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REVIEW PAPER ON ANALYSIS OF AUTOMATIC COW FEEDING AND DRINKING SYSTEM

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Abstract: Automatic cow feeding and drinking systems have become increasingly important in modern dairy farming, offering precision, labor efficiency, and improved animal welfare. These systems are designed to provide consistent and accurate feed delivery while monitoring cow behavior and health.

I. INTRODUCTION

In the realm of modern dairy farming, the integration of technology into daily operations has become essential for optimizing productivity and ensuring the welfare of livestock. One of the most significant advancements in this field is the development of automatic cow feeding and drinking systems. These systems utilize a combination of robotics, sensors, and data analytics to deliver precise amounts of feed and water to cows, tailored to their individual needs.

Automatic feeding systems typically involve the use of Total Mixed Ration (TMR) robots, which prepare and distribute feed mixtures several times a day, ensuring that cows have constant access to fresh and balanced nutrition. This not only enhances the cows' health and productivity but also minimizes feed wastage and reduces the labor required for manual feeding.

The adoption of these systems offers numerous benefits. Precision feeding ensures that each cow receives the appropriate amount of nutrients, which can improve milk production and overall health. Additionally, the reduction in labor allows farm workers to focus on other critical tasks, thereby increasing overall farm efficiency【5†source】. Moreover, these systems are equipped with advanced monitoring capabilities that track feeding behaviors and detect potential health issues early. For instance, changes in feed intake can signal problems such as mastitis or lameness, allowing for timely intervention.

Despite the clear advantages, the implementation of automatic feeding and drinking systems comes with challenges. The initial investment and ongoing maintenance costs can be significant, and farmers must be prepared to integrate and manage complex technological systems. Nonetheless, as the technology continues to evolve, these systems are becoming more accessible and beneficial for dairy farms of various sizes.

In summary, automatic cow feeding and drinking systems represent a transformative approach to dairy farming, enhancing efficiency, precision, and animal health monitoring. As technology advances, these systems are expected to become an integral part of modern agricultural practices, contributing to sustainable .

In certain regions of rural area, cow feeding is done conventionally by hand and periodic time stamps by human interference. This process is really hectic and time consuming, the cattle need to be fed. It is a simple statement, but one that resonates with every cattle producer. To make this necessary task easier for farmers, the concept of automatic cattle feeding system came into existence. Automatic Cattle Feeding System is a robotic feeding system which consists of a battery operated robotic vehicle that is capable of feeding an equal amount of feed. The feed is manually loaded in the feeder and it follows the feed fence through a pre-determined route until it reaches the feeding fence at a pre-determined distance where it places the feed through a moving bogie. To ensure the precise, timely and adequate feeding of cattle of each group, this project is applicable in an agricultural country like Nepal where the lack of manpower in cattle farming has an adverse effect on dairy production. The main objective is to design an automatic cattle feeding system that moves around the fence to distribute the feed uniformly. With the application of the rail following robot, remarkable changes can be brought to this field. In this we are using Arduino circuit for controlling the motor for feeding the cattle After certain time space. With the application of Automatic Cattle Feeding system uniformity in feed distribution can be maintained.

BEST HEALTHY FEED FOR BEEF CATTLE:

Grain Supplement. Grain can get cattle growing quickly and can help cattle get fat.

Hay. Hay can provide every important nutrient for cattle, but it has to be picked at the height of its nutrient richness — that is, before it becomes too dry.

Pasture and Forage.

Concentrates.

How much consumables do we have to feed per day?

A lactating cow will consume between 18 and 25 kg of dietary dry matter each day, depending on how much milk she is currently producing. Cows have access to feed and water at all times, except during milking (2 or 3 times per day)

PROBLEM STATEMENT:

The main problem farmers facing now is feeding the cattle with conventional and time consuming method. This conventional method is really an hectic task for the farmers. By considering those factors we decided to develop this project.

My Working principle:

The project is about automation in the process cow feeding. In this project the bogies which are being used for feeding cows are controlled by the Arduino circuit. In this Arduino circuit we are going to burn the program to control the movement of the Bogie twice a day. At 12 PM and 5 PM. When the timing is set to the Arduino circuit we just need to pour the bogie with feeder manual in the morning and the rest of the work is done by the system itself.

