The Smart Lighting App

Tony Naughton – 20091454

Computer Systems and Networks Assignment

Project Description

- The Smart Lighting App combines several methods of switching on/off lighting into one application.
- The app is run on a Raspberry Pi, and an LED simulates the light.
- The LED can be switched on/off in three ways:

1. The LED will switch on when the sun sets, and will switch off when the sun has risen.
2. A physical tactile push button switches the LED on/off
3. A server running on the RPi will feature an embedded switch on a web page which can turn the LED on/off

- Thingspeak is used to monitor the frequency the LED is switched on/off.

Sunset/Sunrise Control

- The level of natural light that in a room will vary all year round as the sun is rising and setting at different times each day.
- As a result, the period each day for when artificial light is required will vary.
- The time of the sunrise and sunset are found using an pre-built program called 'Sunwait' (https://github.com/risacher/sunwait)
- The cron daemon is used to monitor when the sun has risen or set.

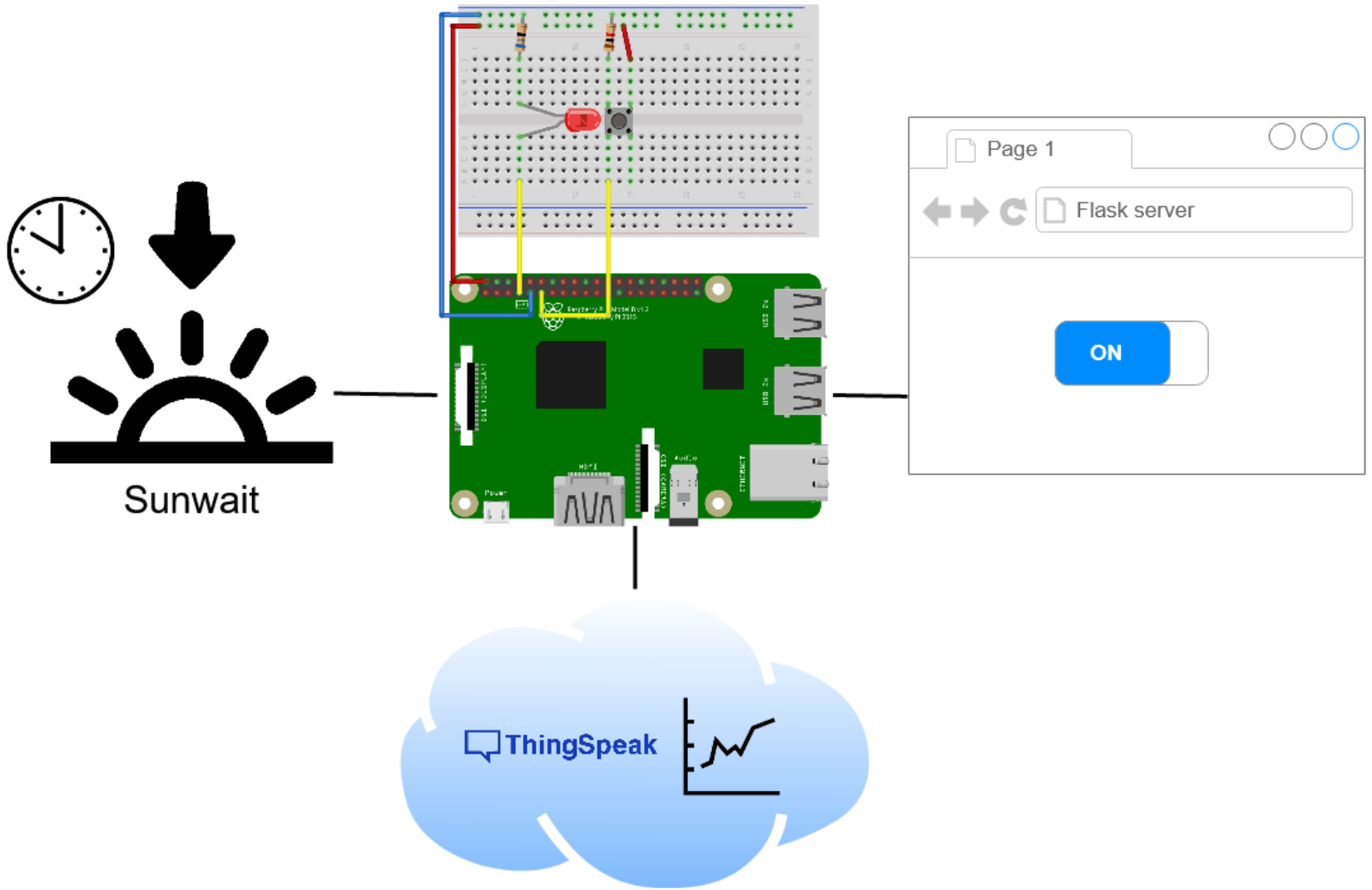
crontab entries:

```
'*/5 * * * * sunwait sun up 51.886661N 8.618732W ; python /home/pi/development/smart-lighting-app/light.py DAY'
'*/5 * * * * sunwait sun down 51.886661N 8.618732W ; python /home/pi/development/smart-lighting-app/light.py NIGHT'
```

