

Expression of Interest (EOI) and Ideation Phase

A. Statement of Interest

We are eager to participate in this competition and propose a groundbreaking solution to revolutionize livestock management on small-scale farms. By harnessing the power of the MYOSA platform and its advanced sensor technology, we aim to develop a comprehensive and innovative system that empowers farmers with real-time insights into their livestock's health, behavior, and environmental conditions.

Our proposed system will not only help farmers detect and prevent diseases early but also optimize resource utilization, improve animal welfare, and ultimately boost agricultural productivity. By continuously monitoring key parameters such as temperature, humidity, and animal movement, our system will enable farmers to make data-driven decisions, leading to better outcomes.

We believe that our solution has the potential to significantly impact the agricultural industry by addressing the challenges faced by small-scale farmers. By providing them with the tools they need to monitor their livestock effectively, we can help them improve their livelihoods and ensure the sustainability of their farms.



Ideation Details

MYOSA Board Usage:

The MYOSA board is the core platform of our proposed animal monitoring system, acting as the central hub for real-time data collection, processing, and transmission from multiple sensors in the farm environment. It will integrate data from the motion, temperature, and humidity sensors, allowing a comprehensive assessment of each animal's activity and environmental conditions.

The MYOSA board will continually collect and process data, using the motion sensor to track livestock movement and patterns across the farm area. By monitoring for unusual movement, such as reduced activity or erratic behavior, it can detect early indicators of illness or injury, prompting timely interventions. The board's high-capacity processing capabilities will allow the continuous tracking and comparison of motion data over time, creating patterns for each animal's typical behavior and alerting when deviations occur.

Environmental monitoring is achieved by leveraging the board's compatibility with temperature and humidity sensors to assess ambient conditions. Consistent tracking of temperature levels in each animal's surroundings helps prevent exposure to extreme conditions that can lead to stress or illness. Simultaneously, the humidity sensor monitors moisture levels in the environment, providing an ideal dataset to help farmers adjust animal housing conditions,

particularly in areas susceptible to drastic humidity changes, to ensure respiratory health and comfort.

By gathering and processing these three critical data points, the MYOSA board transforms simple sensor inputs into actionable insights that help the farmer manage animal health proactively. This level of automation reduces the need for constant manual observation, lowers the risk of unnoticed health concerns, and enhances farm productivity by promoting healthier livestock, which, in turn, supports a sustainable and efficient farm operation. The MYOSA board's versatile and robust architecture allows it to function seamlessly in this demanding farm setting, meeting the unique needs of small farm owners.

Sensor Selection:

Core Sensors:

1. **MPU6050:** This 6-axis inertial measurement unit (IMU) can be used to track animal movement patterns, detect abnormal behaviors, and estimate activity levels.
2. **SI7021:** This sensor can monitor ambient temperature and humidity, which are critical factors affecting animal health and comfort. It can help identify potential heat stress or respiratory issues.

Optional Sensors:

3. **APDS9960:** While not directly related to livestock monitoring, this sensor could be used to detect the presence of livestock in a specific area, especially if you're working with smaller animals.
4. **BMP180:** This sensor can be used to measure altitude, which could be useful for monitoring livestock in mountainous regions. However, its primary use case for livestock monitoring might be limited.
5. **CCS811:** This sensor can be used to monitor air quality within the barn or enclosure. Poor air quality can lead to respiratory problems in livestock.

Additional Circuitry and Software:

To maximize the MYOSA board's functionality and enable seamless real-time monitoring, several components and software enhancements are planned:

- **Power Supply Circuit:** A dedicated power supply circuit will ensure consistent, reliable power for the MYOSA board and attached sensors, essential for continuous data acquisition and processing.
- **Wireless Communication Module:** This module enables real-time data transmission to a cloud-based platform, ensuring that sensor data on livestock activity, temperature, and humidity can be remotely monitored. Farmers can access this data through a user-friendly web dashboard or mobile app, which provides an integrated view of each animal's well-being and surrounding environmental conditions.

- **Custom Software:** Our custom software layer will handle data processing, manage historical storage, and generate actionable insights. Advanced algorithms analyze sensor data, triggering alerts when abnormal patterns are detected, such as unusual movement or adverse environmental conditions. This information is displayed on an intuitive, farmer-friendly dashboard that offers real-time visualizations, trend tracking, and access to historical data for better decision-making.
- **Data Processing and Microcontroller Integration:** A microcontroller will be implemented to handle initial data processing from sensors and manage temporary data storage before transmission. This integration allows the MYOSA board to function efficiently even in environments with limited connectivity, as it stores and transmits data at optimized intervals.

Significance of the Application:

Small-scale farmers face challenges in continuously monitoring livestock health due to limited resources. Our system leverages the MYOSA board to provide real-time data on animal movement and ambient conditions, enabling early detection of health issues and proactive intervention. By tracking movement, farmers can identify disease hotspots and optimize grazing areas. Temperature and humidity monitoring also allows for timely adjustments in shelter and ventilation to ensure animal welfare. The intuitive dashboard consolidates these insights, supporting data-driven decisions, reducing illness-related losses, and enhancing productivity, thereby transforming traditional livestock management for improved efficiency and sustainability.

Intended Use of MYOSA Platform:

The MYOSA platform's versatility, modularity, and robust sensor suite make it an optimal foundation for our livestock monitoring system. By integrating motion, temperature, and humidity sensors, the MYOSA board allows us to comprehensively monitor animal health and environmental conditions, critical for early illness detection and overall welfare. The platform's plug-and-play design facilitates rapid prototyping, enabling swift testing and deployment while minimizing development overhead.

The MYOSA platform's scalability is a significant asset, supporting expansion from small pilot installations to fully integrated farm-wide deployments. This adaptability enables us to align with farm size, budget constraints, and specific operational needs, making it an efficient investment as the farming operation grows. Beyond livestock, the platform can incorporate additional sensors, such as soil moisture or light intensity, for applications extending into crop management, providing holistic farm insights.

Customizable software within the MYOSA ecosystem offers further advantage, allowing us to program specific, real-time alerts and notifications tailored to individual farm parameters. This personalization enables the platform to alert farmers to critical conditions immediately, optimizing response times and resource allocation. Ultimately, MYOSA's technical design offers a scalable, precise, and multifunctional solution, meeting the rigorous demands of modern, data-driven agriculture and positioning it as an indispensable asset for farm management innovation.

Automated Livestock Health and Environmental Monitoring System

