



## DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

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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# OVERVIEW

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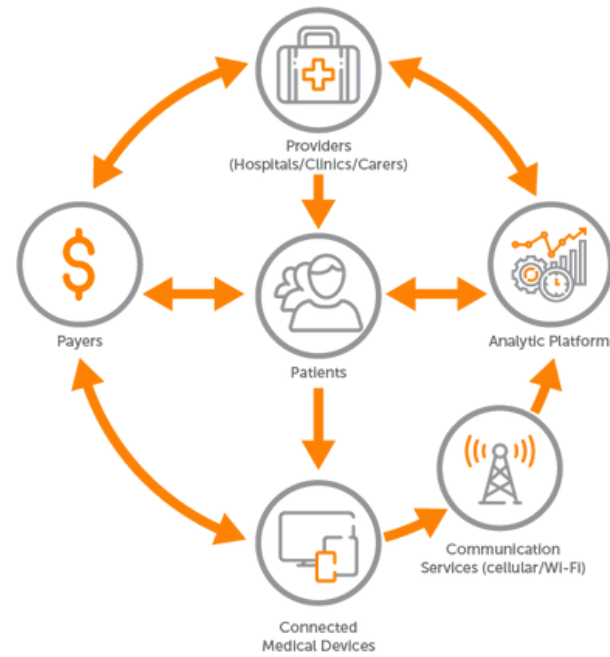
# INTRODUCTION

- 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**(Internet of Medical Things) is formulated
- The proposed system plays the role of information agent to manage the diseases and helps provide care at any time



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# OBJECTIVES



Note: Arrows indicate points at which data from connected devices can be transferred  
Source: Deloitte LLP, 2018

- To **implement various facades of IoMT** in achieving an optimal GHC facility
- To **build a physical wearable device** that achieves the goal of monitoring, sensing and alerting incase of a disease
- To facilitate the **use of various sensors and collect data** to provide for forewarning
- To maintain a sensus and **provide care on time** with the data interpolated with the help of machine learning model(s) from the general response



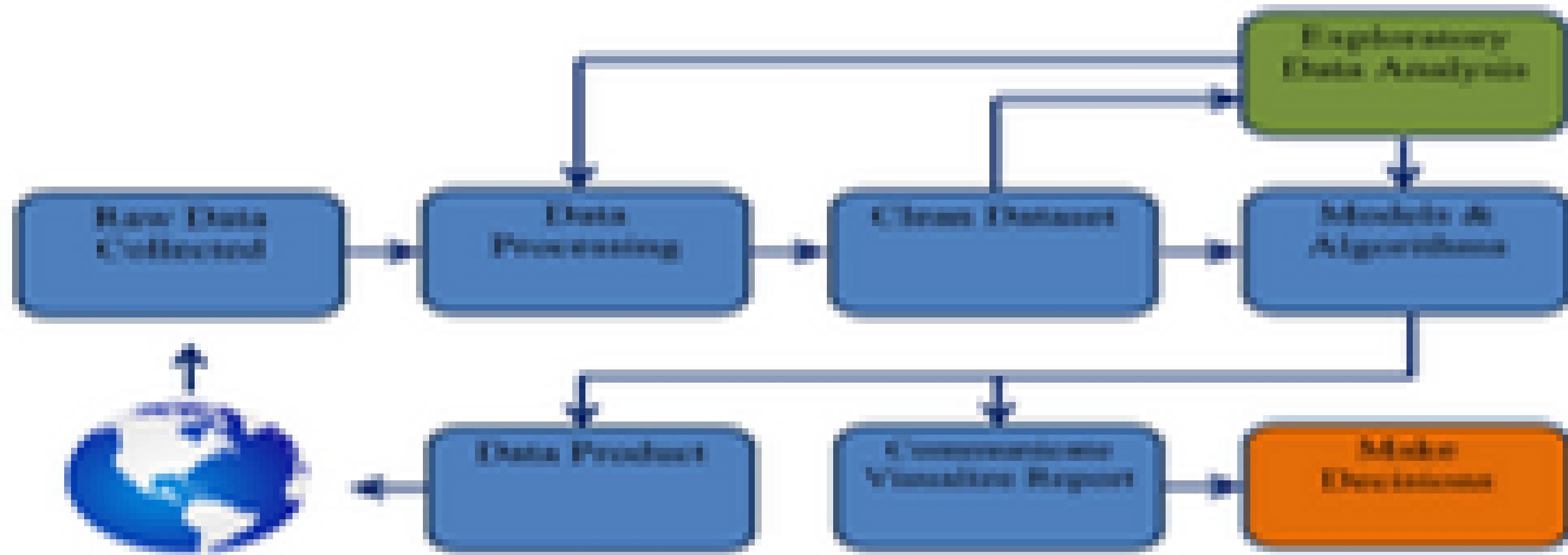
# PROBLEM STATEMENT

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 are a serious and highly contagious disease that affects goats. Therefore, it needs to be continuously monitored through sensors to analyse 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.

he 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.



