

Advance Milk Collection and Testing System

AnisaMulani¹, AishwaryaKadam², SnehaTakale³, Vikram Mane⁴, SagarShinde⁵

^{1,2,3}Student-Bachelor of Engineering, E&TC Engineering Department, ADCET, Ashta, India

⁴Assistant Professor, Head of department, E&TC Engineering Department, ADCET, Ashta, India

⁵Founder of Amplifier Electronics, Karad, India

Abstract: Milk Collection and testing is the traditional and rigmarole process. Make this process easy system has design which can save time, money, documentary database creation process and reduce clerical work. In this advance milk collection and testing system Raspberry Pi is the heart of the system. All the collection and testing is done through the Raspberry Pi which is advanced system on chip (SoC) device. RFID module has used for identification and the recognition of the farmer. Ones famer will get authentic to the system. The next system has divided into two tanks first tank is for the testing, and the another tank is to store collected milk. In testing time system itself measures milk quantity calculate SNF and check the adulteration of Urea in milk. Second collection tank is divided into two parts first parties to collect adult read milk and the second part is to collect pure milk from the farmers this system is fully automatic and works without human interaction. So the system can save labor cost, time, and reduce the clerical work in dairy. Here in the system has used digital or virtual database so the farmer can access that virtual database anytime and anywhere of the world.

Keywords: Milk Collection, Adulteration, Raspberry Pi 3 B+, Radio Frequency Identification (RFID), Farmer, SNF, Database.

1. INTRODUCTION

India is a country which is depends on farming. India's most of the economy has depends on the agriculture so there are many people in India they have chosen farming as their business. From India most of the farmers belongs from small towns and villages. Along with the farming there are small businesses which have depends and grown up from farming like cattle handling, poultry farm, green grocering and fruit vendoring and the farmers are earning much from these small businesses. From these businesses, Cattle handling is one of the best business module has grown up since last few decades. Along with the farming, most of the farmer's keeps cattle in their farm house. There are few cattle's like buffalos and cows have abilities to produce milk. Milk it is one of the necessity of the society which mostly comes from small villages and towns. There are many companies which have located in cities and the roles of those companies are, to collect milk from the ground station or villages and reprocess that milk distribute to metropolitan cities. So these companies have produces many jobs and the government have kept control on them to maintain

quality of milk so it comes under food industry. So it is important to have control on these companies.

As we know that food industries are developing day by day. Few innovations have introduced in last few years. So this system has introduced a system which can bring innovation in food and dairy industries. If we will see most of the dairy industries have scattered in small towns and villages at base station. There are many farmers who are facing many problems in service and while distributing milk to dairies. So we are developing a system which can reduce man power and can make milk collection more reliable and handy for farmers as well as companies.

2. NECESSITY

- **Reduce man power:** At base station companies have keep man power and companies are paying them high. But employees don't work efficiently as per their salary and the employees are doing scamps.
- **Clerical work:** Most of the dairies have carried out notebooks to carry forward farmer's day to day ledger. At the end of the month they calculate every day's ledger and pay the bill to the farmer according to farmer's data & this is tedious process to calculate bills at the end of month.
- **Adulteration:** There are many farmers which adulterates for their benefits by adding water, detergents, starch, urea, baking soda etc which results to increase SNF in the milk. Due to it they get much value for their milk. But these adulterations in the milk are dangerous to human health.

3. OBJECTIVE

- The main objective of the system is make dairy milk collection system easy and automated for farmers and big dairy company.
- By using this system, it is easy to control the milk adulteration dairy can maintain the quality of their milk and can give 100 % pure milk without adulteration to the society.
- One more objective of this system is reduce the clerical work of the farmers and dairy operators. The system will help farmers to maintain their ledger with company.

