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Automatic Cattle Feeder

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Abstract: *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 battery operated robotic system that is capable of feeding an equal amount of feed. The feed is manually loaded in the feeder After the feed is mixed in the mixer, it falls onto the conveyer belt and follows a predetermined path until it reaches the last cattle in the fence. To ensure the precise, timely and adequate feeding of each cattle, this project is applicable in an agricultural country where the lack of manpower is there in cattle farming. Due to less man power there is an adverse effect on dairy production. The main objective is to design an automatic cattle feeding system that it moves around the fence to distribute the feed uniformly. With the application of following robotic system , remarkable changes can be brought to this field. . The use of PIC microcontroller helped to control and switch off the whole system whenever there is any issue in the hardware. With the application of Automatic Cattle Feeding system uniformity and hygiene in feed distribution can be maintained.*

Keywords: cattle feeder

I. INTRODUCTION

Background

nimal feed distribution systems are a very common item and are used greatly both on a domestic scale as well as on a larger scale in commercial applications. Animal feed distribution systems come in many different forms with different ways to control how the feed actually gets distributed. Whether it is a manual system, an automatic system on a timer, or a sensor based system; there are many different ways to accomplish the same end outcome, with some of the routes being more efficient than others. Many users are looking for a system that is not only capable of running on its own, but also one that is visually appealing. In today's college culture, many young adults are looking for a new experience, and one of these experiences is bringing a pet of some sort home. Whether it be a dog, cat, hamster, or any other sort of pet, these animals need to be properly cared for and nourished. Often times, a source of stress for these animals can be not getting fed the proper amounts of feed or not getting fed on time. This is a sad reality that leads to malnourishment and eventually abandonment of these animals. In addition, many times feed will come in an airtight bag that pet owners can forget to close up completely after feeding pets. This leads to things like growing mold spores and bacteria cultures in the feed itself. All these reasons come together to pose the question of: "Is there a better way to do this?", and the answer is yes.

Objective

The objective function of this project is to design and build the hardware for a dog feed distribution system that would operate on a sensor basis through the use of a load cell, an LCD display, and a servo motor. It will provide schematics to be used for the wiring of the system, images and procedures for the construction of an aesthetically pleasing and useful outer-casing, as well as the code developed that is necessary to ensure every component does its job. Constraints of the system would be that the actual hardware would need to be able to be confined to the end user's available area of use.

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Features

An automatic cattle feeder using the PIC 16F877A microcontroller can be equipped with various features to enhance its functionality. Here are some common features you can incorporate into such a system:

1. Portion Control: The feeder can be programmed to dispense specific portion sizes of feed to ensure accurate and consistent feeding.
2. Feeding Schedule: The microcontroller can be programmed to set up feeding schedules based on specific times of the day or intervals, ensuring regular and timely feeding.
3. Customizable Feeding Programs: The system can accommodate different feeding programs based on factors such as the cattle's age, weight, and nutritional requirements. This allows for tailored feeding plans that can be adjusted as needed.
4. Feed Level Monitoring: Sensors can be integrated into the feeder to monitor the feed level and provide real-time feedback on the remaining feed. This feature helps prevent feed shortages and allows farmers to plan for refilling the feeder.
5. Feed Dispensing Mechanism: The feeder can utilize various mechanisms, such as augers, conveyor belts, or gravity-based dispensing, to accurately dispense feed into the designated feeding area.
6. User Interface: A user-friendly interface, such as an LCD display or a keypad, can be included to allow farmers to interact with the system, set feeding parameters, and monitor feeding activities.
7. Data Logging and Analytics: The microcontroller can log data related to feeding activities, such as feed consumption, feeding frequency, and any irregularities. This data can be analyzed to optimize feeding strategies and track cattle health.
8. Alarms and Notifications: The system can generate alerts or notifications to inform farmers about low feed levels, feed dispensing errors, or other system abnormalities that require attention.
9. Power Management: The microcontroller can incorporate power management features, such as sleep modes or low-power operation, to conserve energy and prolong battery life in case of a battery-powered system

Advantages

1. Precise Feeding Control: The microcontroller allows for precise control over the feeding process, ensuring accurate portion sizes and feeding schedules. This promotes optimal nutrition and growth for the cattle.
2. Time and Labor Savings: Automating the feeding process eliminates the need for manual feeding, saving time and reducing labor costs. Farmers can allocate their resources to other important tasks.
3. Consistent and Reliable Feeding: The microcontroller ensures consistent and reliable feeding, eliminating human error and variations in feeding routines. This leads to improved overall animal health and productivity.
4. Feed Efficiency and Cost Reduction: The precise control of feed portions reduces waste and optimizes feed usage. This can result in cost savings on feed expenses over time.
5. Remote Monitoring and Control: By integrating communication modules, such as wireless or IoT capabilities, farmers can remotely monitor and control the cattle feeder. This allows for convenient management and adjustment of feeding schedules from anywhere.
6. Alarms and Notifications: The system can generate alerts or notifications in case of low feed levels, malfunctions, or any abnormal conditions. This enables prompt action and minimizes potential issues.
7. Improved Animal Welfare: The automatic cattle feeder ensures timely and consistent feeding, reducing stress and promoting the overall well-being of the animals.
8. Scalability and Expandability: The microcontroller-based system can be easily scaled up to accommodate larger herds or expanded with additional features as needed. This provides flexibility and adaptability to evolving farm requirements.