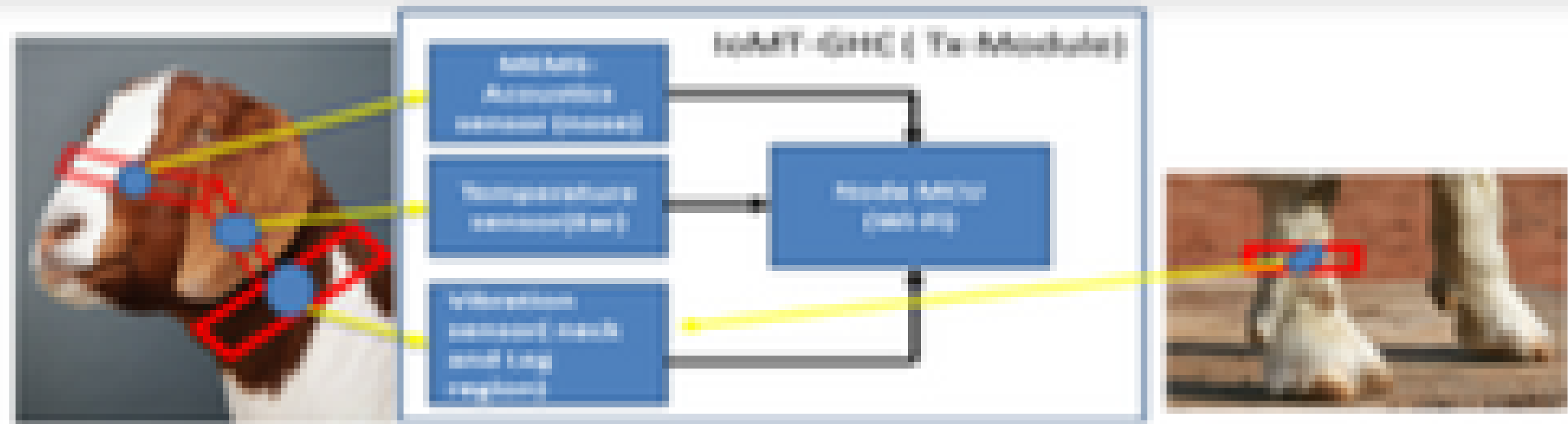
# REPRESENTATION OF WORKING



# METHODOLOGY

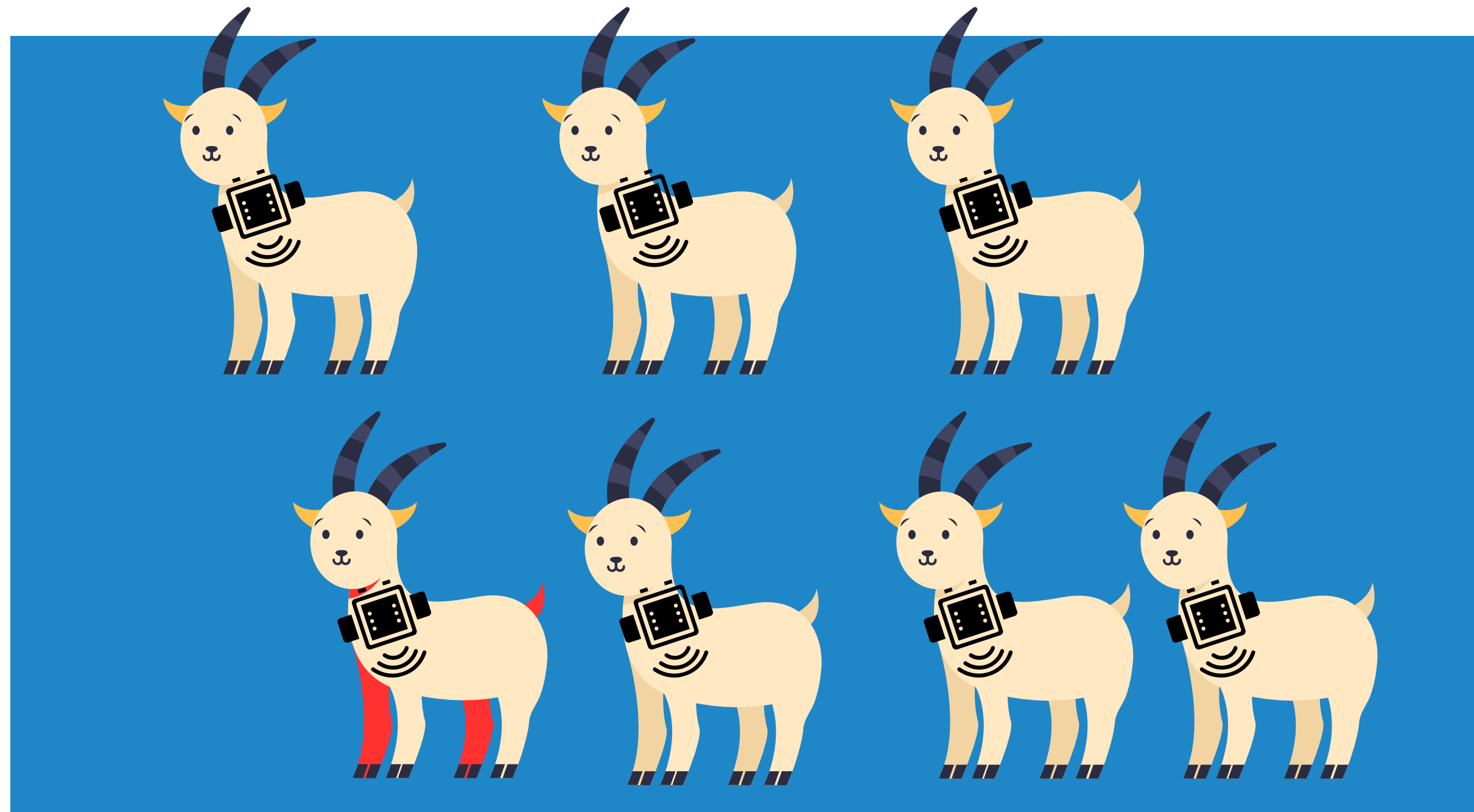
- Goat Health Care (GHC) consists of Embedded System, Wireless Technology and Machine Learning to form the **IoMT-GHC**.
- IoMT-GHC integrates data from sensors such as **MEMS acoustic, MEMS vibration and temperature, fixed in the nose, neck, foot and ear of goat** and analyses the collected data to provide forewarning
- In-stream analysis of data from the IoMT-GHC builds for **interoperability and accelerate 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.
  - A machine learning model can be made from the general response of the goats in the various sensors used, in case any variation is seen from the model, **the model predicts the existence of some form of ailment** in the goat.
  - The variation in parameters, change in the goat's health is informed to the farm owner, nearby veterinary doctor.





