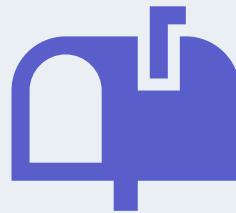


LoRa-Enabled Post Detection System



The Talking Mailbox

By Abhinav Kothari and Justin Chin Cheong

Problem

- Professors/Instructors have a lot to do, and don't always have the time to see the mailbox
- Checking for mailbox and finding nothing can be annoying and waste of time
- Unchecked post for long time if professor busy
- No way of knowing if post received if away



Solution: The Talking Mailbox



Check post

Your mailbox knows when something arrives

- Pressure sensor to detect post in box
- Same sensor can detect when post is removed



Notify

The mailbox talks to you

- Update a website to see if post is in the box
- Optional: mail the respective person



Alert

Stay alert

- Monitors battery and alerts user in case of low battery
- Detects opening, and alerts user: avoid tampering

Approach to Solution

Check for post

Use a pressure sensor to detect if a post comes in

Notify personnel

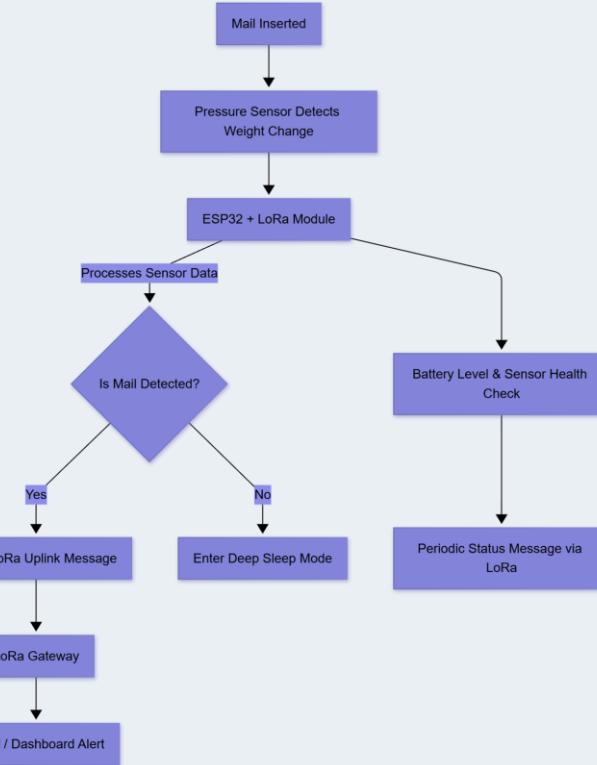
Detecting post triggers LoRaWAN gateway notification (website/mail)