Overall, an automatic cattle feeder using the PIC 16F877A microcontroller improves feeding efficiency, reduces labor and feed costs, enhances animal welfare, and offers advanced monitoring and control capabilities for optimal cattle management

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Limitations

While an automatic cattle feeder using the PIC16F877A microcontroller offers several advantages, there are also some limitations to consider:

1. Complexity of Programming: Programming the microcontroller to perform specific tasks and meet the requirements of the cattle feeding system can be complex. It requires a certain level of technical expertise in microcontroller programming and electronics.
2. Power Supply: The PIC16F877A microcontroller requires a stable power supply to operate effectively. In remote areas or locations with unreliable power infrastructure, ensuring a continuous power source can be a challenge.
3. Mechanical Reliability: The mechanical components of the feeder, such as the feed dispensing mechanism, may experience wear and tear over time. Regular maintenance and periodic replacement of parts may be required to ensure the system's reliability and longevity.
4. Environmental Factors: Outdoor installations of automatic cattle feeders are exposed to various environmental conditions, such as extreme temperatures, moisture, dust, or potential damage by animals. These factors can affect the performance and durability of the system and its electronic components.
5. Compatibility and Integration: Integrating the PIC16F877A microcontroller-based cattle feeder with existing farm management systems or other equipment may require compatibility considerations and additional integration efforts.
6. Limited Intelligence: While the microcontroller can perform specific tasks and automate the feeding process, it lacks advanced intelligence and decision-making capabilities. Complex or dynamic feeding scenarios may still require human intervention and judgment.
7. Initial Cost and Investment: Implementing an automatic cattle feeder with a PIC16F877A microcontroller involves upfront costs for hardware, sensors, programming, and installation. For smaller-scale operations, the initial investment may outweigh the potential cost savings.
8. Adaptability to Cattle Behavior: Cattle behavior can vary, and some animals may require individual attention or have specific feeding preferences that may not be fully addressed by an automated feeder. Continuous monitoring and adjustments may be necessary to ensure the system accommodates the unique needs of the cattle.

It's important to evaluate these limitations and consider them in the context of specific farming requirements and conditions before implementing an automatic cattle feeder using the PIC16F877A microcontroller.

II. LITERATURE SURVEY

History

The first automatic feeding system is known to be introduced by Valmetal. The robotic system was fully managed by a PLC capable of articulating and coordinating on its own all of the farm equipment of a dairy farming. Till the present date, Valmetal is the company with the largest number of automated feeding system. The system consisted of a control panel assembled by one of the Valmetal Group of companies "Controls -A-Tech Drummond" consisted of a PLC, a touch screen, a weighting system and other necessary equipment for conveying feed [1]. In 1993, Pellon introduced its first feeding robot, Concentrate Feeder Robot. It was a simple solution to manually dropping feed to cattle in a certain proportion. The concentrate feeder robot assured accurate proportioning. After three years of implementation of the concentrate feeder robot, Pellon introduced Combi Robot to consider concentration as well as the quality of feed. The latest feeding system by Pellon is Feedline Automatic System. The system has its own Pellon Graphics that is independent of computer graphics or internet connections [2]. The farm owned by Frank Murphy and managed by Aine Sweeney was the first beef farm to introduce the Lely automated feeding system. It used the ultrasonic sensor to track its route [3].It has been reported that 16 manufacturers have developed different automatically operating feeding designs for (total mixed ration)TMR/PMR(Partial mixed ration) with as estimated 300400 farms adopting this technology, mostly located in Northern Canada, Europe and Japan. In the US, an automated feeding system for feeding cattle used a single controller connected to the feeder via the communication line. It had a plurality of feeders which were simultaneously coupled to communication line one after the other. The communication system included a

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pneumatic power supply [4]. At present day, there is the number of small as well as large scale commercial enterprises working on automatic cattle feeding systems, most of all in the developed nations. Trioliet is a manufacturing company in Holland which has developed an automated robotic feeding system. It consisted of a robot with mixing and feeding mechanism and was able to feed 700 head of cattle [5]. In the context of Nepal, Dairy farming has not been a much profitable business as it would have been if automation in feeding was introduced. According to the report of Dairy Farm in Kathmandu, there is a lot of possibility in cow or dairy farming but there are only the few commercial dairy farms in Nepal. Ministry of Livestock Development reports that our country has been importing 0.5 million liters of milk per day from India. This is due to the inadequate feeding of cows. Feed management is key for milk production. Proper feed management leads to positive changes in cow behavior including good health, increased quantity and quality production, etc. [6] .According to a report of The Kathmandu Post, dairy farming is much better than foreign employment. If automation is brought in feeding, it would decrease labor time by 25% as well as less manpower will be required with increased profit. The farm size can be increased and dairy industries will be a money making business in Nepal [7]. To ensure the success of dairy farms, automatic cattle feeding system would be a key solution. The system uses Atmega328 microcontroller with features of variability. It has 32 general purposes I/O lines which would make it possible to connect many peripherals. In this project, we are adding android application which will have direct control on the feeding system.

