1D Digital World: Laundry Pi Bot

Team 1
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Background Problem

- Wasting time in checking the availability of washing machines
- Users forget to set laundry reminder and subsequently forget to collect their clothes
- Hogging up the washing machines, causing inconvenience for other users

Solution

- A Telegram bot that:
  - Reminds users when their laundry is completed
  - Notifies users on the availability of washing machines

Benefits

- There is no need to be physically present to check what washing machines are available. Hence, the user can save time spent on making extra trips down to the laundry room.
- Users can do other tasks without constantly checking and reminding themselves to collect their laundry.
- Users are informed of the washing machines' availability, without inconvenience in waiting for an available washing machine. Also, users will not have to clear the clothes of the previous user's laundry, saving time and potential misunderstanding.

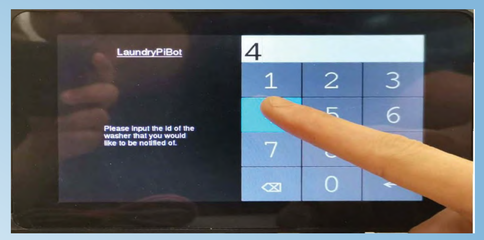
Schematic Diagram and Components

Starting/Stopping Quotient

If the vibration/non-vibration time exceeds a certain threshold in a preset time period, the state of the washer will be changed from idle to running/ vice versa.

Raspberry Pi (RPi)

The RPi runs the sensor, Telegram chat bot and the Kivy app. It updates a washer state in the database when the starting/stopping threshold is met. If a washer state is changed from running to idle, it will trigger the Telegram bot to notify users in the waitlist.



Vibration Sensor

Attached to the washing machine is a vibration sensor that is activated when it detects vibration from the washer, sending a GPIO.HIGH signal to the Raspberry Pi (RPi).

\+ **Laundry App UI**

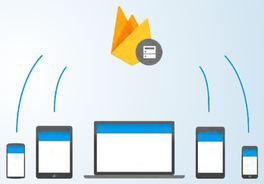
Washing machine

QR code

Provides a shortcut to the Telegram bot on mobile phones.

Firebase database

Stores information about washer states using timestamps as a key.



Telegram Bot

Provides a chat UI and notifies users when a particular washer has stopped running.

State	Input	Next State	Output
Faulty	GPIO HIGH Signal for 70% of the starting time	Running	Washer state has been updated to running
Idle	GPIO HIGH Signal for 70% of the starting time	Running	Washer state has been updated to running
Running	GPIO LOW Signal for 70% of the stopping time	Idle	Washer has stopped running.
Running	/report command	Faulty	Washer has been reported as faulty
Idle	/report command	Faulty	Washer has been reported as faulty

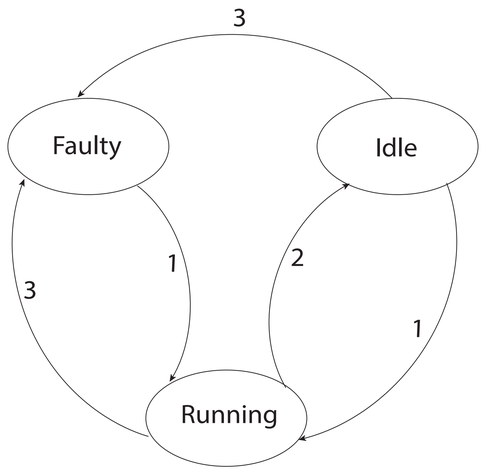


Figure 1 and 2 showing state table and state transition diagram

Legend:
1 : GPIO.HIGH signal for 70% of the starting time
2: GPIO.LOW signal for 70% of the stopping time
3: /report command

How to use Laundry Pi Bot:

Telegram Bot:

1. Scan QR code or search for the bot directly on Telegram.
2. Send contact after running /start if you want to use the Kivy app.
3. Possible commands to run are:
- /washers
- /notify
- /notify (washer id)
- /report (washer id)

Kivy App:

1. Key in the id of the washer you want to be notified of.
2. Key in your phone number. You must have registered your contact in the Telegram bot beforehand.

Figure 3: /washers
/washers provides an overview of all washer states: whether running, idle or faulty. If a state is running, it also shows the time since it started to run.

Figure 4: /notify (washer id)
Alerts user when the specified washer has stopped running, whether or not the washer is currently running or idle.

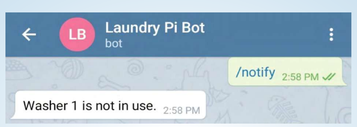


Figure 5: /notify
In the case that all washers are unavailable, /notify will notify the user when the next available washer has stopped running. Otherwise, it informs the user of a currently available washer.

Figure 6: /report (washer id)
Users can use this command to report a faulty washer.