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Automated Lifestock Care and Environment Motoring System

[1]Prof. C. V. Nalawade, [2]Ms. Yogini. Bhosale, [3]Ms. Swati Agale, [4]Ms. Pallavi Fate

[1234]Professor, Department of Electronics and Telecommunication and Engineering, SPPU University, Pune, Maharashtra, India

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Abstract

In today's scenario, farmers are experiencing difficulties in maintaining the automated cow shed system that integrates real-time clock, temperature control, lighting, watering, feeding, and fragrance using Arduino Uno. They have to spend more time or hire workers at a greater expense. Therefore, in this paper, we propose an automated process that can be utilized for cow sheds. Nowadays, in rural areas, cow sheds are located in farming areas where it is challenging to care for the cows. This report deals with the system of an automated feeding of cows, providing drinking water, temperature control, lightning and fragrance. This all automated process is controlled with the Arduino Uno.

Introduction

The livestock industry plays a vital role in food security and economic development worldwide. However, traditional livestock farming practices are often labor-intensive, inefficient, and can compromise animal welfare. The increasing demand for high-quality livestock products, combined with the need to improve animal health and reduce environmental impact, has driven the development of innovative technologies in livestock farming.

Can you provide more details about the Automatic Cow Feeding System? It's a technological solution for feeding cattle without human interference. You can design and develop an automated system that provides shade and water for cows using a servo motor to enhance their comfort and productivity. The Automatic Light On/Off System in a cow shed, based on a Real-Time Clock (RTC), controls the lighting in the shed according to a predetermined schedule. Additionally, the Automatic Temperature-Based Fan in a cow shed regulates temperature and maintains a comfortable environment for the cows.

The primary issue that farmers are currently facing is the feeding of cows using conventional and time-consuming methods. Considering these factors, we have decided to develop this project. We aim to design an automated cow feeding system utilizing Arduino Uno and sensors to dispense the appropriate amount of feed at scheduled intervals, based on the cow's weight and nutritional requirements.

However, cattle are susceptible to environmental stressors, such as extreme temperatures, humidity, and inadequate lighting, which can compromise their health and productivity. Heat stress, for instance, can lead to reduced milk production, decreased fertility, and increased mortality rates.

Smart shade systems have emerged as a promising solution to mitigate these challenges. These systems can provide optimal environmental conditions, reduce labor costs, and enhance cattle welfare.

Literature Review

Automated shade with real-time clocks aim to provide shade for cows, improving their health

and productivity. Arduino Uno is used to control the shading system, utilizing sensors and actuators. Here's an expanded literature survey for an automatic cow shade system with real-time clock using Arduino Uno, incorporating temperature control, light, watering, feeding, and fragrance.

DR Harshal P. Patil, Aarati R. Chaudhari, Yatin P. Patil, Vijay D. Chaudhari, et al [1] As design of this new system that is automated cowshed is much better than the previous systems we hope that this will be the very efficient than the other ones and provide the best result as we expected." Fully Automated Cowshed".

DR. Jussi Nikander, Mikko Laajalahti, Sari Kajava, Auvo Sairanen, Mikko Järvinen1 and Matti Pastell1 Natural Resources Ins et al [2] disscuss some concepts apart from cow behavior, Modern cattle farming research is dependent on large amounts of data gathered from various automation systems in a cowshed. These systems are typically provided by various commercial vendors, and thus are not able to share data. "Development of a general cowshed information management system from proprietary subsystem".

DR. Lisette M.C.Leliveld, et al [3] has give some ideas There is a need for designing an In recent decades, livestock husbandry has undergone considerable changes. In the dairy industry, increasing farm sizes and the accompanying automation are posing challenges to the monitoring of cow welfare, health and production, because farmers are less often present on the farm and lack the time to examine each individual cow on a daily basis (Barkema et al., 2015, Berckmans, 2014, Norton et al., 2019)." Real-Time automatic integrated monitoring of barn environment and dairy cattle behavior:Technical implementation and evaluation on three commercial farms" Prof. Sudam Vasant Nikam, Mr. Moreshwar Nandu Bamgude, Mr. Rohan Sunil Dhanawade, Ms. Kajal Babaji Hule, Ms. Rupika Ashok Nakti., et al [4] explains the system which Internet of things (IoT) is recently become the effective digital technology used in Smart Livestock to increase productivity, efficient and sustainable farm operation. The main aim of this Project is to knowledge of IoT and to use its features as interrelated computing devices such as, interrelation between mechanical and digital machines." Smart livestock using IOT".