M. Parthasarathy, et al [1] discussed
The AFS is a new practical and completely modern concept to overcome the difficulties due to labor shortage and to increase the white revolution .AFS is an automated feeding machine with proper technique of refilling the fodder at correct interval. The AFS relies on the programmable logical Control method. The basic work to be performed by the AFS machine is to grab the fodder from the stockyard to cutting machine through conveyer and then the feed which has to be given to the cattle is cut as per the required conditions, then the feed is directed to the feed distributor chamber through conveyer. This system also serves the cattle at proper interval of time

Specifications

- PIC16F877A Microcontroller : Operating Voltage- 2V to 5.5V.
- Bus width: 8 bits
- Program memory: 14.3 KB
- Ram Size: 368 bytes
- Servo Motor: Operating Voltage- 4.0V to 7.4V.
- Shaft Type: Keyway
- Maximum Current: 24.81A
- Rated Current: 8.3A
- DC Motor: Operating Voltage – 12V to 24V.
- Speed: 1500rpm
- Continuous Current: 3.33-11.29
- Continuous Torque: 0.6875-1.31 ln-lbn.
- L239D Motor Driver :- Voltage Range -4.5V to 36V.
- Separate Input: Logic Supply
- Output current :1 A per cannel Peak
- Output current :2 A per cannel
- Conveyer belt. Length: 60cm width: 8cm.

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III. BLOCK DIAGRAM AND DESCRIPTION

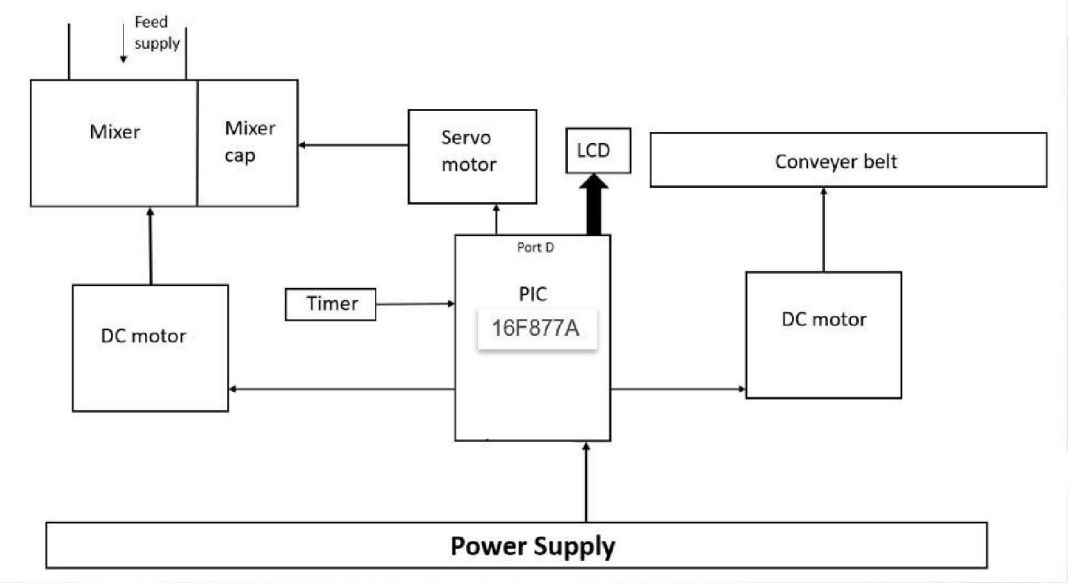

Fig 1: Automatic cattle feeder block diagram

PIC16F877A microcontroller, Regulated Power Supply, DC motor, servo motor, and conveyor belt are the five main components. As we can see, the microcontroller is at the heart of the device and controls every aspect of it. The controller is written in C in the MP lab IDE, which is used to develop logic. All three motors' ON timing is controlled by the microcontroller. One dc motor mixes the feed in the mixer, another dc motor moves the conveyor belt, and a servo motor opens the dispenser lid. The timing is entered using a keypad and displayed on an LCD.

