LoRa-Enabled Post Detection System

The Talking Mailbox

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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 a waste of time
- Posts can remain unchecked for a long time if professor is busy
- No way of knowing if post received if away (e.g., on conference/vacation)

Solution: The Talking Mailbox

Check post

Your mailbox knows when something arrives
- Weight 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 weight sensor to detect if a post comes in

Notify personnel

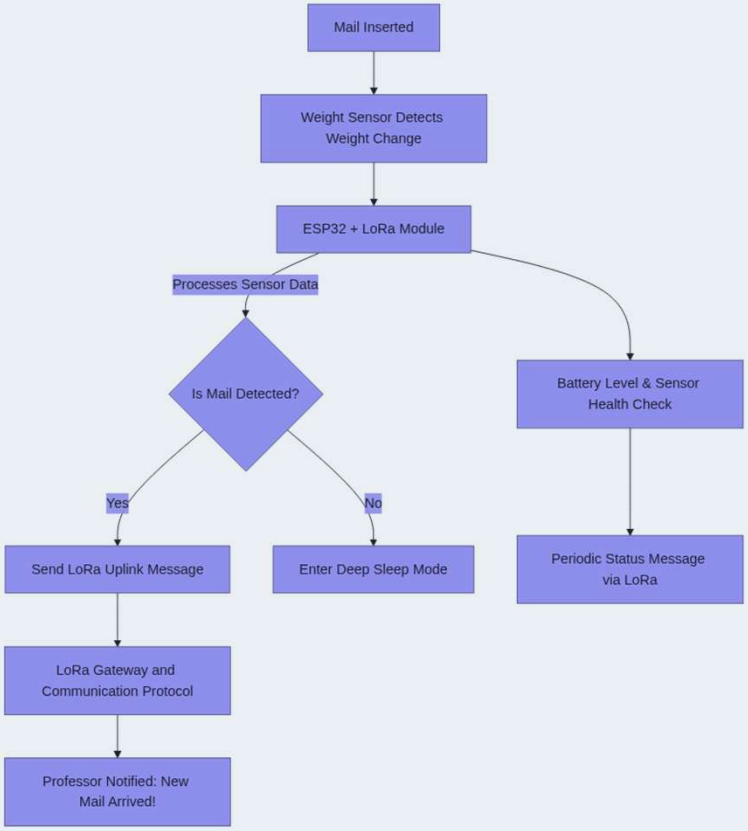
Detecting post triggers LoRaWAN gateway notification (website/mail)

Detect opening

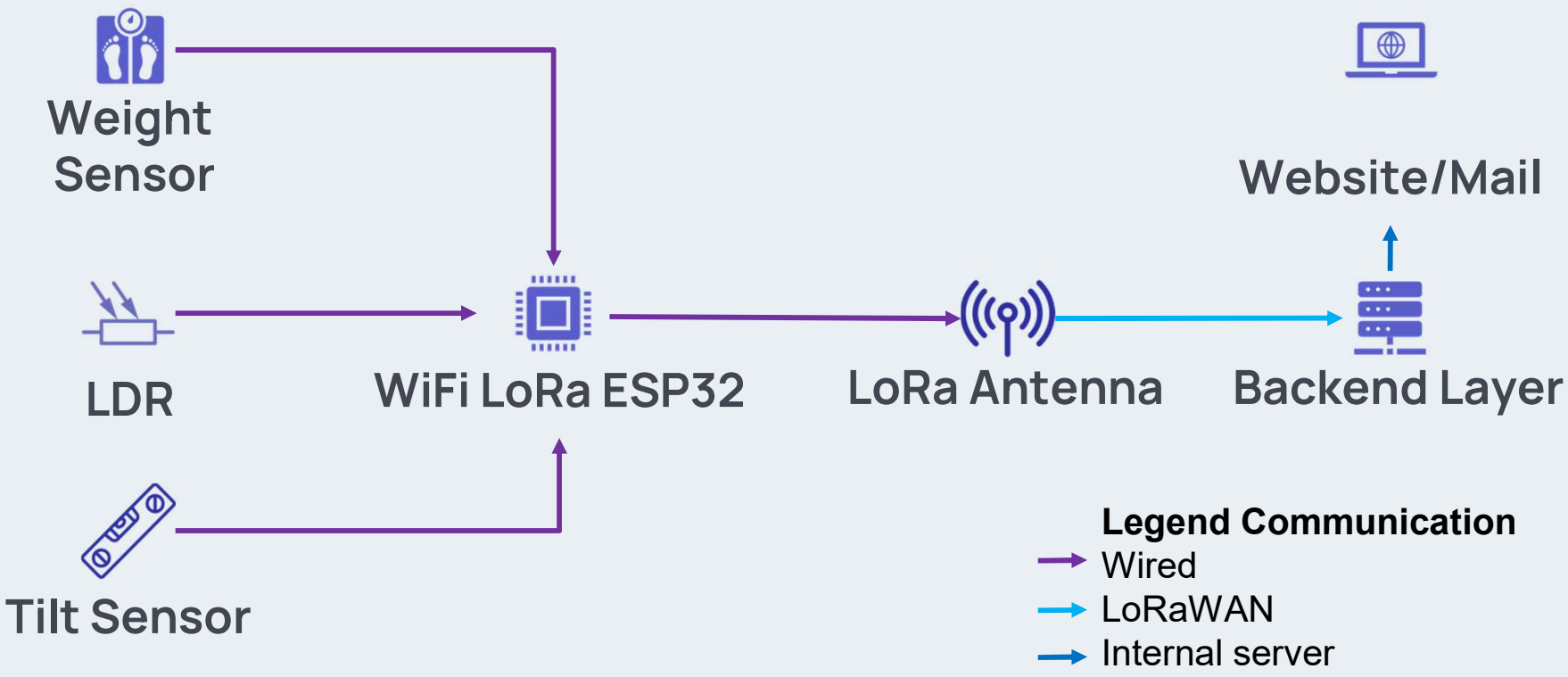
A combination of Light Dependent Resistor and Tilt Sensor on the lid to detect opening

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

- It can detect whether or not mail is present within 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
- It sends battery status updates to a website every hour
- It sends a low battery warning to a website when the battery falls below a defined threshold

Technical Requirements

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

- The weight sensor can detect a change in weight of approximately 20g. This indicates when a piece of mail has been placed within the box
- The tilt sensor can detect the rotation of the post box lid. This indicates when the lid is opened.
- The LDR can detect the change in light intensity by a defined threshold. This indicates when the lid is opened.
- The transmitter can reliably connect and communicate via the LoRaWAN Gateway.
- The server with which the LoRaWAN communicates, can send emails to relevant personnel about the mail.
- The power supply is a battery with a working voltage of 3.1V to 5.5V
- The enclosure can protect the system within a typical indoor environment (IP 31)
- The system should function at temperatures ranging 0-40°C and humidity 10-90%

Price Estimates

Component	Price Estimate [EUR]
Weight Sensor	8.00
Digital Tilt Sensor	3.00
ESP 32 + LoRa Module + Antenna	15.00
LDR	1.00
Battery	9.00
Housing estimate (extreme case)	20.00
Total	**55**

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