

**SSN COLLEGE OF ENGINEERING  
KALAVAKKAM-603110**

**INTERNALLY FUNDED STUDENT PROJECT (IFSP-2023)**

**Forewarning of Goat diseases diagnosis using IoMT to improve the productivity  
And economy of small and big farming**

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**Budget (in thousands)**  
*Twenty Thousand*

**Project Duration (in months)**  
*Twelve months*

Signature of the Project Students

Signature of the Project Guide(s)

Signature of the HOD

**1. Project Title:** Forewarning of Goat diseases diagnosis using IoMT to improve the productivity and economy of small and big farming

**2. Broad Subject:**

**3. Project Duration** (*in months*): Twelve months

**4. Budget** (*in thousands*): Twenty thousand only

**5. Project Summary:**

Goats were one of the first domesticated animals. Easier and cheaper to manage than cattle, goats are far more profitable than other animals. They prove vital for development because of their ability to convert forages, crops, and household residues into meat, milk, fibre, and skin. The foot and mouth disease is a serious and highly contagious disease that affects goats. Therefore, it needs to be continuously monitored through sensors to analyze the clinical behaviour of the goats. Multiple systems are available in an animal healthcare information system that are used for clinical usage and formulating resolutions. So far, complete data is not available for the following cases: individual goats affected by a particular disease, groups of goats affected by geolocation-based diseases, and all aspects of a goat healthcare information system.

**6. Keywords :**

Disease pattern, continuous monitoring, goat healthcare data analytics, forewarning system, geolocation

**7. Objectives :**

- To improve the productivity and economy of small and big farming by forewarning the goat diseases and reducing the mortality rate.
- Achieving a GHC by implementing various facades of IoMT.

**8. Introduction :**

In India, disease control and management system helps to identify the symptoms in sheep and goat, such as fever, redness and swelling of nose, respiratory failure, nasal discharge accompanied by sneezing and cough, muscular stiffness and difficulty in walking, which are caused by epizootic, only through physical evaluation. The total goat population in India is around 150 million and out of which 75% is located in 6 states. In this 40% are non-descript animals and the rest comprise pure/graded, cross bred or exotic animals in Tamil Nadu. High mortality rate in lambs (up to 40%) is a worldwide problem. The clinical disease and the spread of the outbreak in the locality identified through GIS and web-based monitoring. This provides opportunities for future disease control to enhance animal welfare and rural prosperity. To improve the productivity and economy of small and big farming by forewarning the goat diseases and reducing the mortality rate, a GHC-Goat Health Care facility

incorporating IoMT is formulated. The proposed system plays the role of information agent to manage the diseases and helps provide care at any time.

## 9. Definition of the Problems

- The major diseases such as Blue Tongue, Peste-des-Perits Ruminants (PPR), ORF, and Anthrax cause mortality in goats.
- The diseases are the major cause of mortality in goats with young ones and adult goats being almost equally affected. Adult females suffered a higher mortality than males due to diseases.
- The mortality patterns were found similar in both the genders in the given time period. Gender had significant association with different age groups and diseases in terms of mortality pattern. Diagnosis of above diseases is made through appropriate laboratory investigations.

## 10. Review of status of Research and Development in the subject :

### 10.1 National Status

[REF] / YEAR	PROBLEM	METHODOLOGY / COUNTRY
[1] / 2012	Web-based software to predict livestock diseases	Project Directorate on Animal Disease Monitoring and Surveillance (PDADMAS) under ICAR has developed a Web-based interactive software to predict livestock diseases two months in advance in the country / India
[2] / 2019	Spread and impact of goat pox	A detailed description of the clinical disease and the spread of the outbreak in the locality are provided. Awareness of the disease with reference to farming practices will provide opportunities for future disease control to enhance animal welfare and rural prosperity / India
[3] / 2016	Different endemic infectious diseases causes significant economic loss	Prevalence, diagnosis, management and control of important diseases of ruminants with special reference to Indian Scenario / India

