


Dairy Farm Automation by Using Line Follower Robot and Automated Dairy Farm Cleaning

A project report submitted to the Department of Mechanical Engineering, Sonargaon University, in partial fulfillment of the requirement for the degree of Bachelor of Science in Mechanical Engineering.

Supervised by:


Saikat
Biswas
Lecturer,
Dept of
Mechanical
Engineering,
Sonargaon University.

Submitted by:


Md. Nazmul Sharif
Student ID: BME1501005121

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Abstract

In 2021 human time and there physical work are more valuable. If we use this project then it's will help us for save money and time which we can invest another place.

Aim of this work was finding the way to save money, time and human comfort & human safety.

The conclusion at the end of the work is that Dairy Farm Automation by Using Line Follower Robot and Automated Dairy Farm Cleaning is not 100% suitable for dairy farming process because of some technical problem but in future research can improve its technical quality.

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Chapter I: Introduction

1.1 General:

Dairy product like meat, milk and lather most important things in our daily life . Milk is grate drinking liquid for our health. Dairy meat fulfills our required protein and dairy lather we use in built belt, bag and cloth. But in modern life style no body like to maintain a dairy frame du to physical and mental work. That's why continuously decreasing dairy production and increasing the price of milk, meat and lather. Bangladesh is an agricultural country so without developing the mechanism of production dairy we have not any other way to continue dairy farming and reducing price dairy products.

1.2 Objectives:

The objectives of this project work are:

- i. Construction of a line follower robot to feeding in dairy frame and designing and construction a AI cleaning technology.
- ii. Reducing cost of dairy products production.
- iii. Increasing human safety and comfort in dairy farming.

Chapter II : Literature Review

2.1: Historical Background: When we hear the word ‘automation’ in this day and age, our minds automatically go to advanced technology such as artificial intelligence (AI), machine learning, and robotics. However, the history of automation technology is much deeper than just these extensions of automation that are used in the workplace today. Automation is defined as the creation of technology and its application in order to control and monitor the production and delivery of various goods and services. The idea of automation isn’t necessarily a modern one, as the theory behind utilizing automation technology has been around for centuries, although it has become more specific as well as refined to fit certain industries in the last 100 years.

The word automation traces its earliest roots back to the time of the Ancient Greeks, specifically around 762 B.C. The earliest mention of automation technology came in Homer’s *The Illiad*, in which Homer discusses Hephaestus, the god of fire and craftsmanship. As the story goes, Homer discusses Hephaestus’s workshop, and how Hephaestus had ‘automatons’ working for him, which were essentially self operating robots that assisted him in the process of developing powerful weapons and other items for the Greek gods. Although there is little to no evidence that Hephaestus’s workshop actually existed, this story was written by Homer, a real Greek poet. It shows that the Greeks had at least thought of the idea of using automation technology to solve a problem, which for them was to improve the efficiency of creating weapons and tools.

Throughout history, there is evidence of different groups of people attempting to use automation to solve everyday problems they faced, from miners around the 11th century to workers in the 17th century. However, the time period when automation really began to take off was the Industrial Revolution. The increase in demand for things such as paper and cotton caused a change in the production of these items, with an immense amount

of emphasis placed on extreme efficiency and production. In the textile industry, innovations such as the cotton gin became mechanized, powered by steam and water, allowing for greater production yields. In the paper industry, the Fourdrinier was invented, a machine that was able to make continuous sheets of paper, and eventually led to the development of making continuous rolling sheets of iron and other metals. Huge jumps in other fields such as transportation and communication were also made, leading to an increase in even more automation technologies. In fact, a little later on, the term 'automation' itself was coined in 1946, due to the rapid rise of the automobile industry and the increased use of automatic devices in manufacturing as well as production. D.S Harder, an engineer who worked for Ford Motor Company, is credited with the origin of the word.

