WHO WEN TEK DA BIKE?!

EE 491E: CYBER-PHYSICAL SYSTEMS AND THE INTERNET OF THINGS

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WHAT'S THE PROBLEM?

Moped Thefts Around Campus

- Many students drive mopeds/ride bikes to campus
- These mopeds/bikes get stolen frequently
- The UH body is constantly notified via email
- (We're tired of that.)

Moped Theft at Hawaiian Studies Inbox x

UH Manoa Department of Public Safety <announce@hawaii.edu>
to announce

Today, Friday, December 15, 2017 at 2:50 p.m., UHM DPS received a report of a moped theft that occurred at the Hawaiian Studies, Dole Street moped rack. The moped was parked at 12:00 p.m. and discovered missing at 12:26 p.m.

The description of the moped is a black, Zummer, license number Z-31430.

If you see suspicious activity, especially in parking areas, or if you have any information regarding any of our moped thefts, please call the UHM Department of Public Safety (DPS) at (808) 956-6911 or the Honolulu Police Department at 911.

DPS recommends:
- Utilize the FREE UH Manoa Bike Cage. You can also use the Bike Cage to store your moped over the summer with a valid permit. For more information, visit this link: http://manoa.hawaii.edu/commuter/bike.html
- Lock your moped, even if leaving it unattended for just a few minutes.

Motorcycle Theft near Hale Lokelani Inbox x

UH Manoa Department of Public Safety <announce@ha
to announce

Yesterday, Tuesday, January 2, 2018, a motorcycle was re
stolen. It was taken from the Hale Lokelani motorcycle/mo
It was last seen when parked on Saturday, 12/16/17. A pol
was filed with Honolulu Police.

Motorcycle description: 2016, white, Honda, CBR 500R
License: 819 XPB

If you see suspicious activity, especially in parking areas, o
you have any information regarding any of our motor vehicl
please call the UHM Department of Public Safety (DPS) at
6911 or the Honolulu Police Department at 911.

DPS recommends:
- Lock your moped, even if leaving it unattended for just a f
minutes.
- To avoid a citation or tow on campus, park in a designate
parking area.
- Use a solid steel lock that cannot easily be cut or remove
your moped.
- Remove unsecured items or personal belongings from yo
before leaving.
- Don't lock your scooter in the same location all the time --
thieves notice patterns.
- Be sure that your lock or chain cannot be lifted over the s
the handlebar area when locked.
- Secure your moped to a rack or other immovable object (provided
you are still in a legal parking area)

Moped Theft from moped rack between Law School and Law Library

UH Manoa Dept of Public Safety <announce@hawaii.edu>
to announce

Today, Monday- January 08, 2018 a moped was reported stolen from UH Manoa. The moped was reported as stolen on Monday-January 08, 2018 between 3:30 pm- 7:40 pm. The moped is described as a 2015 Black SYM DD 50 moped, Lic: Z49088.

A report has been filed with Honolulu Police.

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DPS recommends:
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http://manoa.hawaii.edu/commuter/bike.html
- Lock your moped, even if leaving it unattended for just a few minutes.
- To avoid a citation or tow on campus, park in a designated moped parking area.
- Use a solid steel lock that cannot easily be cut or removed from your moped.
- Remove unsecured items or personal belongings from your moped before leaving.
- Don't lock your scooter in the same location all the time -- thieves notice patterns.

OBJECTIVE:

Create a lock for the moped/bike using the Raspberry Pi

Tasks:

1. Gather data from the SenseHat
2. Send that data to Bluemix, store in cloud
3. Retrieve data from cloud
4. Determine locking mechanism on bluemix based on data or user input
5. Check if bike is "stolen" over interval of time

DEVELOPMENT & DESIGN

D&D (Part 1)

- We were inspired by Homework 4
  - Used the motion data gathered from the SenseHat:
    - Acceleration
      - X, y, and z components
    - Compass
  - These components are used in detecting movement of moped

D&D (Part 2)

We start by entering our pin number into the virtual lock to lock/unlock it

User's phone is notified when locked/unlocked

D&D (Part 3)