Prof. Mrs.T.S. Shirdhone1, Miss. Patil Aishwarya Arjun2, Mr. Pol Sourabh Mahesh3, Miss. Ranjane Rajashree Shridhar4, Mr. Shinde Aniket Pandit5, et al [5] Dairy milk production is depend on the management of animal husbandry. After the implementation of this system climate will control and the good climate is help to improve immunity of animal's. The main advantage is improve milk production by 1-2 liter per day. "Smart Hybrid climate control using iot for cow and buffalo shade".

METHODOLOGY

This section outlines the research design, hardware and software development, testing, and data analysis procedures used to develop and evaluate the automated cow shade system.

1.Research Design

I. System Design: Developing a comprehensive system that integrates real-time clock, temperature control, lighting, watering, feeding, and fragrance systems.

Experimental Testing: Testing the system with 3-4 cows to evaluate its effectiveness.

2.Testing and Evaluation

i. Experimental setup: 3-4 cows, climate-controlled environment

ii. Performance metrics: Temperature control, lighting uniformity, water savings, feeding efficiency, stress reduction

iii. Data collection: Sensors, camera traps, cow health records

3.Hardware Development

1. Arduino Uno microcontroller
2. Real-time clock (RTC) module (DS3231)
3. Temperature sensors (DHT11)
4. Light sensors (LDR)
5. Water level sensors (Ultrasonic)
6. Feeding system (Servo motor)
7. Fragrance system (Essential oil diffuser)
8. Relay modules
9. Power supply.

4. Software Development

1. Arduino IDE (Embedded C)

ANALYSIS METHOD

1.System Integration:

1. Connect sensors to Arduino Uno
2. Connect motors and relays to Arduino Uno
3. Connect LCD display and keypad to Arduino Uno
4. Write and upload software code to Arduino Uno
5. Test and calibrate system components
6. Integrate system components into a single unit

2. System Requirements:

1. Power supply: 9V or 12V DC
2. Operating temperature: 32°
3. Humidity: Humidity can easily reach 80% during the summer and can reach almost 100% in poorly designed buildings.
4. Memory: 32KB (Arduino Uno)

5. Processor: ATmega328P (Arduino Uno)

3 Performance Metrics
Temperature Control Accuracy (TCA), Lighting Uniformity (LU), Water Savings (WS), Feeding Efficiency (FE), Stress Reduction (SR).

4.Hardware Functions:
1. Temperature sensing (DHT11)
2. Humidity sensing (DHT11)
5. Feeding system control (servo motor)
6. Fragrance system control (servo motor)
7. Lighting system control (relay or transistor)
8. Watering system control (relay or transistor)
9. Motor control (servo and DC motors)
10. LCD display
11. Keypad input
12. Real-Time Clock

5.Software Functions:
1. Real-Time Clock (RTC) management
2. Temperature control algorithm
3. Lighting control algorithm
4. Watering control algorithm
5. Feeding control algorithm
6. Fragrance control algorithm
7. Sensor data acquisition and processing
8. Motor control (servo and DC motors)
9. LCD display management
10. Keypad input processing

6. Data Collection Tools
Temperature sensors (DHT11), Light sensors (LDR), Water level sensors (Ultrasonic), Feeding system monitoring software.
Data Analysis Software
Arduino IDE

BLOCK DIAGRAM

The diagram illustrates a system controlled by an Arduino Uno microcontroller, incorporating several input and output components:
Power Supply: Provides power to the entire system.

DHT11 Temp/Hum: A sensor measuring temperature and humidity, sending data to the Arduino Uno.

Keypad: Allows user input to control the system.
Arduino Uno: The central processing unit, receiving input from sensors and the keypad, and controlling the outputs.

LCD Display: Shows information to the user, likely displaying temperature, humidity, or system status.

Servo Motors (1, 2, 3): Three servo motors controlled by the Arduino, potentially used for mechanical movement or adjustments.

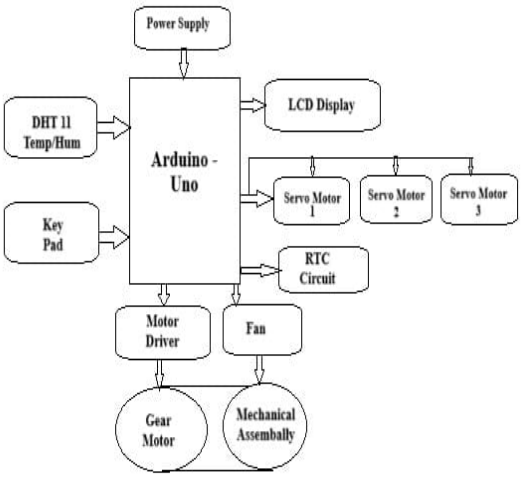
RTC Circuit: A Real Time Clock circuit, likely used to keep track of time for scheduling or data logging purposes.

