IoT : Data, Data Storage and Data Processing

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Data Gathered by Sensors

Our IoT cooking system uses a Bluetooth thermometer connected to a Raspberry Pi. The thermometer measures the internal temperature of meat during cooking and the Pi acts as a bridge between the thermometer, the Internet and the database. The system may also use a camera module for photo-based doneness detection but we will try to use the users phone if possible.

1. Bluetooth Thermometer

* Data collected:
  + Internal meat temperature
  + Battery level of the thermo
  + Timestamp of each reading
* How it works:  
  The thermometer uses a thermistor sensor inside the metal probe. A thermistor changes resistance with temperature. The onboard chip converts this change into a digital temperature reading and sends it over bluetooth to the Raspberry Pi.
* Frequency of readings:
  + Default: 1 reading every 5 seconds
  + High accuracy mode: 1 reading every 1 second
  + Low power mode: 1 reading every 30 seconds – 1 minute for slow cookers
* Sample data format:
* {
* device\_id: Dylan’s Pi,
* thermometer\_id: bluetooth\_thermometer,
* temperature\_c: 63.5,
* battery\_percent: 80
* }

2. Raspberry Pi Camera Module

* Data collected: Photos of the meat’s surface during cooking to visually detect rawness of the meat.
* How it works: The users takes a picture of the meat inside and out and it gets compared to photos in the database to confirm if its cooking right or done.
* Frequency of capture:
  + Whenever the internal temperature rises by 5°C
  + User is pinged to take photo if they don’t know if meat is cooked or not
* Stored data:  
  Each photo is stored with a timestamp and associated cooking session ID.

3. Third-Party API Data

* Data collected:
  + Recommended cooking temperatures
  + Recipe details and images
* Source: Third-party cooking/food safety APIs (BBC Foods)
* Use: These are stored in the local database and used to give the user guidance on safe cooking temperatures for specific meats.

Data Storage

All sensor data and cooking records are stored in a MySQL relational database. MySQL is used because it provides data integrity, supports structured queries. It is also the database software we are most familiar with.