## 10.2 International status

[REF] / YEAR	PROBLEM	METHODOLOGY / COUNTRY
[1] / 2020	The welfare of animals be continuously monitored in a real-time way	Collecting on-farm videos / School of Information and Computer Sciences, Anhui Agricultural University, Hefei, China
[2] / 2016	Recent advances in wearable sensors	Nano biosensors and advanced molecular biology diagnostic techniques for the detection of various infectious diseases of cattle / Bio-Nano Laboratory, School of Engineering, University of Guelph, Guelph, Canada
[3] / 2011	Analytic function of disease rate and guide goat immunization	Goat medical records subsystem / Coll. of Animal Husbandry & Veterinary Med. Shenyang Agric. Univ. Shenyang, China
[4] / 2009	Human-animal interaction	Health status of animals in terms of body condition scoring, skin and hair conditions, lameness and injuries, and management practices in relation to cleanliness, animal handling and moving, milking procedures and abnormal behaviours, are proposed as potential animal-based indicators / Italy

## 11. Novelty Importance of the proposed project in the context of current status:

## 12. Patent details (*domestic and international*), if applicable

## 13. Work plan and Detailed technical information

### 13.1 Methodology

The proposed methodology to forewarning goat disease is shown in Figure 1.

- Goat Health Care (GHC) consists of Embedded System, Wireless Technology and Machine Learning to form the IoMT-GHC.
- IoMT-GHC integrates data from sensors such as MEMS acoustic, MEMS vibration and Temperature, fixed in the nose, neck, foot and ear of goat and analyses the collected data to provide forewarning.
- In-stream analysis of data from the IoMT-GHC builds for interoperability and accelerates time for forewarning.

- The proposed IoMT-GHC system plays the role of information agent to manage the diseases and helps provide care at any time.

The Data analytic process in identifying the disease based on geolocation is shown in Figure 2.