4. MOTIVATION

- In this system our main goal is to eliminate the Traditional milk collection system and introduce advanced milk collection system which helps in reducing human efforts. Also it includes collection, billing and the testing of milk.
- Most of times the farmers who lives away from the dairy, they have to come early to submit the milk also further milk process more than two peoples are required. So must be a system which will do the measurement lie fat, weight in few steps. Thus we develop a system that will automatically perform these operations.

5. BLOCK DIAGRAM

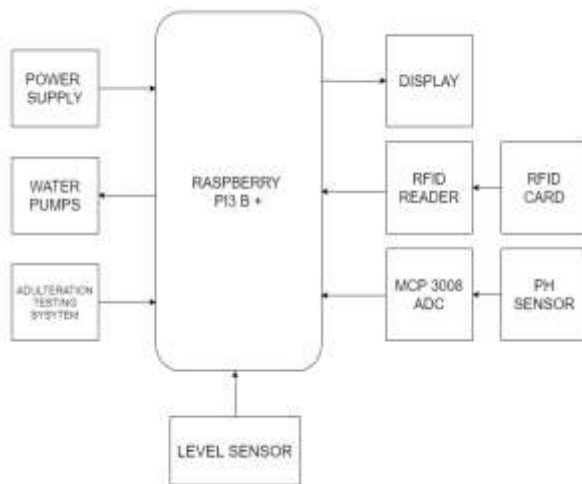


Fig 1: Block Diagram of Advanced Milk Collection and Testing System

6. BLOCK DIAGRAM DESCRIPTION

6.1 Raspberry Pi 3B+

Raspberry Pi 3B+ is a system on Chip (SoC) device. It has BCM2837 ARM cortex A53 processor from ARMv8 family. It has its own operating system which is raspbein Jessie. Raspberry pi comes with 40 GPIO pins. These pins make raspberry pi special device, for controlling peripherals. Raspberry pi has inbuilt 1GB RAM, inbuilt Wi-Fi to connect internet. It has up to 64GB expandable memory to install its operating system. In advance milk collection and testing system raspberry pi 3 is performing as a heart of the system. It is controlling all peripheral in system. Internet connection has provided to the system using Wi-Fi or Ethernet port to the raspberry pi.

6.2 RFID Reader

RC522 RFID Module has used in advanced milk collection and testing system, it supports 13.56 MHz frequency. It works on 3.3 volt input power. This RFID module comes with MFRC522 controller. It is passive type of RFID Module. RFID reader has used to recognize the farmer in system. To each farmer have its own RFID card. Throw that unique RFID number the system will recognize.[3]

6.3 Ultrasonic Sensor

Ultrasonic Sensor has used as a level sensor. Ultrasonic sensor is the sensor which works on ultrasonic sound. Trigger is used to transmit ultrasonic sound and Echo is used to receiver side of the sensor. This sensor works on 2cm to 4m distance.

6.4 MCP3008 ADC

MCP3008 is 10 bit ADC which is used convert analog value in to digital value. Raspberry pi has 40 GPIO pin but none of the pin is capable to read analog value. So here MCP3008 16 pin IC has used to convert analog value. It connects with raspberry pi using SPI protocol. This IC has total 8 ADC channels.

6.5 PH Sensor

pH stands for potential Hydrogen, and it tells us whether a solution or substance is BASIC (pH above 7.0), ACIDIC (pH below 7.0) or NEUTRAL (pH of 7.0). Acidic solutions contain a greater concentration of Hydrogen ions (H+) Basic solutions contain a higher concentration of Hydroxyl ions (OH-) [9]. A plant's pH needs vary whether they are grown in soil or hydroponics, so it is important to tailor your pH level to your growing method [9]. The optimal pH range for most common hydroponic crops is between 5.5 and 6.0. This analog pH sensor, specially designed for analog input, it easy to use and can be used as a plug and play solution to measure pH value of a solution without any additional circuit required. It has power LED which works as the Power Indicator, a BNC connector and PH2.0 sensor interface[9]. It has used to measure SNF in milk using milk pH.