- DC motor:- It is used to mix the feed and move the conveyor belt in rotational motion.
- Timer:- It is used to set the timer for how much time the conveyor belt will stop in front of cattle's before rotating in reverse direction.
- Servo motor :- It is used to open the mixer's cap.
- LCD:- It is used to display the timing for which the conveyor is going to stop

IV. HARDWARE SYSTEM DESIGN

PIC16F877A Microcontroller

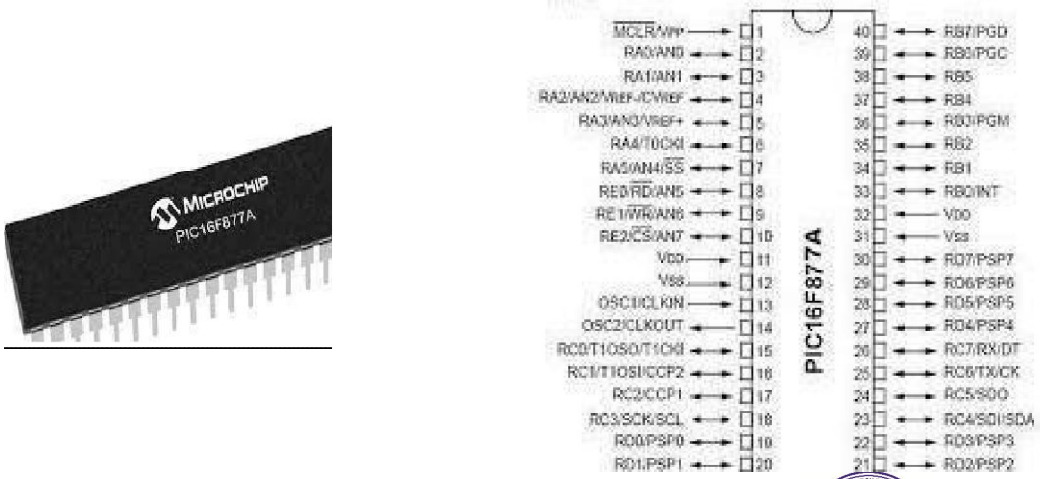

Fig 2: PIC 16F877A and its pin diagram

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The PIC16F877A is a 40-pin (DIP) microcontroller which Microchip describes as powerful based on having a 200 nano second instruction speed. The PIC16F887 is an 8-bit microcontroller from Microchip. The 40-pin IC has 14 Channel 10-bit ADC making it suitable for applications which require more ADC inputs. The IC also has 2 Comparators, 2 Timers (8-bit and 16-bit) and supports SPI, I2C and UART communication protocols

DC Motor

A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation

Fig 3: DC motor

Servo Motor

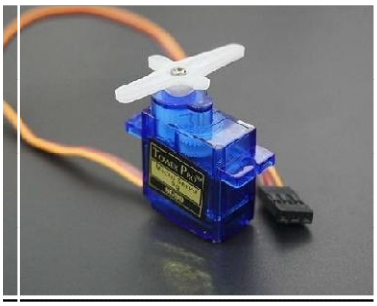

Fig 4: Servo motor

A servo motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision.

LCD Display

Fig 5: 16x2 LCD display

The LCD display used in the development of the RFID-based car parking system is a 16x2 alphanumeric display module. It has a character font size of 5x8 dots and can display up to 32 characters at a time (16 characters per row).

Technical specifications:

Model: 16x2 LCD Display

Display Format: 16 characters x 2 lines Operating Voltage: 5V DC

Interface: HD44780 or equivalent

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Working

1. Turn ON the power supply given to PIC16F877A.
2. Set the time to feed cattle & load that timing into the PIC16F877A by using the code.
3. The feed is manually loaded in the feeder and the timer is set on LCD.
4. DC motor starts to mix the feed present in the feeder.
5. Servo motor is used to open the mixer's cap.
6. After that Food will be dropped onto the conveyer belt and then the belt will begin to move in a rotational motion by using dc motor.
7. The conveyer belt will feed the last cattle before stopping then it will stay in OFF condition till the timer ends, it will begin rotating again in reverse direction to collect the remaining feed.
8. Power supply is turned OFF.

