

List of Improvements

Hardware:

- Added functionality for setting the parking lot number as part of the hardware system
 - Allows user to set which location is being recorded when the box is put in the field
- Added LCD screen to allow for more user interaction with the system
 - Allows user to confirm they have configured which location is being recorded correctly
- Utilized 2 PIR sensors to detect whether vehicle is entering/exiting
 - Previously, there was no function to determine whether the subject was entering or exiting

Hardware/database interfacing:

- **NOTE:** While Arduino Sketch was used for the vehicle detection logic as well as setting/updating the currently monitored parking lot, Python was used to read from the Arduino's serial port and send entries to the database due to the fact that the Arduino lacked capability for handling the tamulink-wpa encryption protocol. Under no circumstances does the Python code send commands to - or otherwise interface with - the Arduino.
- Added offline data storage functionality if a wi-fi connection can't be established
 - Will enter data into a file with a timestamp for each entry and upload those entries to the database the next time there is a wi-fi connection
 - Sample file contents (0/1 indicates exit/enter):

```
2018-04-29 16:43:41 lot35 0
2018-04-29 16:43:48 lot35 1
2018-04-29 16:43:54 lot35 0
2018-04-29 16:44:00 lot35 1
```
- Parking lot number will update in real time if user changes it with the switch/buttons

Database Improvements:

- Added more columns to the database.
 - Previously, there were only 2 columns in the database: entryNumber and entryTime
 - Columns location, InOrOut, weekDay were added
- Location Column
 - Specifies which lot the data is for since we now have multiple lots to account for
- InOrOut column
 - Specifies which way the car went in relation to the sensor
 - Specifies whether or not the car entered or exited the lot
- WeekDay
 - In addition to the entryTime column, the weekDay column specifies which day of the week the car was recorded.
 - Sunday is the first day of the week at 1 and Saturday is the last day of the week at 7
 - This allows for more data to be extrapolated from the database as needed without much effort from the programmers side
- Duplicate Entry Unique Constraint
 - In order to make sure data isn't being spammed into the database, there is a unique constraint to make sure that there are no duplicate entries in the table
 - In addition to making sure there is no dirty duplicate data, the time stamp only records data every second. If data is entered any faster than a second, it will not be recorded which minimizes data contamination.
 - Unless the lot is a race track, cars will not be going through the entrance/exit faster than a second or an accident will definitely occur

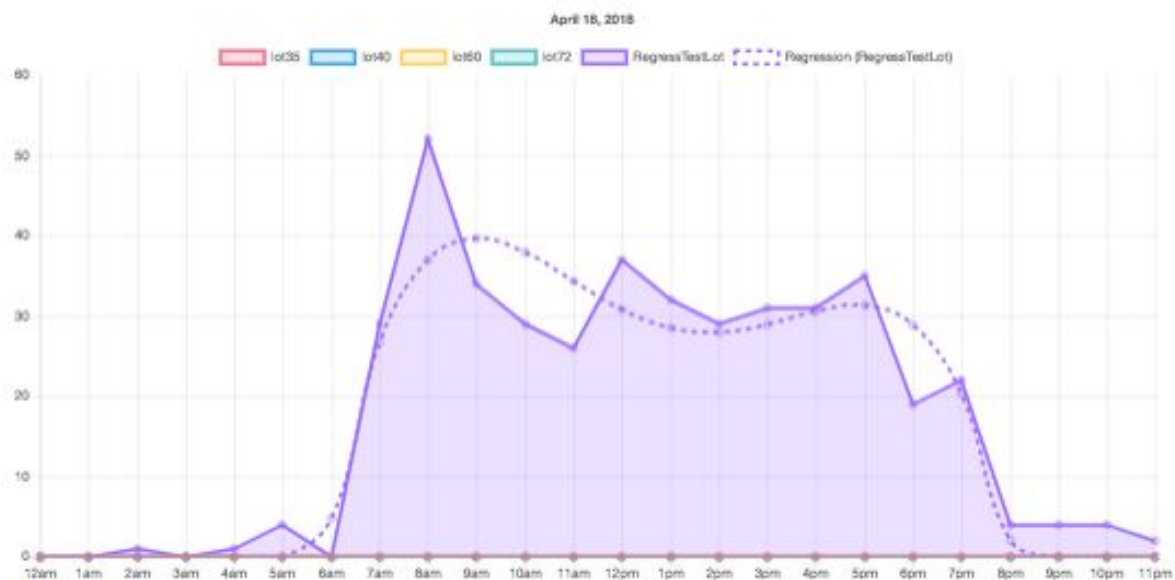
PHP-MySQL Database API Improvements:

- Made the PHPtoSQL.php file (the api) into a class in order to facilitate object oriented programming
 - Increases portability
 - Better structured
 - Allows for all data related to the API to be kept in the API object which keeps the code using the API cleaner
- Made an interface for the PHPtoSQL.php file called PHPtoSQLInterface.php
 - Only have to include the interface file in code
 - Makes it easier to read since there is no other code to look at
 - Makes it easier to read what functions are available
 - Takes care of any other includes that might be necessary for the API
 - Increases portability and organization
 - Makes programming easier since you know what you have to implement or else the php code won't run
- Made an interface for the COMMON class
 - Makes it easier to read what functions are available
 - Makes includes easier since just have to include the interface

Webpage:

- Added a regression line function to the graph
 - Can specify what order of polynomial to make the regression line to find the best fit line
 - Can choose which lot to put the line over
 - Can change and remove the line based on what time range on the graph is being analyzed
- Added ability to choose which lot is being displayed on the graph
 - Simply click on the color of the lot in the legend to add or remove the data from the graph.
- Added auto-refresh feature. Reloads the graph's data every 10 seconds seamlessly (eg. the user does not perceive the page reloading).
 - If a lot has been added since the last refresh, it will also be loaded at the next update.
- Can support “infinite” locations/datasets.
 - New datasets are assigned a color from a predetermined list. When the colors have been exhausted, the scheme starts over (eg. Reg, blue, ... purple, red blue, ...).
- Added instructions for the user on how to manipulate the graph.

CSCE 315 Project 2



Data Controls

View by: Date:

Regression Controls

Dataset: Start: End: Polynomial Order:

Instructions

Data controls

These tools give you control over what data is displayed on the chart.

View by: mode

Changes how data is broken up. For example, viewing by day will show all traffic for the given day, broken up by hour.

Date: dd/mm/yyyy

Changes the date you are viewing. Note: If you are viewing (for example) by year, then changing the day/month will have no effect.

Submit

After making any changes, make sure to click the submit button.

Regression controls

These tools allow you to add and modify a best-fit polynomial line over a particular dataset.

Dataset: choice

This allows you to choose a dataset to work with.

Start/End: time

These options allow you to specify a range for your data. Any data before start or after end will not be used to generate the regression line.

Polynomial order: number

Specifies the polynomial order for the best-fit line. For example, if you wanted to display a parabola, you would select 2 as your order.

Add

Add the regression line to the chart. Note: If a regression line is already present, it will be replaced with the new one. Also note, if changes are made in "Data controls", you will not see a difference in the regression line until clicking "Add" again.

Clear

Removes the regression line from the chart. Does nothing if there is no regression line.