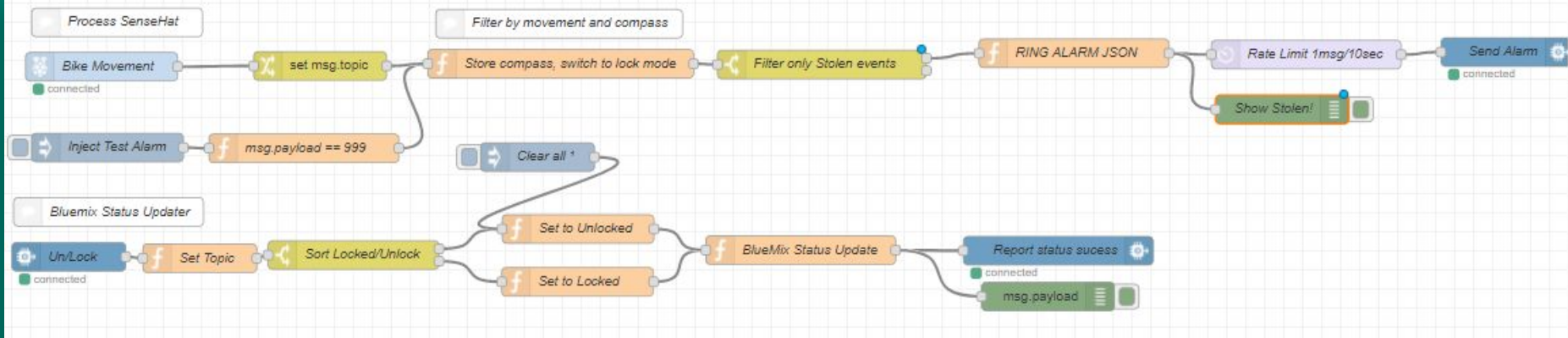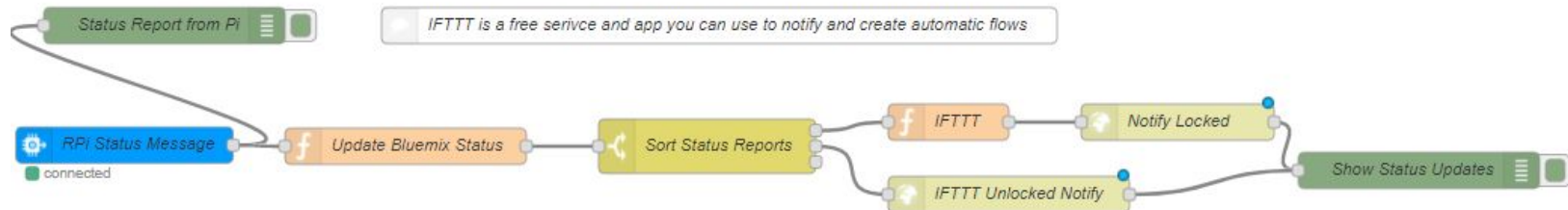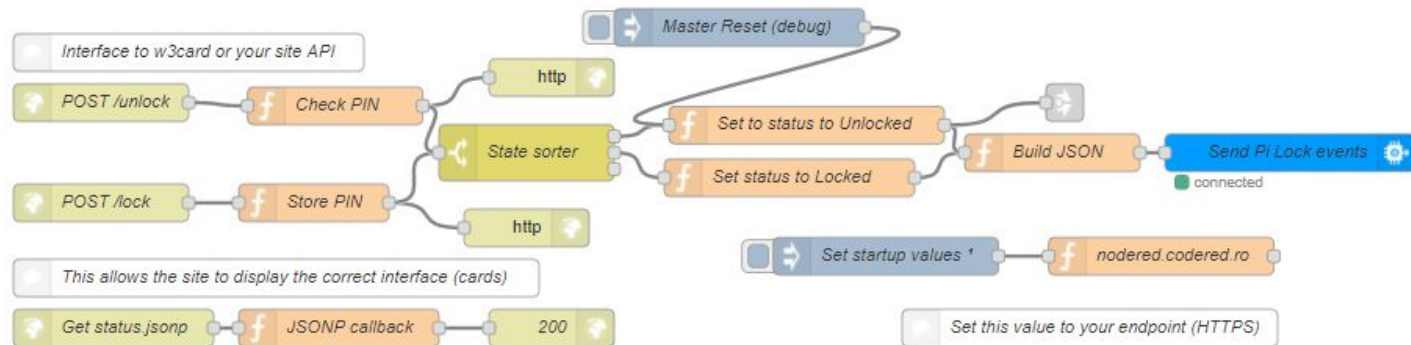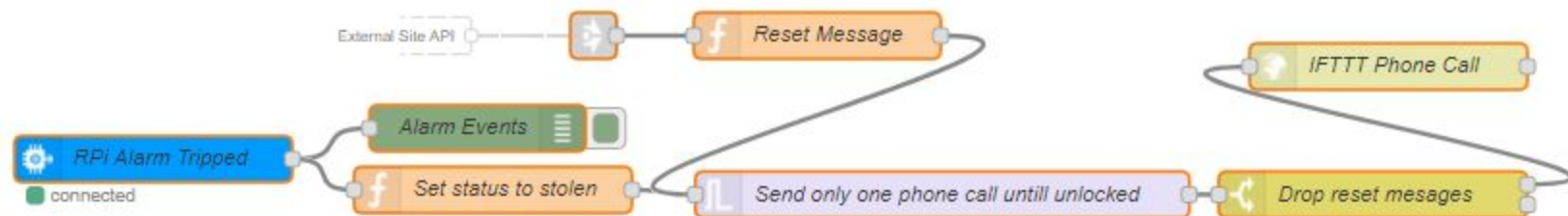- Motion data of the moped is constantly being retrieved from the SenseHat
  - Data is sent into the message flow and stored into Bluemix
  - Data is compared to the state of the lock
    - If locked: ALARM triggered, user gets phone call notifying about theft
    - If unlocked: No alarm triggered

Interface to w3card or your site API

POST /unlock → Check PIN

http

Master Reset (debug)

Set to status to Unlocked

State sorter

Set status to Locked

Build JSON → Send Pi Lock events
connected

POST /lock → Store PIN

http

Set startup values * → nodered.codered.ro

This allows the site to display the correct interface (cards)

Get status.jsonp → JSONP callback → 200

Set this value to your endpoint (HTTPS)

Status Report from Pi

IFTTT is a free serivce and app you can use to notify and create automatic flows

RPi Status Message
connected

Update Bluemix Status

Sort Status Reports

IFTTT → Notify Locked

IFTTT Unlocked Notify

Show Status Updates

QUICK DEMO

THANK YOU!