V. CIRCUIT DIAGRAM

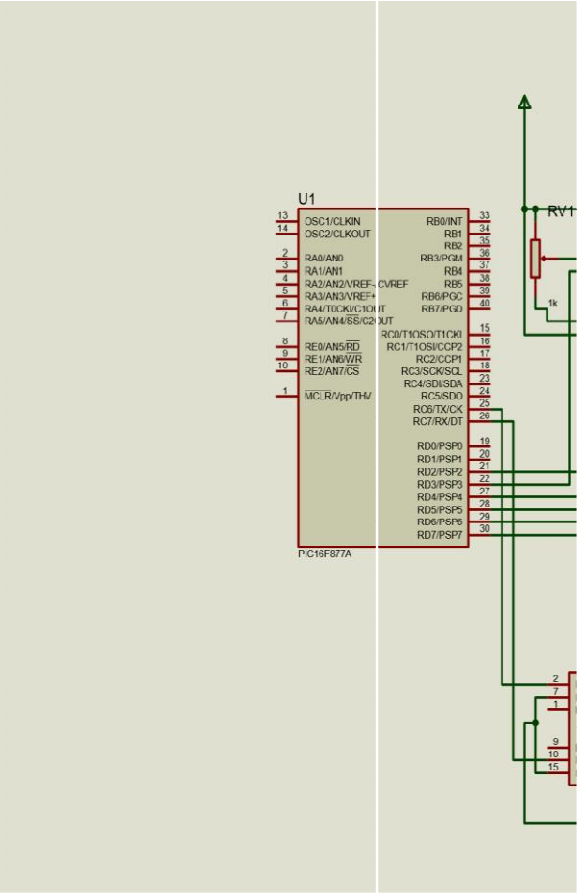

Fig 6: Automatic Cattle feeder circuit diagram

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PCB layout

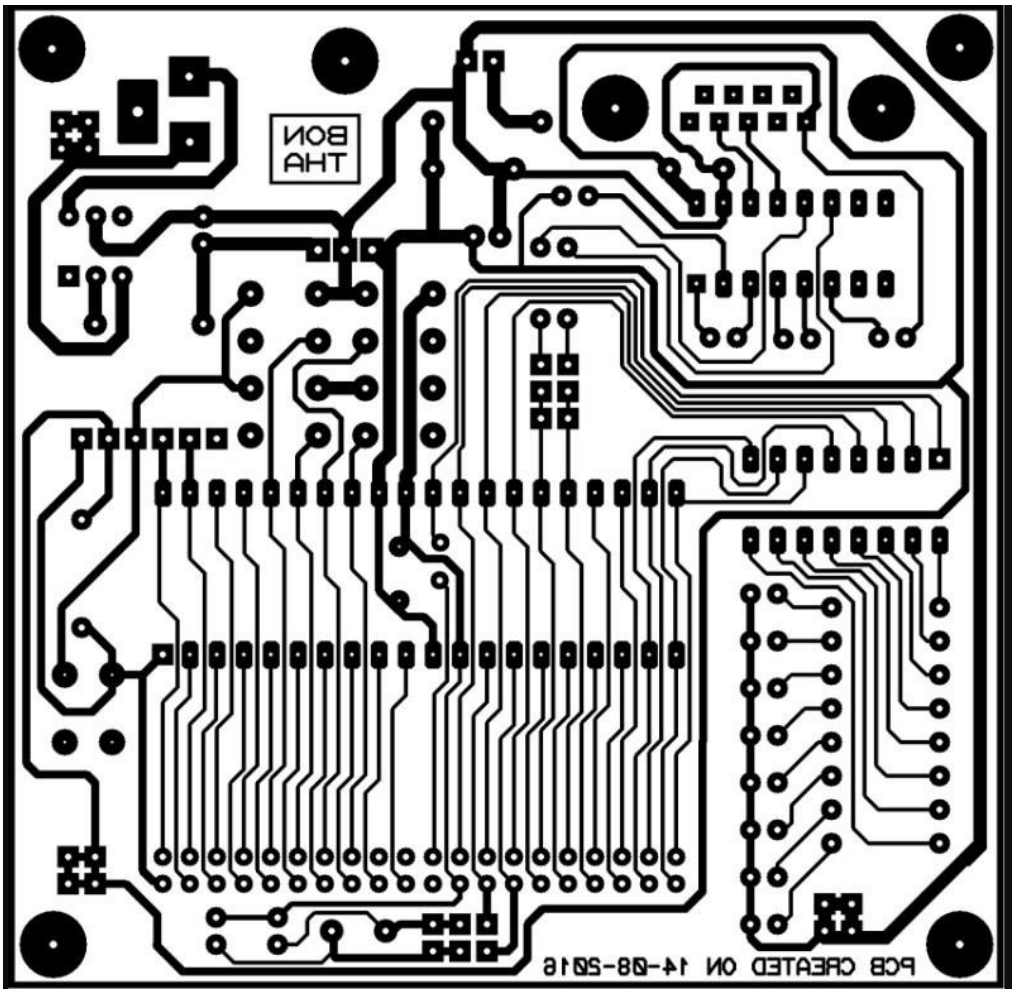

Fig.7: PCB layout : Topview

Software system design

Algorithm

1. Start.
2. Turn ON the power supply and initialize all the ports.
3. Set the timer into the program.
4. Turn ON the dc motor for mixing after manually loading the feed into the mixer.
5. Servo motor will work to open the mixer's cap to drop the feed onto the conveyor belt.
6. Conveyor belt will start to rotate by using dc motor.
7. After reaching to the last cattle conveyor will stop till the timer ends.
8. Again dc motor will start to rotate the conveyor belt in reverse direction.
9. Turn OFF power supply.
10. 10.stop.

