Community Fridges Usage Data Acquisition

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Community Fridges

RVA Community Fridges (RVACF) is a nonprofit group operating 15 fridges in greater Richmond, providing free food to combat food insecurity

Problem:

- 20% of children, 21% of adults in RVA are food insecure
- Data collection and fridge maintenance currently rely on manual methods, limiting efficiency and funding opportunities

Objectives:

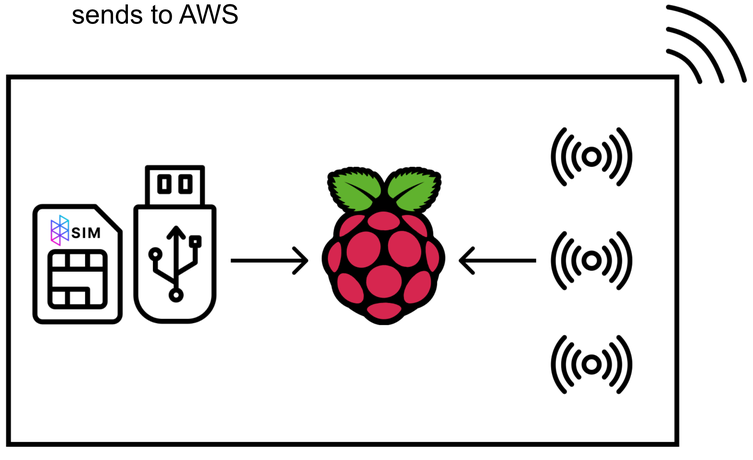
- Automate data collection from motion sensors and temperature sensors
- Transmit data from fridges to AWS for cloud-based storage and analysis
- Send maintenance alerts to RVACF community Discord server
- Integrate user-friendly dashboard into the existing RVACF website to display fridge data

Data Acquisition

Approach:

- Equip each fridge with sensors:
  - Motion sensors detect fridge usage
  - Temperature sensors record current temperature

- Create connectivity modules for each fridge:
  - Hologram SIM cards and USB modems connect Raspberry Pi's to internet
  - MicroSD cards provide non-volatile storage
  - Raspberry Pi code packages data into JSON and sends to AWS



Data Transmission

Amazon Web Services (AWS):

- AWS Lambda receives fridge data and writes to AWS Timestream, an IoT time series database
- The Discord bot, hosted on AWS ECR and Lambda, queries Timestream and returns data to the server
- AWS API Gateway routes endpoint requests and logs information in CloudWatch
- AWS EventBridge handles temperature alerts to Discord

Access:

- Updated RVACF website displays fridge usage and temperature for community members to access
- Admin dashboard displays all data for organizational leaders and administrators
- Discord bot sends automated maintenance alerts to RVACF volunteers