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AML Laboratory

Predicting the Actual Shelf Life of Milk

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Background

01

The unconsumed milk, stored in fridges or placed outside

02

Opened one, go bad faster, exposure to the environment

03

Sealed milk, environmental factors, the length of preservation

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Introduction

Aim： Predict the remaining preservation length of opened and sealed milk with temperature, humidity, pH and light intensity data collected by sensors.

Challenges:

1. Working out the nonlinear hypothesis between these environmental factors and shelf life remained.

2. Ensuring that Arduino and testing sensors are able to continue testing separating from the computer.

3. The great demand for different kinds of data for training and testing.

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Proposed Approach

Temperature

Humidity

Light intensity

Oxygen concentration

Open or sealed (milk bottle)

The shelf life of milk

(How long the pH value of milk drop below 6.4 or rise above 6.8.)

Neural Networks

↓

RNNs : Recurrent connection, parameter sharing

↓

LSTM : long-term memory

Time series forecasting

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Performance Assessment

Mean square error (MSE)

Mean absolute error (MAE)

R^2 score

Performance measures

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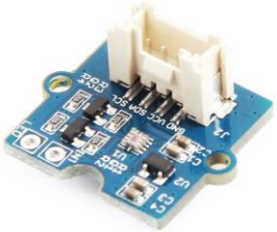
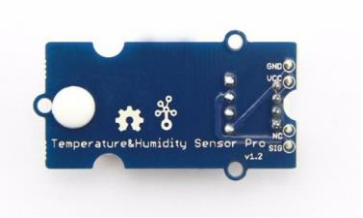
Hardware

Arduino Mkr Zero

Grove - Sunlight Sensor

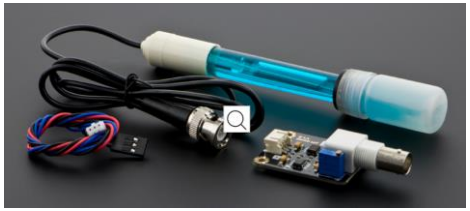


Grove - Temperature & Humidity Sensor Pro



Grove - Gas Sensor (O2)

Gravity: Analog pH Sensor



Grove - OLED Display 1.12"

Mini refrigerator

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Estimated Budget

Hardware Components	**Prices/GBP**
Arduino Mkr Zero	18.64
Grove - Sunlight Sensor	8.92
Grove - Temperature & Humidity Sensor Pro	12.80
Grove - Gas Sensor (O2)	57.88
Gravity: Analog pH Sensor	26.31
Grove - OLED Display 1.12"	13.06
Mini refridgerator	120
Total	***257.61***