Overall, as the information presented shows, automation has a deep and rich history that spans over the centuries. The main uses of automation prior to the 20th and 21st century have been in industrial fields, and have only more recently been incorporated into the IT world. The drivers of all automation technology, however, have always been similar. With industrial automation, the goal was always clear: to improve the efficiency of manufacturing a variety of items. With IT automation, the goal is to improve efficiency by creating a process that is self-sufficient and replaces an IT worker's manual labor in data centers and cloud deployments. The parallels are clear, and they show why automation will always be prevalent in society. Developing technology to lessen the burden on human workers, increase business efficiency and make our lives easier in terms of reducing manual labor is something that has been important to us for centuries, and will continue to make its impact in the future(<https://www.quali.com/blog/the-history-of-automation/>).

2.2: Review of the Relevant Literature:

In India The IB Group started its dairy farm way back in 2000 with just 10 animals and gradually grew to a stage where mechanization was inevitable. Considering the future possibilities, they then decided to start full-scale Commercial Dairy Farming and Milk Production on a larger scale.

They approached DeLaval and ordered a 50 bail Rotary Milking Parlour with Automation in 2009. That's how the Abis Dairy Farm was set up in Raipur, Chhattisgarh. This includes automatic cow identification, milk yield recording, sorting gate to separate cows, activity monitoring and many more types of automation. "Today, we milk more than 1500 cows thrice a day and it is possible only because of DeLaval's Rotary," says Dr. Mukesh Sharma, General Manager. "DeLaval's superior installation and high quality equipment maintain the milk quality. We get data of all cows and parlour performance in Herd Management Software of DeLaval. Since 2009, there is not even a single day when milking stopped in the parlour due to a breakdown."

Their team visited various countries to study how large sized dairy farms work and what equipment they use and found DeLaval's presence in most of the renowned dairy farms.

In China Benefit from excellent milk quality and innovative efficiency with the In-Liner Everything milking process used on all our robotic milking systems. Find out how the optional GEA cell count sensor, an early detection system for mastitis in every individual udder quarter, can improve animal health management in a pioneering way. Welcome the ergonomic and intuitive design for you, and the comfortable stall space for your cows. Above all, the GEA Dairy Robot R9000 robotic milking product line offers you the efficiency potential to milk more cows in a faster amount of time. And at the end of the day, that means you receive a quicker return on your investment.

which can milk the herd of 400 cows in just two hours. There are 4 prototypes of the machine are running; 2 in Germany and 2 in Canada. Each stall unit on the DairyProQ rotary has its own robotic arm, and is designed to completely automate the entire milking process. Rotary parlours using this system can run between 28 and 80 stalls.

Robotic arms do the milking: Once the cow steps into her stall on the revolving carousel, the control panel on each module displays her milking status and shows the parlour operator if attention is needed. The modules instruct robotic arms when, where and how to do the milking. Attaching the teat cup along with teat preparations (including pre-dipping), fore-stripping, stimulation, the milking process, and post-dipping are done in-line, in one single attachment. The unit is automatically removed and back flushed between milking to cleanse the clusters between cows.

Although the number of farms has declined over the decades, production has actually increased -- especially at dairy farms. Modern automation technology and robotics are helping to keep both cows and farmers happy, but at the cost of jobs.

About the above studies it is proved that the **Automation** is a very important phenomenon for solving the problems of economic development in Bangladesh. Automation removes frustration and mismanagement issues from the dairy farm industries and implements a dynamic and time demanding farming system in Bangladesh. So, it is very much important to complete a study about **Automation** at dairy farm in Bangladesh.

2.3: Manually dairy frame feeding and cleaning by human physical and human mental energy:

Manually feeding in dairy farm is a classical procedure of dairy farming. In this procedure human can effected by various kinds of diesis due to various

and bacteria.