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Flowchart

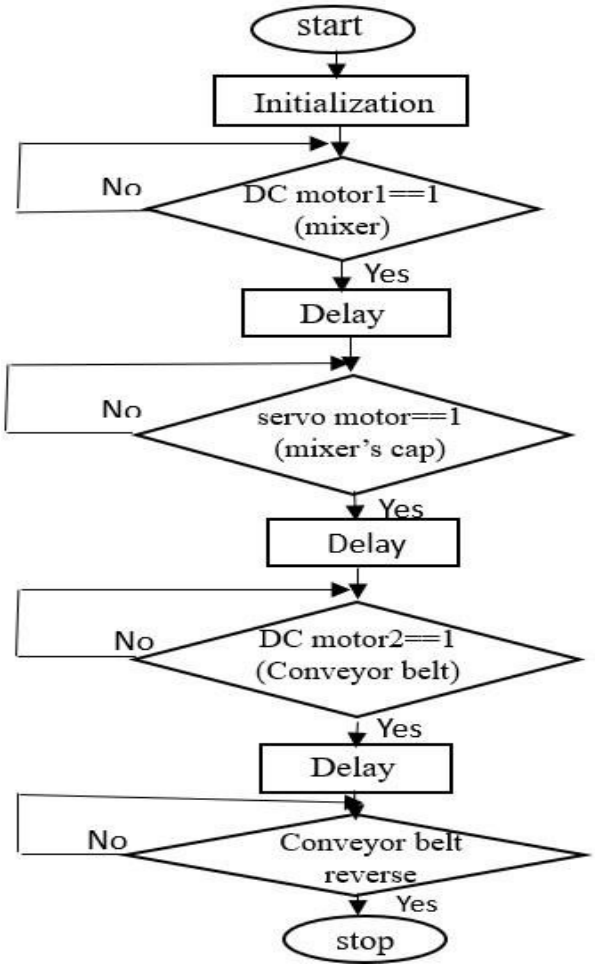

Fig 8: Automatic cattle feeder flowchart

Source Code

```
#include <htc.h>
#define _XTAL_FREQ 20000000 #define RS RD2
#define EN RD3 #define D4 RD4 #define D5 RD5 #define D6 RD6 #define D7 RD7 #include <xc.h>
#pragma config FOSC = HS          // Oscillator Selection bits (HS oscillator) #pragma config WDTE = OFF
// Watchdog Timer Enable bit (WDT disabled) #pragma config PWRTE = ON
// Power-up Timer Enable bit (PWRT enabled) #pragma config BOREN = ON
 // Brown-out Reset Enable bit (BOR enabled)
#pragma config LVP = OFF          // Low-Voltage (Single-Supply) In-Circuit Serial Programming Enable bit (RB3 is digital I/O, HV on MCLR must be used for programming)
#pragma config CPD = OFF          // Data EEPROM Memory Code Protection bit (Data EEPROM code protection off)
#pragma config WRT = OFF          // Flash Program Memory Write Enable bits (Write protection off; all program memory may be written to by EECON control)
#pragma config CP = OFF // Flash Program Memory Code Protection bit (Code protection off)
//LCD Functions Developed by Circuit Digest.
```

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```
void Lcd Set Bit(char data bit) //Based on the Hex value Set the Bits of the Data Lines
{
if(data_bit& 1)
D4 = 1;
else
D4 = 0;
if(data_b it& 2)
D5 = 1;
else
D5 = 0;
if(data_bit& 4)
D6 = 1;
else       22
D6 = 0;
if(data_bit& 8)
D7 = 1;
else
D7 = 0;
}
void Lcd_Cmd(char a)
{
RS = 0;
Lcd_SetBit(a); //Incoming Hex value EN = 1;
 delay_ms(4); EN = 0;
}
Lcd_Clear()
{
Lcd_Cmd(0); //Clear the LCD
Lcd_Cmd(1); //Move the curser to first position
}
void Lcd_Set_Cursor(char a, char b)
{
char temp,z,y; if(a== 1)
{
temp = 0x80 + b - 1; //80H is used to move the curser z = temp>>4; //Lower 8-bits
y = temp & 0x0F; //Upper 8-bits Lcd_Cmd(z); //S
Lcd_Cmd(y); //
}
else if(a== 2)
{
temp = 0xC0 + b - 1;
z = temp>>4; //Lower 8-bits
y = temp & 0x0F; //Upper 8-bits Lcd_Cmd(z); //Set Row
Lcd_Cmd(y); //Set Column            23