6.6 Water pumps

Here in the system 12 volt water pumps have used to remove milk from one tank and pass milk to sub tank. To switch these water pump here in system relays have used.

6.7 Power Supply

The Raspberry Pi 3 is powered by a +5 Volt micro USB power supply. The exact current of raspberry pi is depends on peripherals or device which we connect to raspberry pi. The official raspberry pi power supply come with 2.5 Amp. The model B uses

between 700-1000mA depending on peripherals are connected the model. The maximum power the Raspberry Pi can use is 1 Amp, If you want to connect or interface a USB device that will take the power requirements more than 1 Amp, then you should use it an externally-powered USB power source. The power requirements of the Raspberry Pi increase as we increase various interfaces on the Raspberry Pi. The General purpose input output (GPIO) pins can draw 50mA safely divide across all the pins. The HDMI port uses 50mA current and the camera module consumes 250mA, and keyboards and mice can take as little as 100mA to 1000mA.

6.8 O-LED Display

OLED display has used to display the all the details like milk quantity in litter, SNF value, and farmer name, details etc.

6.9 Adulteration testing system

Adulteration testing system is used to detect urea adulteration milk.[2] The results obtained by testing milk for various concentrations of urea added in the constructed manometric biosensor were encouraging[6]. The results indicate that this technique can be effectively used to detect urea levels in milk[6]

7. FLOW CHART

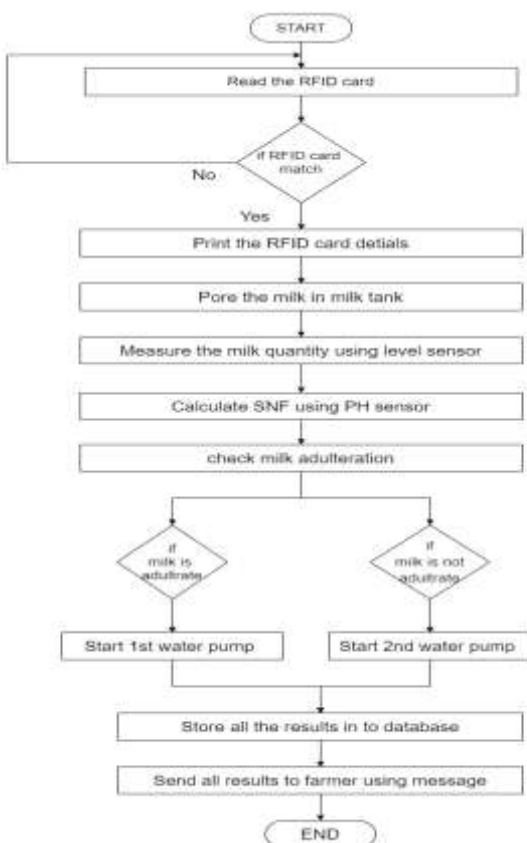


Fig2: Flow Char

8. WORKING PRINCIPLE

In proposed system Raspberry Pi 3 B Plus is performing as a main controller of the system. All the peripherals have connected to the Raspberry Pi GPIO pins. Internet has connected to the Raspberry Pi using Wi-Fi or Ethernet cable RC 522 RFID module has connected with Raspberry Pi using SPI protocol. Here in the system RF ID is connected to recognize farmer [2]. The farmer will have its own unique RFID tag [2]. Ones a farmer will get recognize [2]. Farmer needs to pour his milk into the main tank. In main tank level sensor has used to measure milk quantity. Along with the level sensor PH sensor has used in main tank to measure SNF from the milk. The PH sensor which has used that is analog sensor. But Raspberry Pi only supports digital pins so between pH sensor and Raspberry Pi MCP3008 analog to digital converter has used to measure milk PH. To find milk adulteration here in the system adulteration testing system has used which will help system to find urea adulteration [2]. Once all the testing will done on the basis of adulteration testing result. Milk will get segregate into sub tanks. If milk is adulterated milk will get collected into the Sub tank A if milk is pure it will get collected in sub tank B. When milk will get collected all the testing result like adulteration, SNF, quantity of milk will get updated on global server or web site using internet. So from that server or website farmer easily can check his transaction history or ledger after year also. So the system will help to the farmer and dairy company to reduce clerical work. At last from the server everyday system will generate text message to the farmer through that message farmer will get notified everyday's milk result from the system.

