JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Management of Automatic Cow Feeding and Drinking System Using Microcontroller

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Abstract— **Traditionally, feeding cattle by hand requires a lot of time. This research introduces an autonomous cattle feeding system that follows the path for a predetermined amount of time to feed the animals next to the feed fence. The feed mechanism is operated over a predetermined time period by the prototype using an Arduino circuit. The motors are coupled to allow for both forward and backward motion. A rail bogie is driven by a DC motor and feeds the cattle at regular intervals. In order to use this equipment, you basically pull on the rope that is looped around the motorized shaft.**

Keywords— **Automatic feeding machine, Pulling mechanism, Rail bogies, DC motors, Arduino circuit, Cattle feed.**

I. INTRODUCTION

Cow feeding is a laborious, time-consuming operation that happens in rural settings. Despite being simple, the tedious work takes a lot of time. The automatic cattle feeding system includes a battery-powered truck that automatically feeds each cow the same amount of feed. Feed is manually supplied into a feeder, which passes it at a predetermined distance through a moving belt. It fed the animals on time and in the right amount. Countries with small populations of dairy farmers can put this plan into practice. The rail-following Arduino Uno robot is in charge of controlling the motor.

II. LITERATURE SURVEY

India is a heavily agricultural nation, and agriculture is the foundation of the Indian economy. Cattle farming is the area of agriculture that is expanding quickly. For their livelihood, the majority of people also engage in dairy and cattle farming. Cattle feeding is crucial in the farming of cattle. The "Automatic Cattle Feeding System" is the solution to expanding dairy production and making it successful. The amount of manpower required has decreased thanks to the automatic cow feeding system. Dairy farming will grow in size and become a profitable sector. Cattle farmers' work will be reduced as a result of automation. This technology offers statistical data useful for further research, is very dependable, and enables more natural all-day feed supply. In this paper, we discuss the "Automatic Cattle Feeding System" and the usage of the Arduino UNO circuit, a motor, a rail bogie, a battery, etc. A microcontroller that tracks the journey and an Arduino UNO circuit were used to create this prototype model. The bogie is pulled by a DC motor utilising a rope arrangement. Utilizing this system will lower labour expenses.

Since technology is not used in the dairy industry, there is a great demand for labour. These expenses are particularly significant for the owner of a dairy farm due to the temporary nature of the work required there. They should be paid for the entire day. In order to save labour costs, work hours, and free up a dairy farm owner's time so that he or she may concentrate on other chores rather than feeding the cattle, it is imperative to develop an autonomous cattle feeding system. Automating their businesses is something that dairy producers are increasingly pursuing. Since the last ten years, various manufacturers have developed automatic cow feeding systems (AFS), which are similar to automatic concentrate dispensers and automatic milking systems (AMS). A higher frequency also reduces the feed's tenacity on the handle, lowering the possibility of contamination and aberrant fermentation. The development of this mechanical cattle feeding system, including its design and the numerous parts employed, is discussed in the newspaper.

III. METHODOLOGY

The research for this project began with a market and literature review. In order to understand the autonomous cow feeding system, numerous research papers on topics related to the one under consideration were studied. After studying the market survey, this system's standard component was chosen. Following that, a 3D model was created using CATIA software. For analytical purposes, this model has been used in ANSYS software. Subsequently, components will be produced and put together.

A. Dc Motor

Two motors are required for fluid movement in all directions. There are two D.C. motors employed, each with a 200 rpm rated speed. Each of these motors is positioned so that it drives four legs. A 12V battery that may be recharged powers the motors. This section explains several factors that must be calculated to choose the best motor for a certain application. Examples and selection processes are provided. DC Motor as shown in Fig 1. DC motor

Fig 1. DC motor

Establish the design's drive mechanism, general dimensions, moved distances, and positioning period first. Verify the necessary requirements for the drive system and equipment. (Stop accuracy, position holding, speed range, operating voltage, resolution, durability, etc.).

B. Arduino Circuit

It is a device that generates electronic projects. It is free open-source software that can be downloaded. Arduino also goes by the name of microcontroller. The Arduino platform was developed to provide experts, students, and amateurs with a straightforward and economical approach to build devices that interact with their surroundings using sensors and actuators. It was first introduced in 2005. It makes programming easier.It may be quickly programmed using C or C++. Arduino UNO Circuit board as shown in Fig. 2.

Fig 2. Arduino UNO Circuit

C. 12v Battery

A lead acid battery is used to provide electricity. A charger supplies it with 2.1 volts of charge voltage per cell.The battery stores the electricity that is produced by a different source. Since lead acid batteries can only store a charge, they are referred to as storage batteries. A common 12 volt battery for an RV or marine craft has an AH rating of 125, which means it can produce 10 amps of energy for 12.5 hours. Lead acid batteries can be connected in series.