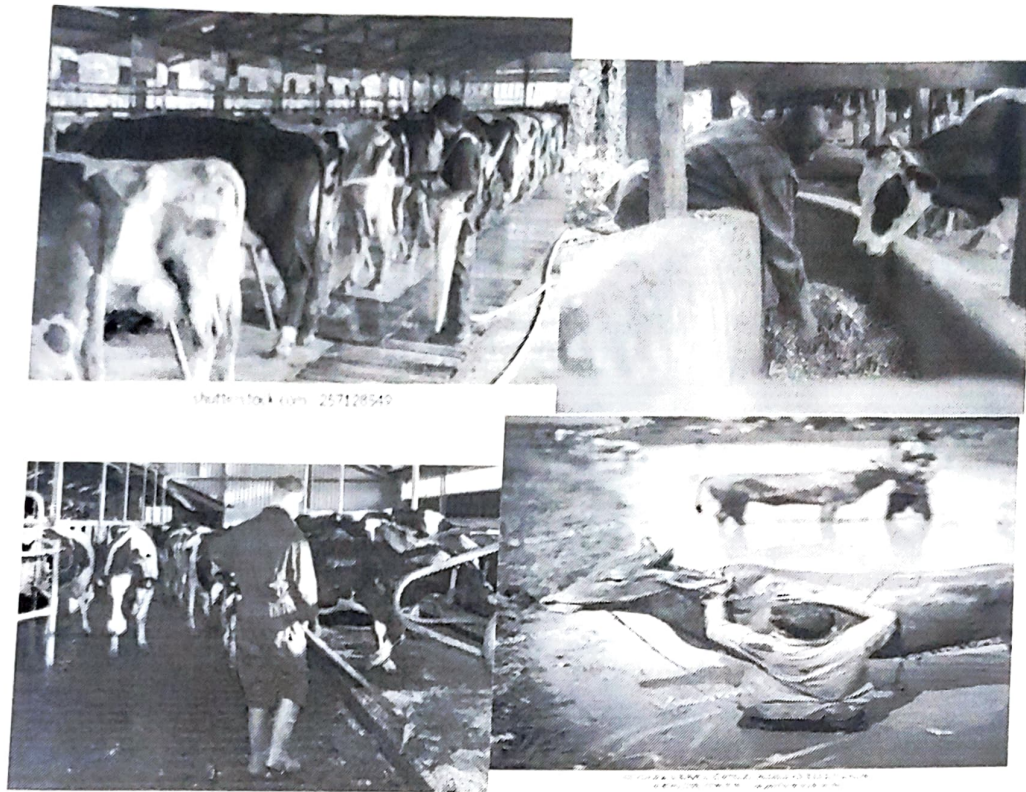


Fig 2.1 Manually dairy frame feeding and cleaning by human physical and human mental energy

2.4: Semi-automatic feeding and cleaning technology:

In this procedure we need human to operate feeding car and cleaning car it's also costly.

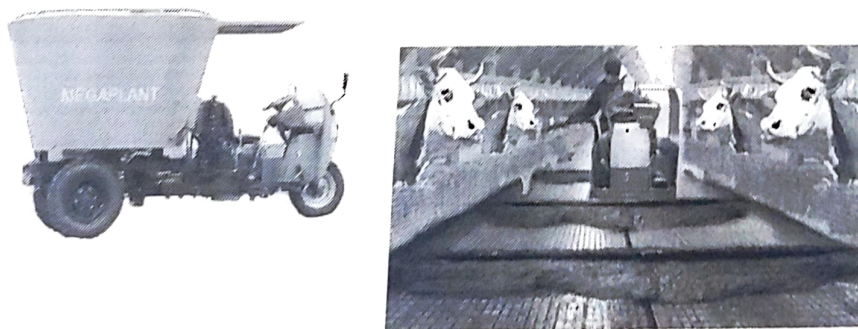


Fig 2.2 Semi-automatic feeding and cleaning technology

2.5: Fully automatic dairy frame feeding and cleaning by line follower robot and AI cleaning technology:

In this process we don't need human to feeding and cleaning .Feeder line follower robot will provide feed to cow and AI cleaning system will clean the farm and will give bath every cow.

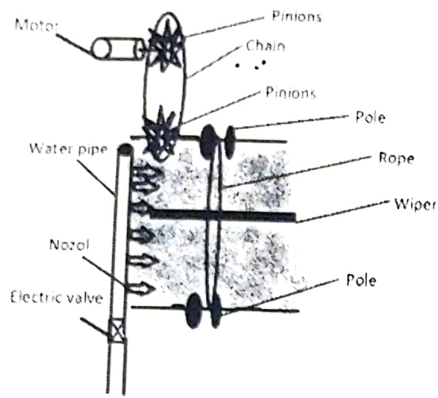


Fig 2.3 Fully automatic dairy frame feeding and cleaning by line follower robot and AI cleaning technology.