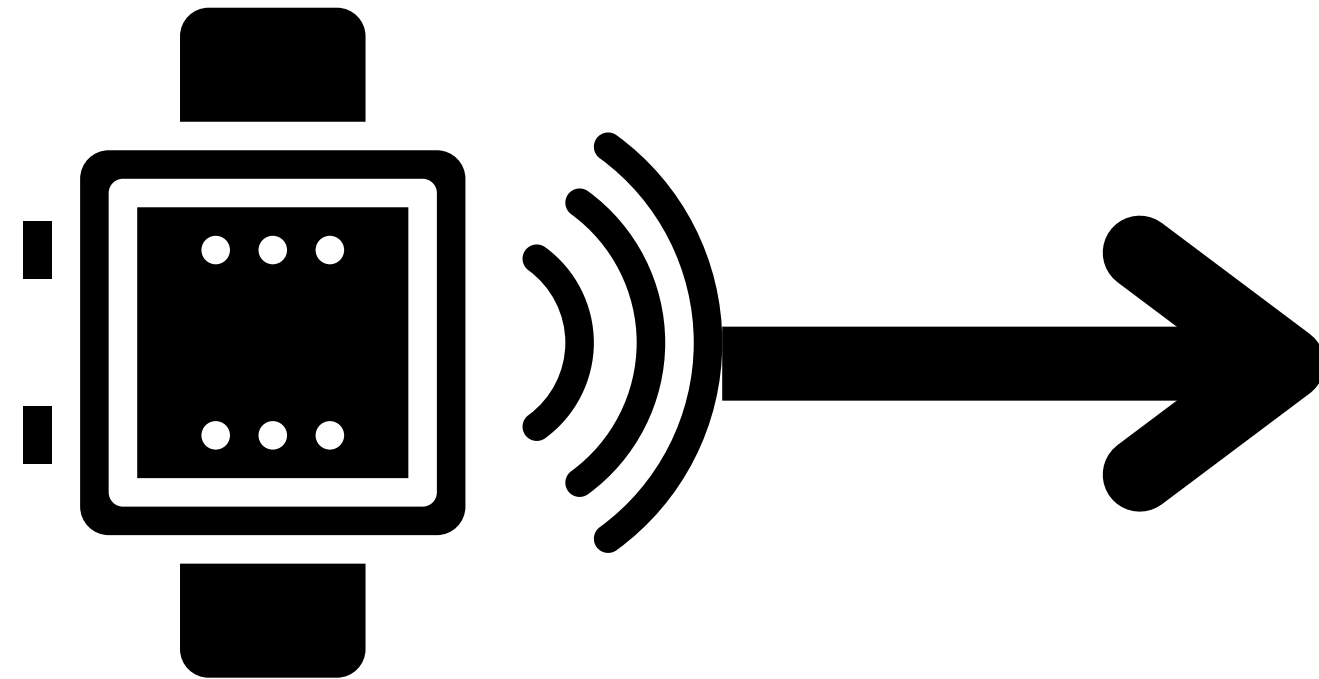


# ILLUSTRATION



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# ILLUSTRATION



Device transmits data

Collected results passed to the cloud

Data interpolation using ML model

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# IoMT and Technology Stack

Technologies used:

1. Deep learning cnn model for image recognition and feature extraction to classify the goats as healthy or sick based on appearance
2. Raspberry pi for running the tensorflow lite model (for classification)
3. A esp8266 node MCU attached to each wearable device with sensors wirelessly and listener program in Raspberry PI having the ESP8266 send data to the Pi.
4. Picamera for capturing images, opencv for video capture object generation



# TIME SCHEDULE OF ACHIEVEING GIVEN 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	9-12	12-18
1	Data Collection						
2	Process development						
3	Evaluation and Validation						
4	Product development						
5	Documentation						

## **Interconnection of devices:**

- **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. 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.**



# ADVANTAGES OF PROPOSED PROJECT OVER CONVENTIONAL APPROACH:

**1.Collection of real time data continuously and updating it in the cloud periodically.**

**2.Generally, for cattle monitoring the usage of computer vision is widespread but here the other sensors are also used for data collection, which would boost the accuracy.**

**and can predict illness in an earlier time.**

The target beneficiaries:

- It helps the **farmers**,people engaged in animal husbandry rearing goats which could be possibly infected by diseases.
- It is required to prevent and combat these diseases.Otherwise,It can cause damage to other **farming businesses and to the economy** at large, and can pose a threat to public health.
- It **decreases the losses and setbacks in the farm**,It helps 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 contracting the disease from the infected goat.





# CHOICE OF SENSORS

**Humidity sensors:** The sensor can monitor the respiration pattern and used for physiological and physical monitoring. Leaky nose and mouth

**Vibration sensors:** Used for vibration-related health monitoring and voice sensing by evaluating the vibration acceleration of the skin surface, Movement of the animal.

**Temperature sensors:** Used for monitoring the course of certain diseases by measuring body temperature.

**Acoustics sensor:** Used for monitoring physiological and pathological conditions e.g. heart and respiratory sounds.

**Heart rate sensor:** Used for detecting the pulse rate and monitoring stress and activity levels during the day accurately.



# BUDGET ESTIMATE

PARAMETERS	QUANTITY	COST (in rupees)
Rasperrypi(4b)	1	8799
NodeMCU(32 bit)1	1	794
Sensors (humidity sensor, vibration sensor, temperature sensor, acoustics sensor, heart rate sensor)	1(each)	499+38+153+176+219
Pi Camera	1	361
Miscellaneous		8961
TOTAL		20,000



## 21. Budget Justification:

PARAMETERS	NECESSITY
RasperryPi	To control Pi camera and take relevant input image signals.
NodeMCU	IOT component to connect the different sensors to the cloud and use data for future use.
<p>Sensors</p> <ol style="list-style-type: none"><li>1. Humidity sensors</li><li>2. Vibration sensors</li><li>3. Temperature sensors</li><li>4. Acoustics sensor</li><li>5. Heart rate sensor.</li></ol>	<p>Humidity sensors: The sensor can monitor the respiration pattern and used for physiological and physical monitoring.</p> <p>Vibration sensors: Used for vibration-related health monitoring and voice sensing by evaluating the vibration acceleration of the skin surface.</p> <p>Temperature sensors: Used for monitoring the course of certain diseases by measuring body temperature.</p> <p>Acoustics sensor: Used for monitoring physiological and pathological conditions e.g. heart and respiratory sounds.</p> <p>Heart rate sensor: Used for detecting the pulse rate and monitoring stress and activity levels during the day accurately.</p>
Pi Camera	The Pi Camera module can be used to take pictures and high definition video. Raspberry Pi Board has CSI (Camera Serial



Interface) interface to which we can attach the PiCamera module directly.



THANK YOU