}
}
void Lcd_Start()
{
```

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```
Lcd_SetBit(0x00);
for(int i=1065244; i<=0; i--) NOP();
Lcd_Cmd(0x03);
 delay_ms(5); Lcd_Cmd(0x03);
 delay_ms(11); Lcd_Cmd(0x03);
Lcd_Cmd(0x02); //02H is used for Return home -> Clears the RAM and initializes the LCD Lcd_Cmd(0x02); //02H is
used for Return home -> Clears the RAM and initializes the LCD Lcd_Cmd(0x08); //Select Row 1
Lcd_Cmd(0x00); //Clear Row 1 Display Lcd_Cmd(0x0C); //Select Row 2
Lcd_Cmd(0x00); //Clear Row 2 Display Lcd_Cmd(0x06);
}
void Lcd_Print_Char(char data) //Send 8-bits through 4-bit mode
{
char Lower_Nibble,Upper_Nibble; Lower_Nibble = data&0x0F; Upper_Nibble = data&0xF0;
RS = 1;  // => RS = 1
Lcd_SetBit(Upper_Nibble>>4);      //Send upper half by shifting by 4 EN = 1;
for(int i=2130483; i<=0; i--) NOP(); EN = 0;
Lcd_SetBit(Lower_Nibble); //Send Lower half EN = 1;
for(int i=2130483; i<=0; i--) NOP(); EN = 0;
}
void Lcd_Print_String(char *a)
{
int i;      24
for(i=0;a[i]!='\0';i++)
Lcd_Print_Char(a[i]); //Split the string using pointers and call the Char function
}
void main()
{
TRISB=0x00; //Port-B as Output TRISC=0x00; //RD7 as input
TRISD = 0x00;
Lcd_Start(); while(1)
{
Lcd_Set_Cursor(1,1); Lcd_Print_String("Cattle Field"); Lcd_Set_Cursor(2,1); Lcd_Print_String("Monitoring");
 delay_ms(2000); Lcd_Clear();
Lcd_Set_Cursor(1,1); Lcd_Print_String("Starting MIxing "); Lcd_Set_Cursor(2,1); Lcd_Print_String("Motor");
RC6=1;
 delay_ms(2000); Lcd_Clear();
Lcd_Set_Cursor(1,1); Lcd_Print_String("Cattle Field"); Lcd_Set_Cursor(2,1); Lcd_Print_String("Monitoring");
 delay_ms(2000); Lcd_Clear();
Lcd_Set_Cursor(1,1); Lcd_Print_String("Stopping MIxing "); Lcd_Set_Cursor(2,1); Lcd_Print_String("Motor");
RC6=0;
  delay_ms(2000);
Lcd_Clear();       25
Lcd_Set_Cursor(1,1); Lcd_Print_String("Starting Conveyer "); Lcd_Set_Cursor(2,1);
Lcd_Print_String("Motor"); RC7=1;
 delay_ms(2000); Lcd_Clear();
Lcd_Set_Cursor(1,1); Lcd_Print_String("Cattle Field"); Lcd_Set_Cursor(2,1); Lcd_Print_String("Monitoring");
 delay_ms(2000); Lcd_Clear();
Lcd_Set_Cursor(1,1); Lcd_Print_String("Stopping Conveyer"); Lcd_Set_Cursor(2,1);
Lcd_Print_String("Motor"); RC7=0;
```

