Towards a Socio-Psychological Cyber Physical System for the Health and Wellness of Dairy Cows

Sucheta Soundarajan, Syracuse University

Asif Salekin, Syracuse University

- **Key Contributions**

Using sensors to monitor the **physiological**, **inertial**, and **location** data of cattle in order to evaluate their **socio-psychological** behaviors

Creation of an **innovative method for evaluating the social behavior** of animals in a herd, with a focus on analyzing their **detailed interactions** and **dynamics**

- **Challenges**

Gathering **behavioral and physiological** data in a **real-time** setting presents several challenges, such as the **restricted sensing capabilities** of devices, the **environment harshness**, and the **settings in which the data collection is carried out**

Obtaining accurate and trustworthy information for health and wellness events is challenging.

Existing current sensing devices **do not provide comprehensive information** on **behavior** and **physiology**

- **Scientific Impact**

This work **establishes a connection** between research on **Cyber-Physical Systems (CPS)** and its practical application in the field of **agriculture**

The advancement of technology is required to **integrate location and interaction data with other biometric data**

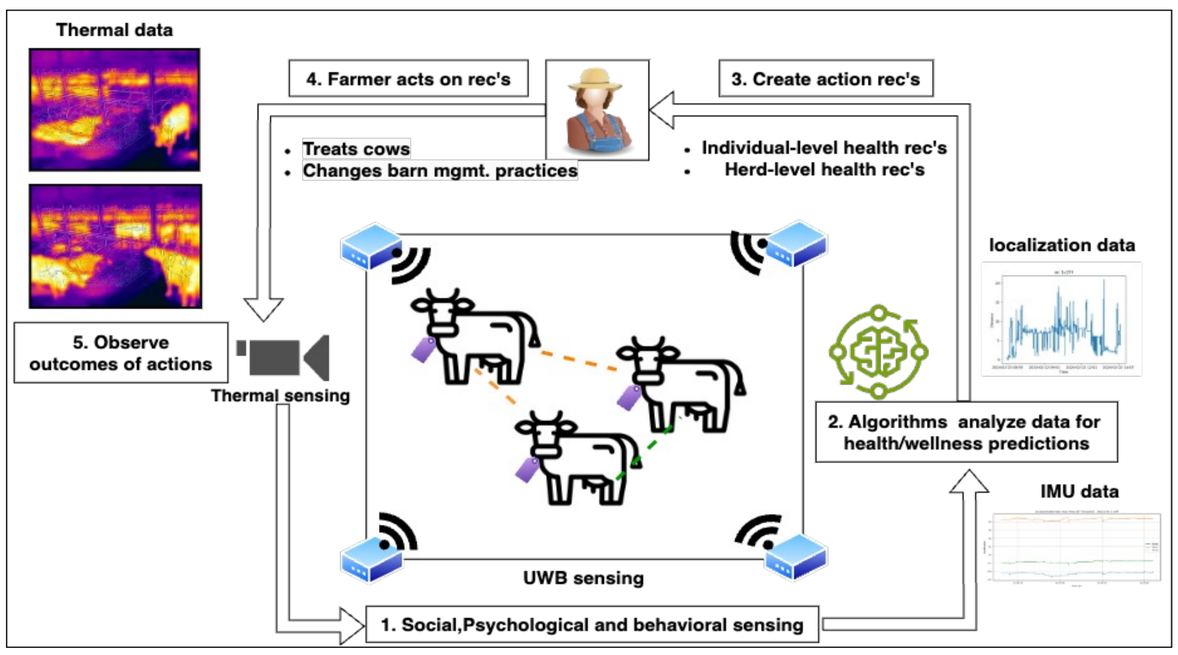
Developing algorithms for **early identification of animal ailments, stress, and other health and wellbeing issues**

- **Solutions/Technical Approach**

Farmer identified **health events** will be used as **ground truth**

Proposed algorithm will **identify social and psychological properties** of interest

Work so far: Trial data collection and deployment of **localization sensors, IMU, and thermal camera**. Work has begun on aligning images (ground truth) with sensor observations to track movement and behavior.



- **Societal Impacts**

Proposed study can help to **understand socio-behavioral patterns** in cattle herds which is helpful for the **dairy industry.**

Work focuses at providing **concrete, actionable recommendations to farmers**

- **Education and Outreach**

Supported two PhD students

Plans to **involve students from agriculture and/or high school students** with animal experience once more data is collected

- **Metrics:**

- We will use the following metrics:
- Milk production
- Number & severity of adverse health events
- Farmer surveys
- Prediction accuracy

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