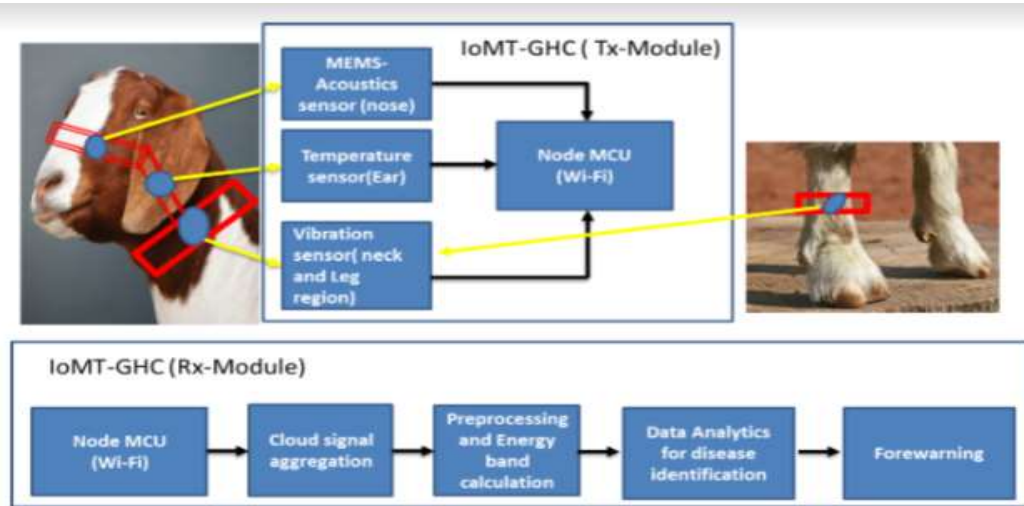


Fig 1. Proposed IoMT-GHC block diagram

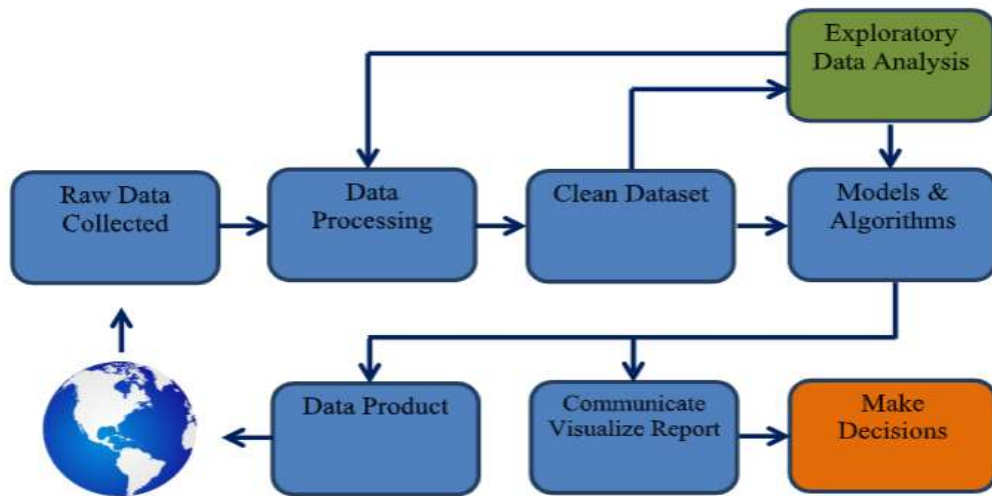


Figure 2. IoMT-GHC Data analytic process for Goat disease identification based on geolocation.

#### 14. Time schedule of activities giving milestones:

##### 14.1 Time Schedule of Activities through BAR Diagram

##### c. Time schedule of activities giving milestones:

Sl. No.	Activity / Milestone	1 <sup>st</sup> part (in months)	2 <sup>nd</sup> Part (in months)	3 <sup>rd</sup> part (in months)

		1-2	3-4	5-6	7-8	9-10	11-12
1	Data Collection						
2	Process development						
3	Evaluation and Validation						
4	Product development						
5	Documentation						

## 15. Deliverables

- Make a system that monitors the goats through computer vision

## 16. Target beneficiaries of the proposed work

The target beneficiaries of the proposed word is farmers ,people engaged in animal husbandry rearing goats which could be possibly infected by diseases. It decreases the losses and setbacks in the farm , the humans who are directly in contact with the goat who have a chance of contacting the disease.

Other goats in the farm which are in the risk of contacting the disease from the infected goat

## 17. Suggested plan of action for utilization of research outcome expected from the project

**17.1 As journal publication**

**17.2 Patent filing**

**17.3 Project preparation for submission to external funding**

## 18. References

- [1] Rao Y, Jiang M, Wang W, Zhang W, Wang R. On-farm welfare monitoring system for goats based on Internet of Things and machine learning. *International Journal of Distributed Sensor Networks*. July 2020.
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Applications, Wuhan, 2011, pp. 1-4, doi: 10.1109/ISA.2011.5873323 Add to Citavi project by DOI.

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- [11] Kumar, S., Vihan, V.S., Deoghare, P.R., 2003. Economic implication of diseases in goats in India with reference to implementation of a health plan calendar. S. Rumin. Res. 47, 159-164.
- [12] Kusiluka, L., Kambarage, D., 1996. Diseases of Small Ruminants in sub-Saharan Africa. VETAID. Centre for Tropical Veterinary Medicine, Easter Bush Roslin, Midlothian EH25, Scotland, 1996.

## **19. List of facilities and Equipments available with Department for the project**

### **20. Budget Estimates :**

- 1.Raspberrypi: (4b)**
- 2.NodeMCU(32 bit)**
- 3.humidity sensor:**
- 4.Vibration sensor:**
- 5.Pi camera:**
- 6.temperature sensor:**
- 7.Acoustics sensor:**
- 8.Testing with live samples ie goats**

### **21. Budget Justification**

*(Justification of the budget estimates is to be furnished separately in the relevant heading to be provided in the proposal. Justification for major equipment should be given clearly)*