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```
delay_ms(2000); Lcd_Clear();
}
}
```

VI. RESULT AND DISCUSSION / OUTPUT

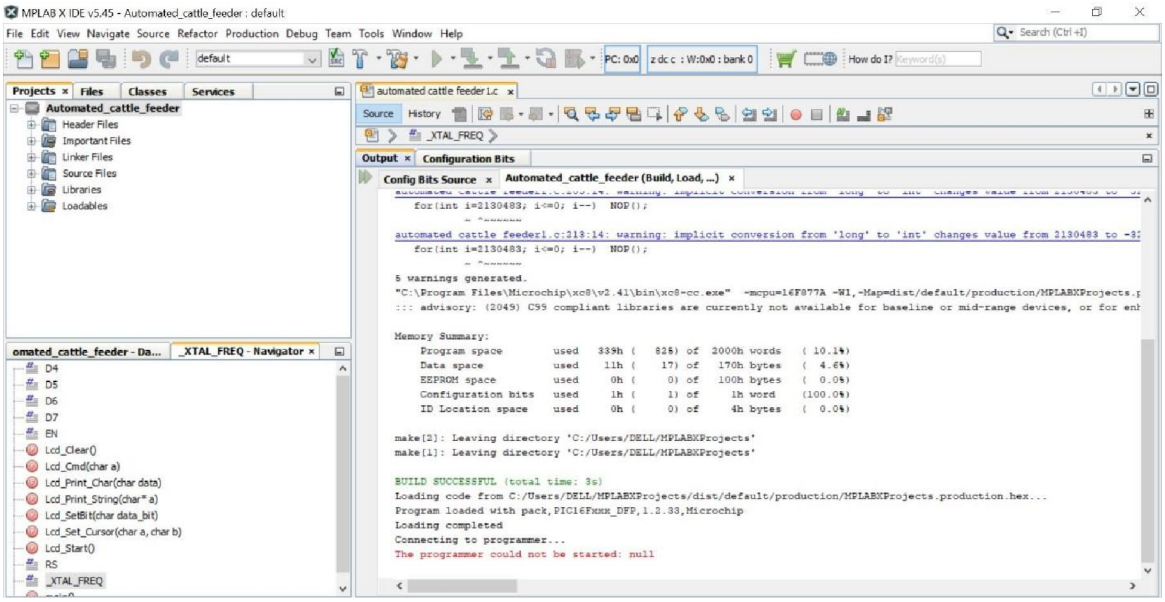

Fig.9 :Automatic cattle feeder code : build successful window (MPLAB ide)

The code of the Automatic cattle feeder in C language is compiled successfully using MPLAB ide. The code includes On/Off conditions of pins such as WDTE (Watchdog Timer Enable bit), PWRTE (Power-up Timer Enable bit) ,etc and delays required to turn the
motors on in co-ordination.

Automatic cattle feeder prototype model looks like:

Fig 10: Model after enclosure

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Turn on the power supply first, after giving supply to the PIC16F877A microcontroller, manually feed is given to the mixer.
After the servo motor is used to turn on the mixer's cap, the DC motor will mix the feed in the mixer.
The feed is dropped onto the conveyor belt after the cap is opened, and the conveyor belt begins to rotate using the dc motor. After reaching the last cattle, the conveyor belt will come to a halt and remain in that position until the timer expires.
As timer ends it will begin rotating in the opposite direction to collect the remaining feed.
This is how the entire model works, demonstrating that this automatic cattle feeder will undoubtedly reduce human effort while also introducing hygiene into the cattle feeding process

Bill of Material

Sr. No.	Name of Component	Specification	Quantity	Rate (Rs.)	Total Cost (Rs.)
1	Adapter	AC input 100-240 V 50-60 Hz 0.3A	1	430.00	430.00
2	Servo Motor	SG90 Micro Servo Motor 4.8V - 6V 1.8 kg-cm	1	155.00	155.00
3	PIC16 mic controller	PIC16F877A Operating V 2V - 5.5V CPU 20 MHz 14 KB	1	599.00	599.00
4	LCD	16x2 LCD Display 5V DC	1	319.00	319.00
5	DC Motor	Themisto 4000rpm 12V-15 Watt	2	187.00	374.00
6	Cables(Female and male)	--	- -	114.00	114.00
7	USB data Cable	USB 2.0 Length: 1 meter Type-A to Type-B	1	49.00	49.00
8	Plywood +Wheels	--	1+1	90.00	90.00
			Grand Total		2,130.00

VII. APPLICATION AND FUTURE SCOPE

An automatic cattle feeder using the PIC16F877A microcontroller can have several applications in livestock management. Here are some potential applications:

1. Feeding Automation: The automatic cattle feeder can be programmed to dispense feed at pre-determined intervals or times. This helps ensure that the cattle receive their feed regularly, even when human supervision is not available. It can be particularly useful in large-scale cattle farming operations where manual feeding may be time-consuming.
2. Portion Control: The feeder can be designed to dispense a specific amount of feed at each feeding cycle. This allows for precise portion control, ensuring that each animal receives the required amount of nutrition. Portion control is especially important for maintaining the health and weight of the cattle.
3. Feed Management: By integrating sensors and data logging capabilities, the feeder can monitor the amount of feed consumed by each animal. This data can be used for feed management purposes, such as tracking the

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feeding habits of individual cattle, analyzing feed consumption patterns, and adjusting the feed formulation accordingly.

4. Remote Monitoring and Control: The PIC16F877A microcontroller can be connected to a network or a wireless communication module, enabling remote monitoring and control of the cattle feeder. This feature allows farmers or livestock managers to monitor feed levels, adjust feeding schedules, or receive alerts for issues such as low feed levels or malfunctioning equipment.
5. Weight Gain Tracking: By incorporating a weighing system, the cattle feeder can track the weight gain of individual animals over time. This information can be valuable for evaluating the effectiveness of the feeding program, assessing the health and growth of the cattle, and identifying any abnormalities or potential health issues.
6. Efficiency and Cost Savings: Automated feeders can help reduce waste by dispensing the precise amount of feed needed. By optimizing feeding practices, farmers can minimize feed costs and improve overall operational efficiency.

VIII. FUTURE SCOPE

The future scope of an automatic cattle feeder using the PIC16F877A microcontroller can involve several advancements and enhancements. Here are some potential areas of future development:

1. Integration with Automated Weighing Systems: Combining the automatic cattle feeder with automated weighing systems can enable real-time monitoring of weight gain. This integration can provide valuable data for growth analysis, feed conversion rates, and identifying any health issues at an early stage.
2. Mobile Application and Cloud Connectivity: Future automatic cattle feeders can be connected to mobile applications, allowing farmers to monitor and control the feeding process remotely. Cloud connectivity can enable centralized data storage, analysis, and access to historical feeding records for efficient management and decision-making.
3. Enhanced Robustness and Durability: Future developments can focus on improving the robustness and durability of automatic cattle feeders, ensuring they can withstand harsh environmental conditions and the physical demands of livestock operations.

These are just a few potential areas of future development for automatic cattle feeders using the PIC16F877A microcontroller. As technology continues to advance, there will likely be many more possibilities for improving efficiency, animal welfare, and overall management of cattle farming operations.

IX. CONCLUSION

In conclusion, the implementation of an automatic cattle feeder using the PIC16F877A microcontroller offers several advantages in the management of cattle feeding. The PIC16F877A is a versatile and powerful microcontroller that enables precise control over the feeding process, ensuring timely and accurate distribution of feed to the cattle. The use of automation in cattle feeding offers numerous benefits. It reduces laborintensive manual feeding tasks, allowing farmers to allocate their time and resources to other important aspects of animal husbandry. Moreover, automating the feeding process enhances feeding consistency, which is crucial for the health and productivity of the cattle. By maintaining regular feeding schedules, the automatic cattle feeder helps promote optimal growth and development while reducing stress among the animals. In conclusion, the implementation of an automatic cattle feeder using the PIC16F877A microcontroller offers a reliable and efficient solution for managing cattle feeding. It streamlines the feeding process, ensures consistency, and enhances overall productivity and well-being of the animals, making it a valuable tool for modern livestock management practices.

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