Fig 3. Battery 12v

D. Submersible Pump

The cavitation problem caused by a significant elevation difference between the pump and fluid surface is eliminated by this type of pump. A submersible pump is a strongly coupled, hermetically sealed motor that powers the pump body. There is extremely little energy needed to propel the water into the pump. Water pressure causes water to enter the pump, preserving the pump's energy. Submersible Pump as shown in Fig. 4

Fig 4. Pump

E. Catia Design

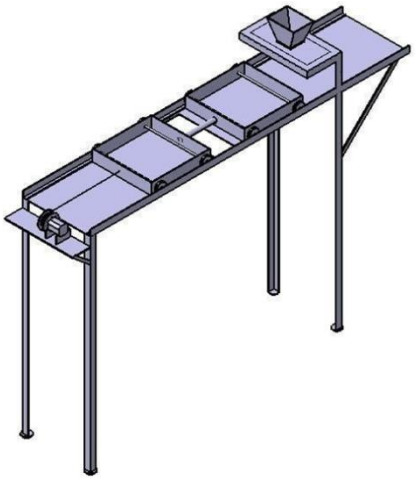

Fig 5. Catia Model

Leading product design software CATIA was developed by a French business. It's a great tool for businesses to create designs, do in-depth analyses, and produce new items that can be used in product development. With the aid of CATIA, stakeholders and designers may collaborate on product modelling and the sharing of their product concepts in a productive 3D design environment. The platform's most recent version offers a wide range of tools for analysis and design. It enables the use of a 3D digital mock-up to simulate items. Dassault Systems unveiled the 3D CAD programme CATIA V5 in 1999. It represented an entirely new design tool that replaced CATIA V4 and showed significant differences from that tool's predecessor.

IV. ANALYSIS

A numerical approach for solving physics and engineering problems is the finite element method (FEM). Structure analysis, heat transfer, fluid movement, mass transportation, and electromagnetic potential are typical problem areas of interest. In most cases, partial differential equation boundary value problems must be solved analytically in order to solve these issues. A set of algebraic equations emerges from the specification of the problem using the finite element method. The approach produces approximations of the unknown values at discrete locations throughout the domain. It splits the complex issue into more manageable, or "finite element," bits in order to solve it.

A. Meshing

ANSYS Meshing is a general-purpose, intelligent, automated high-performance product. It produces the most appropriate mesh for accurate, efficient Multiphysics solutions. A mesh well suited for a specific analysis can be generated with a single mouse click for all parts in a model. Full controls over the options used to generate the mesh are available for the expert user who wants to fine-tune it. The power of parallel processing is automatically used to reduce the time you have to wait for mesh generation

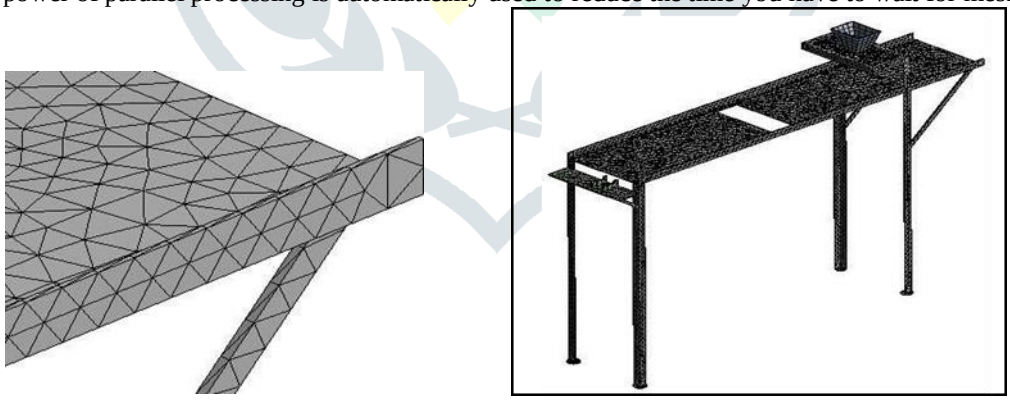

Fig 5. Meshing Model

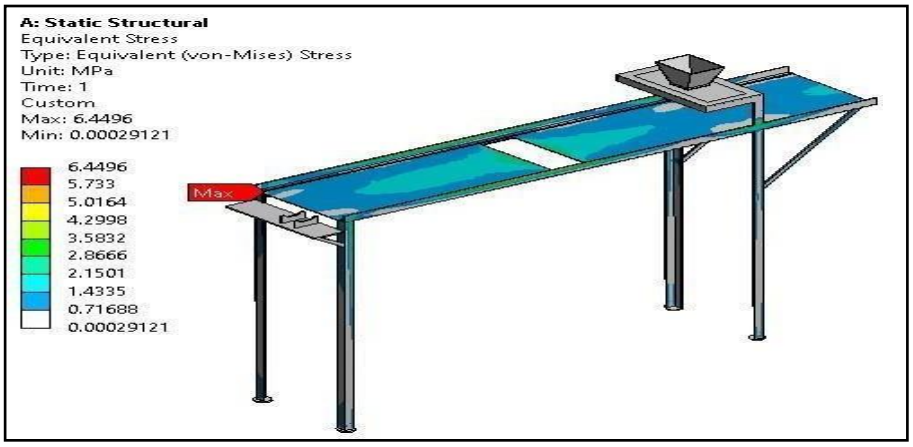

Fig 6. Analysis Model

B. FABRICATION MODEL

Fig 6. Fabricated Model setup

V. CONCLUSIONS

Automation provides feeding based on productivity level while minimising feed costs, staff expenditures, and feed waste. While feed efficiency rises, productivity is maximised. The design of a prototype that can automatically feed animals takes this information into account. As a consequence, the smartphone controlling function and IR and ultrasonic sensor-based sensing technologies have been successfully tested in the targeted work field. In this project, we analyse the statics of the cow feeding structure using ANSYS software. To calculate the total deformation and equivalent stress, do an analysis in ANSYS using the static structural tool..

ACKNOWLEDGMENT

We would like to thank you Prof. Swapnil Deokar of Smt. Kashibai Navale College of Engineering, Pune for continuous guidance during this project work.

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