobot Gravity Interface. The output adopts compact terminal that makes the sensor easier to connect. It's the best choose for electronic enthusiast to do some tiny home scale. The Working Principle of a Compression Load Cell. A load cell is a transducer that measures force, and outputs this force as an electrical signal.

ULTRASONIC SENSOR

Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object As the distance to an object is determined by measuring the time of flight and not by the intensity of the sound, ultrasonic sensors are excellent at suppressing background interference. Virtually all materials which reflect sound can be detected, regardless of their colour. Even transparent materials or thin foils represent no problem for an ultrasonic sensor. Microscopic ultrasonic sensors are suitable for target distances from 20 mm to 10 m and as they measure the time of flight they can ascertain a measurement with pinpoint accuracy. Some of our sensors can even resolve the signal to an accuracy of 0.025 mm.

GEAR MOTOR

A gear or cogwheel is a rotating machine part having cut teeth or, in the case of a cogwheel, inserted teeth (called cogs), which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque and direction of a power source. Gears almost always produce a change in torque, creating a mechanical advantage, through their gear ratio, and thus may be considered a simple machine.

RESULT AND DISCUSSION

We use a path planner to search the house, in such a way that the change of finding layer poultry eggs is maximized. This path planner provides waypoints to the robot, which then drives from waypoint to waypoint. At the same time, a special camera is used to detect the eggs. If an egg is found, its position is stored (the robot is continuously aware of its position in the house), and an action is planned to collect the egg. Using our special collection mechanism (a bended helical spring), it is sufficient to stop in front of the egg, lower the mechanism and push it over the egg.

Fig.2. Hardware Setup

At that time, the egg will move into the device, and Finally, Chicken egg collecting system plays a very important role on the prosperity of layer and breeder management as well as the whole the poultry business. Because the technology is getting enough involved in this business, you should have find smarter alternatives of manual hen egg collecting system. Automatic egg collection is the High Top introduces which is a very costly, effective and time saving alternative way that can increase your production rate and reduce your cost in an effective way. The challenge for the poultry industry is to recognize which components of the production system can be monitored and controlled by robots (machines), and which technology is appropriate to achieve the improved efficiency. If the technology is not available, it may need to be developed. The next step would be to test whether this or similar

technology could be extended to monitor the health and welfare of the birds.

CONCLUSION

Rapid advances are occurring in the application of robotics to the poultry industry. Robotics has contributed to improved production efficiency, particularly from the perspective of reducing labour costs per bird. Due to the intensive nature of most poultry enterprises, the industry is ideally suited to continue to benefit from the incorporation of robotics. As I see it, a major challenge for the future is how to apply robotics to monitor bird health and welfare. What we have presented so far, is a proof-of-concept. This is sufficient to make clear that the idea and approach are valid and can work, but does not mean that we have a fully functional robot yet. The plan is to continue the development in the coming years, and we hope that in a few years' time we have a fully functional prototype. If it is necessary to attach remote sensing transponder devices to sentinel birds, improved battery performance will be required for long-term effective use.

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