Detect opening

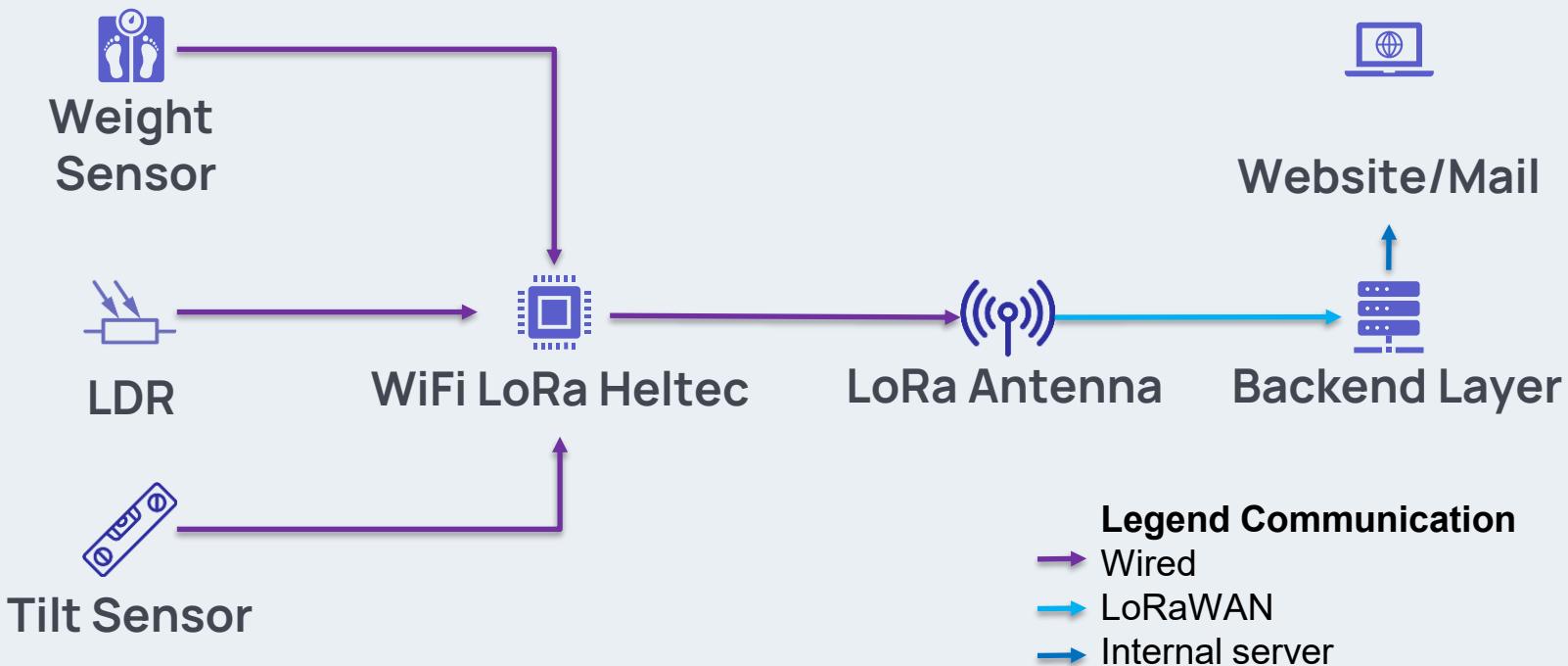
A combination of Light Dependent Resistor and Tilt Sensor on the lid to detect opening

Monitor battery

Check voltage levels, in case it drops below a threshold, alert the user

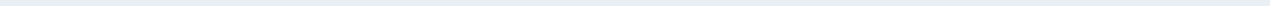


Product technologies and interaction



Thank You

Any questions?



Functional Requirements

For the The Talking Door to be a satisfiable product, the following functional requirements must be implemented:

- It can detect if a mail is in the mailbox
- It can detect if the mailbox is opened
- It can check the battery status
- It can communicate if a mail is in the box to a website (based on LoRaWAN)
- It can detect light as a redundancy for confirming the opening status of the mailbox
- It alerts the responsible person via email or dashboard upon mail detection

Technical Requirements

For the The Talking Door to operate and perform its functions, the following technical requirements must be implemented:

- The pressure sensor can detect when a piece of mail has been placed within the box
- The tilt sensor can detect the rotation of the post box lid hence detecting if it opened
- The LDR can detect the change in light intensity when the lid is opened
- The transmitter can reliably connect and communicate via the LoRaWAN
- The server the LoRaWAN communicates too can notify the personnel about the mail
- The power supply is a battery with a working voltage of 3.3V to 5.5V
- The enclosure can protect the system within a typical indoor environment (IP 31)
- Should function at temperatures ranging 0-40°C and humidity 10-90%

Attribution Links

Some icons were used from flaticons, here are the attribution links:

- <https://www.flaticon.com/free-icons/light-dependent-resistor> : Light dependent resistor icons created by verluk – Flaticon
- <https://www.flaticon.com/free-icons/antenna> : Antenna icons created by Freepik – Flaticon
- <https://www.flaticon.com/free-icons/spirit-level> : Spirit level icons created by juicy_fish - Flaticon

Price Estimates

Estimates

- Weight Sensor : 20.00 euros
- RBS311104: Digital Tilt Sensor : 3.00 euros
- ESP 32 Heltec : 32 euros
- PDV-P9203 : LDR : 0.88 euros
- Housing estimate : 20 euros (extreme case)