Thermometer Features and Machine Learning Breakdown

Introduction

Mella Pet Care™ has developed the first AI-driven, non-invasive, smartphone-enabled thermometer that measures temperature in the axillary or inguinal region of a dog or cat. The device takes the body temperature within 15 seconds and via bluetooth displays the results on current exams in participating patient information management systems. Our device's three patented sensors detect the progression of the temperature curve during a reading, and this data is combined with already inputted patient informatics (i.e. breed, age, sex, weight) to predict basal body temperature. A machine learning model processes these data sets to predict an accurate internal body temperature reading Z ±0.5°C of error (within FDA guidelines).

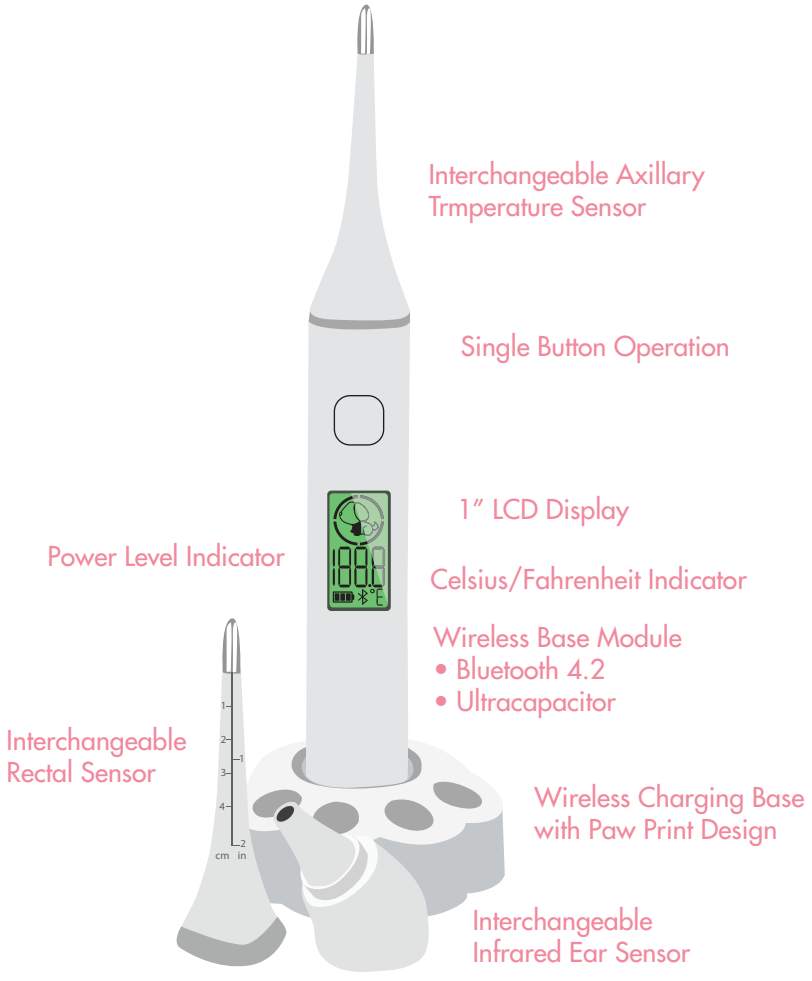
Mella Pro Features

- Integration with Practice Management Systems and Telemedicine Platforms
- Internal Sensor for Room Temperature
- Interchangable sensors for Ear, Rectal, and Axillary Temperature

Accurate and Reliable

Minimal Contact

Seamless Integration

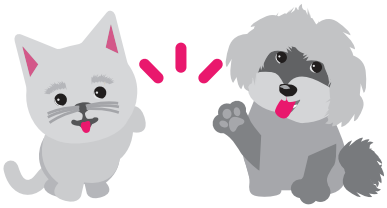


Hypotheses

The hypothesis being tested in the machine learning model is whether the pet characteristics influence the body temperature in a statistically significant way. Differences in body temperature arise from: breeds, secondarily due to follicular density; age; gender, subsequently spay/neuter status; and weight, increasing distance between skin and the axillary artery due to adipose tissue.

Methodology to Machine Learning

The Mella temperature machine learning model utilizes state of the art AI techniques to create an accurate prediction of the pet's temperature. We analyzed 4.5 million pet records from Banfield Hospital and looked at hundreds of pet attributes about the state of the pet and the environment and its relation to body temperature. These initial data points were first used to investigate which factors are the most predictive of rectal temperatures and then used to establish a temperature baseline.



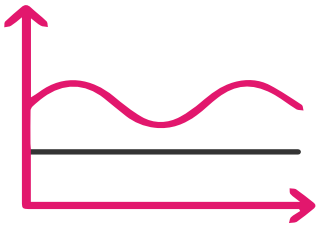
240 CATS **854** DOGS

TESTED IN LIVE ANIMAL TRIALS

A controlled clinical trial was implemented that simultaneously combined patient attributes with multiple axillary and rectal temperature readings from mercury and Mella devices. This new data set was correlated with temperature readings from the existing data for animals with similar breed characteristics to validate our axillary readings. The physical attributes used in machine learning are constantly being measured and weighed until offsets are solidified appropriately.

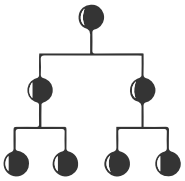
1. Establish Baseline Temperatures

Records from Banifield Pet Hospital provide a baseline of historical animal temperature for different breeds.



2. Build the Model

Initial clinical trials provide data that's correlated with Banifield's records to build the model. Hospital partnerships provide data to expand and validate model.



3. Test the Model

User generated test data contributes to more accuracy by expanding the database and checking the performance of the model.

4. Apply and Tune

Apply the model with a confidence score to account for underrepresentated attributess. Targeted tuning of those attricutes improves overall data quality and quantity and thus improving the model.

MELLA ACCURACY

+/- 0.4 C

Will continue to improve as more data collected

Figure 1 How the machine learning model was built with preliminary data, tested, and continuously tuned to provide a predicted rectal temperature within half a degree of error from the axillary region.

Future Clinical Trials

Mella Pet Care has recently implemented v3 of the Mella Pro featuring a new NTC thermistor sensor and a faster temperature response curve. As hardware changes and improves, new clinical trials are facilitated to produce a new dataset that creates an even more accurate model. Currently, the University of Georgia is championing a single-blinded clinical trial in which Mella's research team will assess the gathered data, implement the new prediction model, and validate predictions with UGA's results.

Partnerships with hospitals that use the Mella Pro and data from crowdsourcing will be used to expand the previous data set and allow for more breeds as well as the same breed animals but with different characteristics to be added to the data set. UGA will run statistical analyses on data from other sources.

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For further information on the machine learning model, product features, and/or to contact us at Mella Pet Care, please visit us at: www.mella.ai