Motor Driver: Controls the speed and direction of the gear motor.

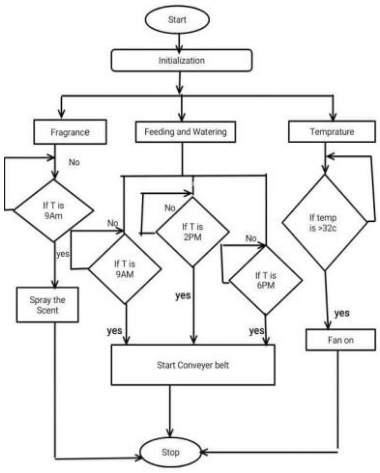
Fan: Provides cooling or ventilation, controlled by the Arduino.

Gear Motor: A motor with a gearbox, providing controlled movement to the mechanical assembly.

Mechanical Assembly: The physical component moved or controlled by the gear motor and servo motors.



Flowchart



Here's a breakdown:
1.Start & Initialization: The process begins with initialization step,likely involving system setup or variable definition.
2.Fragrance:
Checks if the time is 9 AM. If yes, it sprays a scent. If it is 9 AM,a scent is sprayed.
3.Feeding & Watering:
The system checks if the time is either 9AM,2PM or 6PM.
If yes,it feeds grass and waters the cows using a conveyor belt system. . Checks if the time is 6 PM. If yes, it stops the process (likely for the day).
Temperature: Checks if the temperature is greater than 32°C. If yes, it turns on a fan.

Conclusion

Smart shades equipped with real-time clocks using Arduino Uno offer a promising solution for enhancing cow health and productivity. Further research and development can improve the system's efficiency, accuracy, and scalability. This research contributes to the advancement of innovative and sustainable solutions for cattle farming, addressing critical challenges in environmental management and animal welfare.

Future Scope

1. Investigating the impact of automated shade systems on cow productivity.
2.Analyzing the effectiveness of different temperature control strategies and automatic cleaning the cow shade.
3. Developing predictive models for cow health and behavior.

Reference

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Alavi, M., & Leidner, D. E. 2001. Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. MIS quarterly 25(1) 107-136. Boyd, J.R., 1996. The Essence of Winning and Losing. Keynote address. Boyd, J. R. 1987.

Organic design for command and control. A discourse on winning and losing. Endsley, M. 2000. Theoretical Underpinnings of Situation Awareness: a Critical Review. In: Situation Awareness Analysis and Measurement. Mahwah, NJ (ed), Lawrence Erlbaum Associates.

Jussi Nikander1, Mikko Laajalahti1, Sari Kajava1, Auvo Sairanen1, Mikko Järvinen1and Matti Pastell1Natural Resources Institute Finland, Halolantie 31 A, 71750 Maaninka, Finland.matti.pastell@luke.fi

Prof. Mrs.T.S. Shirdhone1, Miss. Patil Aishwarya Arjun2, Mr. Pol Sourabh Mahesh3, Miss. Ranjane Rajashree Shridhar4, Mr. Shinde Aniket Pandit51Professor, Department of Electrical Engineering, D Y Patil technical campus, Talsande.2,3,4,5Student, Department of Electrical Engineering, D Y Patil technical campus, Talsande.

JIM BARTELS 1, (Graduate Student Member, IEEE), KORKUT KAAN TOKGOZ 1,2, (Member, IEEE), SIHAN A 1, (Graduate Student Member, IEEE), MASAMOTO FUKAWA1,3, SHOHEI OTSUBO1,3, CHAO LI 1, (Graduate Student Member, IEEE), IKUMI RACHI1, KEN-ICHI TAKEDA4, LUDOVICO MINATI 1, (Senior Member, IEEE), AND HIROYUKI ITO 1, (Member, IEEE). "TinyCowNet: Memory- and PowerMinimized RNNs Implementable on Tiny Edge Devices for Lifelong Cow Behavior Distribution Estimation". Received February 17, 2022, accepted February 24, 2022, date of publication March 2, 2022, date of current version March 30, 2022.

Vishwa Priya V, Praveen Jeeva P, Poovarasan Sathiyamoorthy N, Vignesh R M "Automated Cow

Management System" Nat. Volatiles & Essent. Oils, 2021.

X. Zhang, C. Xuan, P. Wu, L. Zhang, and M. Yanhua, ''Review on monitoring technology for behaviors of livestock and poultry based on acoustic signals,'' Heilongjiang Animal Sci. Vet. Med., no. 527, pp. 63–68, 2017.

Swapnil Deokar1, Akshay Ingle1, Vaibhav Gosavi2, Prajwal Zope "Management of Automatic Cow Feeding and Drinking System Using Microcontroller". JETIR May 2023.