COMPONENTS USED:

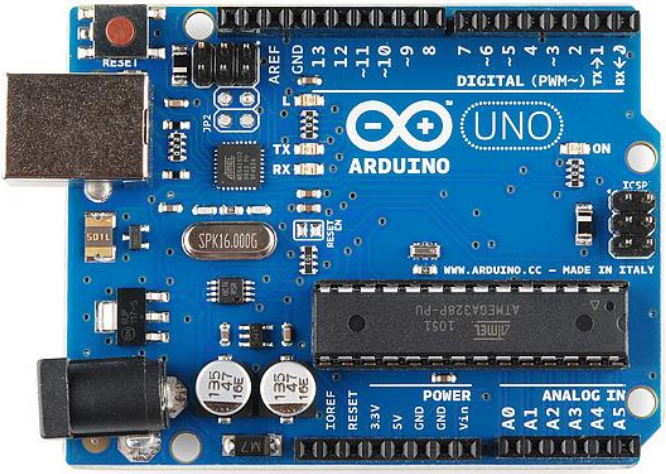
1.DC motor:

For smooth movement in all directions, two motors are necessary. Two D.C. motors with rated speeds of 200 rpm are used. These motors are placed in such a way that each motor drives four legs. The motors are powered by a rechargeable 12V battery.

2. Arduino circuit:

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.For this study secondary data has been collected.



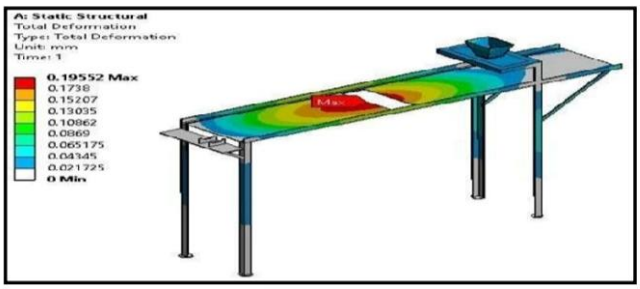
3.Submersible Pump

A submersible pump consists of an airtight sealed motor that is tightly connected to the pump body. The main benefit of this type of pump is that it avoids pump cavitation, which is a problem is caused by a large elevation difference between the pump and the fluid surface. Because the entire system is submerged in the fluid, a submersible pump never needs priming. Submersible pumps are efficient because they need less energy to move water into the pump. Water pressure pushes the water into a submersible pump. which "saves" a lot of the pump's energy. Here are some before and after photos of Pump Man Social's work at various places.

My ANALYSIS

Step 1: Details of material namely copper, steel, grey cast iron, composite material, and fluid domain material is defined in engineering data ie., ANSYS default materal is structural steel..

Step 2: Import of geometry created in any CAD software namely CATIA, PRO E, SOLIDWORK, INVENTOR etc. in geometry section. If any correction is to be made it car be created in geometry section in Design modeller or space claim.



Total deformation is 0.195

Step 3: In model section after import of component

Material is assigned to component as per existing material

Connection is checked in contact region ie., honded, frictionless, frictional, no separation etc. for multi body components.

Meshing or discretization is performed i.e., to break components in small pieces (elements) as per size i.e.. preferably tetra mesh and hexahedral mesh for 3D geometry and for 2 D quad or trial are generally preferred.

Step 4: Boundary condition are applied as per analysis namely in fixed support, pressure, force, displacement, velocity as per condition.

Step 5: Now problem is well defined and solve option is selected to obtain the solution in the form of equivalent stress, strain. energy, reaction force etc.

My Model

Conclusion

1. In this project we successfully designed and fabricated a Automatic cow feeding machine.

2. We used the Arduino UNO for control the movement of motor and pump.

3. Achieved better accuracy in time management for cattle and water supply.

4.The maximum deformation and equivalent stress obtained in structure is 0.19 mm and 6.44 Mpa respectively.

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