9. USED SOFTWARE'S/PROGRAMMING LANGUAGE

9.1 Python Programming Language

Python has dominated the world since last few years. Python is one of the most advanced programming languages of 21st century. Python is object oriented high level programming language. Python's simple, easy to learn Syntax, emphasizes readability so reduce the time of development and the cost of maintenance. Python supports module and packages, which encourages program modularity and code reuse. In 2020 Python is almost ruling in each and every field of software development. Python is widely used in Artificial Intelligence app development. There are other languages also have used in AI app development. But the Python has dominated most in AI. Along with Artificial Intelligence (AI), Machine Learning which is subset of AI also has dominated by Python. Machine learning and Artificial Intelligence (AI) are the Technologies which are spreading across the various industries and the most of the companies have started investing in these technologies. Python offers plenty of benefits for building Artificial Intelligence (AI) and Machine Learning (ML) applications. Like AI and ML

Technologies, there are few technologies which have equally dominated in Python.

9.2 Raspbian operating system.

Raspbian is a Debian-based (32 bit) computer or raspberry pi linux operating system for Raspberry Pi [7]. There are many versions of Raspbian along with Raspbian Buster and Raspbian Stretch [7]. From 2015 it has officially become operating system of raspberry pi and raspberry foundation has declared that Raspbian was developed by Mike Thompson and Peter Green as a project [7]. The first test was completed in June 2012. The operating system is still under development of the raspberry pi foundation. Raspbian is highly suitable for the all Raspberry Pi SoC devices, line's low-performance ARM CPUs.

10. CONCLUSION

We can conclude that, the milk adulteration and collection have becoming serious problem [5]. Due man power, it has used to handle dairy at substation [5]. Hence it is important to have an efficient and reliable quality control system that will daily monitor [8]. Revelation is the most important in dairy industries in collection and testing. The system allows the measurement of quantitative like Volume and qualitative parameters like pH, CLR and SNF. Customer should have their own Radio frequency identification card for accessing the milk collection system. If farmer will loss his RFID card, farmer will have to face some trouble while submitting his milk. This system is capable to differentiate between pure milk and milk adulterated with urea.

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BIOGRAPHIES



Vikram Mane Received B.E Electronics Engineering degree from shivaji University Kolhapur in 1999, and M.E. Degree in Electronics Engineering from shivaji University in 2010,withspecialization in signal processing and Embedded system. Presently working as HOD and an Assistant professor in Annasaheb Dange college of engineering and technology, Ashta, Maharashtra.



AnisaMulani Diploma in Electronics & Telecommunication from Government Polytechnic, Karad in 2017. Appearing for Last year of Electronics & Telecommunication Engineering in Annasaheb Dange college of engineering and technology, Ashta, Maharashtra.



AishwaryaKadamDiploma in Electronics & Telecommunication from Government Polytechnic, Karad in 2017. Appearing for Last year of Electronics & Telecommunication Engineering in Annasaheb Dange college of engineering and technology, Ashta, Maharashtra.



SnehaTakale Diploma in Electronics & Telecommunication from Government Polytechnic, Karad in 2017. Appearing for Last year of Electronics & Telecommunication Engineering in Annasaheb Dange college of engineering and technology, Ashta, Maharashtra.



SagarShinde Specializations in Embedded System, IoT and Python. Fonder of Amplifier Electronics, Karad. Having three years of experience in production, and three years of experience in Embedded Product Development at Amplifier Electronics, Karad, Maharashtra.