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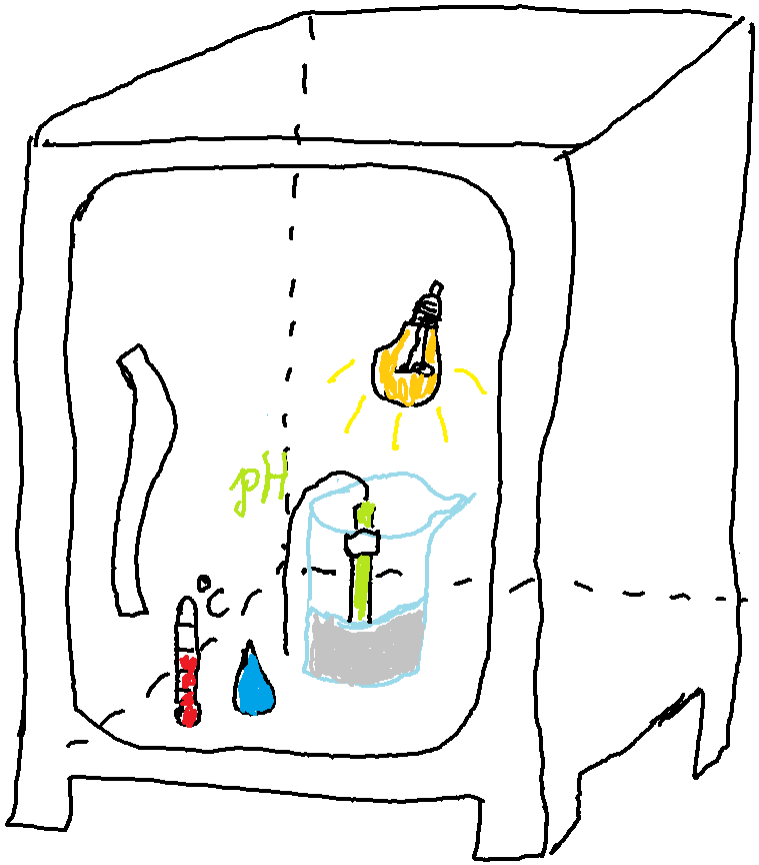
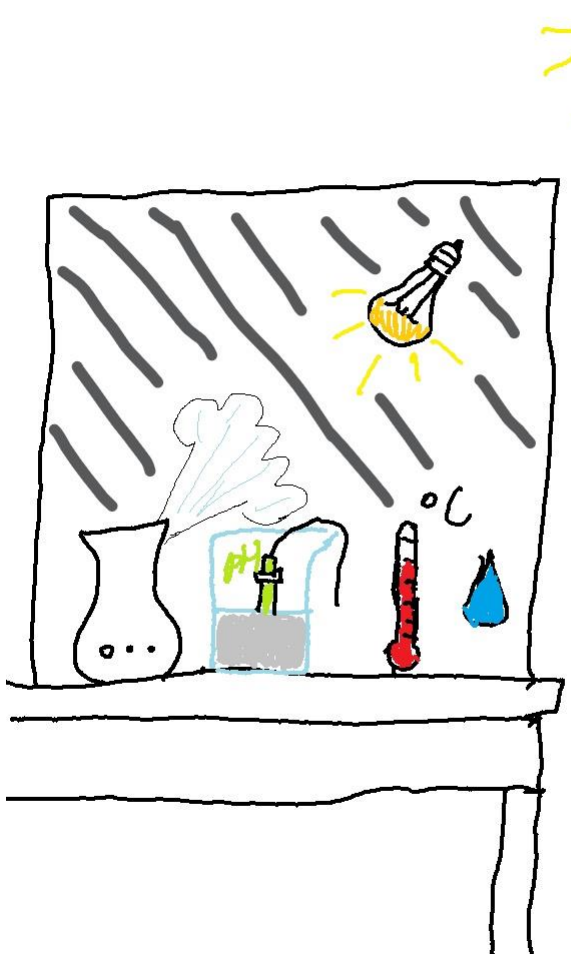
Sensor and Device placement



In the mini fridge



Outside

Deliverables

Deliverables

1.Acquire temperature, humidity, pH, light intensity and concentration of oxygen data for training with sensors and Arduino.

2.Train the model with data acquired.

3.The whole system should be able to give the number of days left till spoiling without any interference.

4.When predicting there are only two days left, the buzzer will make a buzzing sound and the red LED light will shine to remind the owner to drink.

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Time Line

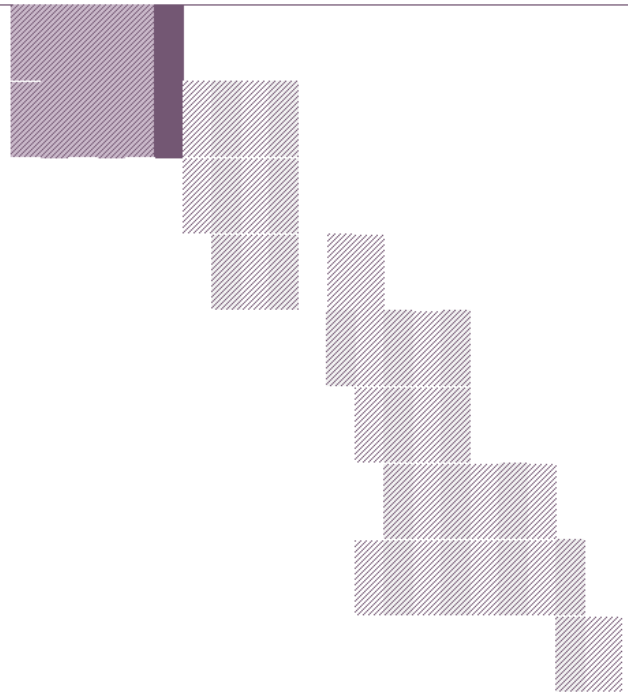
Project Planner

Select a period to highlight at right. A legend describing the charting follows.

Period Highlight: 51

Plan Duration | Actual Start | % Complete

ACTIVITY	PLAN START	PLAN DURATION	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE
Project Discussions& proposals	1	7	2		50%
Literature review	1	10	2		50%
Hardware purchase	7	4			0%
Sensors assembly and debugging with Arduino	8	5			0%
Environmental data collection	1	5			0%
ML model implement in python	2	4			0%
ML experiment testing and adjusting	3	6			0%
Final report	1	9			0%
Project presentation	9	2			0%



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Q&A