Chapter III : Theoretical aspects

3.1 Why This project: In present worlds human time and their physical work are more valuable. If we use this project then it will help us for save money and time which we can invest another place

3.2 Working principle: Line follower robot will follow a line and IR sensor will give signal from detecting peeler for deciding when want to start feeding and when want to stop feeding.

In AI cleaning System A weeper will weep the west of cow In this process when weeper start weeping and will go last border. Then a ultrasonic sensor will detect weeper and a arduino will give serial.printin via RS485 serial protocol and main arduino will receive and run motor in backward when weeper will come in last border in starting line another ultrasonic sensor will detect weeper and will stop motor to run. And every day a pump will give bath every cow.

Chapter IV : Design and Construction of line follower robot and AI cleaning system

4.1 Methods of Study: Experimental methods should be applied for this research.

4.2 Limitations of the Research: Automation is a vast area. Everything could be automated in a Dairy Farm. But for the cause of times and expenditures the study should be delimited only in **Cleaning and Feeding Automations.**

4.4 Description of System components:

The list of the main system components are below:

4.4.1

Arduino UNO

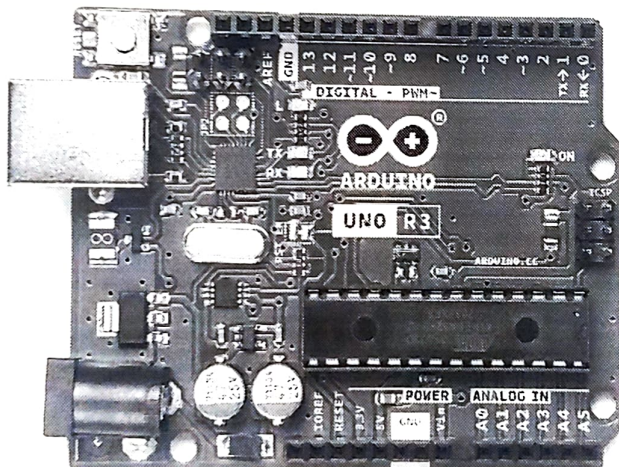


Fig-4.1: Arduino UNO

4.4.2

Ultrasonic sensor

electrical components without human interruption.

Relay: We will use relay for on of the electric component as a switch.

Electric valve: We will use an electrical valve which will open and closed by electric signal, and it will ensure us proper water flow.

Sensor: We will use some sensor for giving the instruction in Development board.

4.5 Construction of the Project :

In line follower robot right side we attached 2 IR sensor .

Back upper side of robot we attach arduino uno and motor driver. In front upper side we attached container of TMR.

In AI cleaning system in starting line we attached a Ultrasonic sensor and another one in finish line.

Budget:

Budget List:

Item	Quantity	Cost
IR sensor	4	600.00
L298N	4	800.00
RS485 Module	2	600.00
Truck chases	1	1,900.00
Water Pump	1	2,000.00
12V Battery	1	2,600.00
Adriano	4	2,400.00
Wire, Pipe, PVC etc		600.00
Frame, Body & Base		2,500.00

Chapter V : Result and Discussion

5.1 Discussion:

Due to using AI feeder line follower robot and AI cloning technology it's not 100% accurate like human done.

Chapter VI : Conclusion

6.1 Conclusion: In this way, the project strives to bring efficiency and accuracy in the Dairy Farm. The automated cleaning and feeding in Dairy Farm should save the time and money of a farm-holder. This project is completely oriented towards the farmer welfare and their economic development. It aids the farm-holder with the complete process of good care of their animals, it helps the farm-holder to come out of their poverty by providing the human free cleaning and feeding in Dairy Farm. It also ensures the health and nutrition of them. Solving all of the above issues is not just an advantage of this project, but also a necessary thing for the betterment of any nation's welfare. This project not only saves money and resources but also time and manpower. Since this project possess so many advantages, every farmer's dream would be to have this implemented in their fields. Since this project is also cost effective and affordable by most of the farmers in our country. There is no doubt that this project would be a market hit.

6.2 Scope of future work: In future work of this project is neural networking
And use of advanced controller .

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