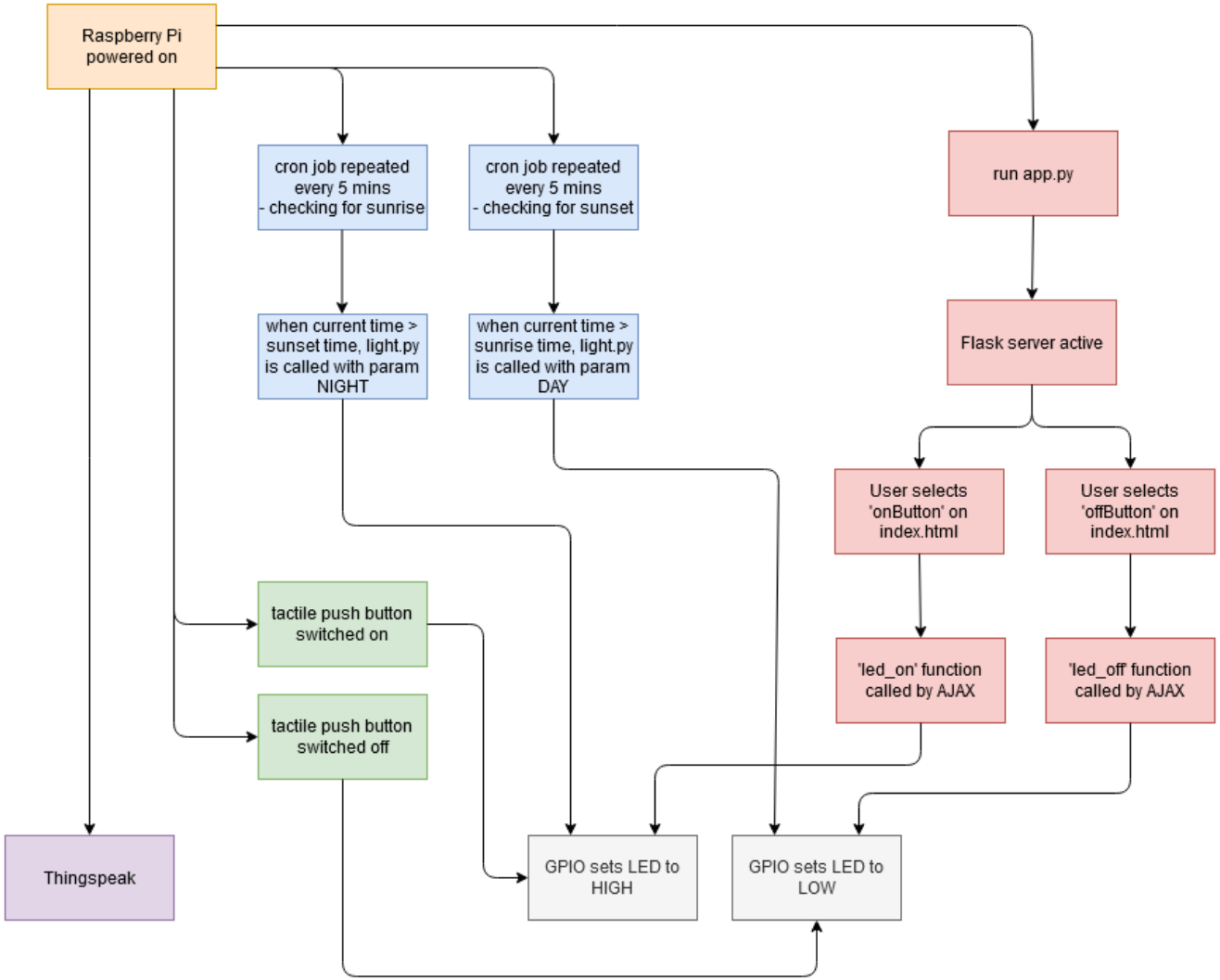
Flask Server

- A Flask server runs on the Raspberry Pi and hosts an interactive web page which allows a user located in the LAN to switch the LED on or off.
- Interacting with button on index.html sends a HTTP Post request using AJAX.
- This request calls the ‘led_on’ or ‘led_off’ function which changes the state of the LED.

Pictorial Representation



Flow chart


Raspberry Pi powered on
cron job repeated every 5 mins - checking for sunrise
cron job repeated every 5 mins - checking for sunset
run app.py
when current time > sunset time, light.py is called with param NIGHT
when current time > sunrise time, light.py is called with param DAY
Flask server active
User selects 'onButton' on index.html
User selects 'offButton' on index.html
tactile push button switched on
tactile push button switched off
'led_on' function called by AJAX
'led_off' function called by AJAX
Thingspeak
GPIO sets LED to HIGH
GPIO sets LED to LOW