IoT (Internet of Things) Information Management Display

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Introduction

- Modern technology-driven world
- Use of technology for constant improvement
- Busy people, volatile schedules
  - Need the ability to communicate updating schedules
  - Share information with coworkers or students
  - Seamless synchronization between systems

The IoT Information Management Display

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Problem Statement

- The lack of communication between faculty and students
- Busy schedules and the inability to communicate face-to-face can result in underachievement
- Reinforces adaptive scheduling and meetings for a better work environment
- An office visitor may otherwise have to navigate clumsy websites to find out when the faculty will return
- Difficulty in making multiple schedules apparent to others
- Abrupt situations may incur a change in schedule and updating everything and those affected can be a multilayered problem

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Minimum Functionality Requirements

- Daily calendar data
- Short memos/announcements
- Advertisements
- Paging function with geofencing
- Current and forecast weather data

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Additional Theorized Functionality

- Sensors
  - Camera
    - Notify the owner who is using the display
  - Door sensor
    - Let a passerby know when the last time to door was opened
      - See if owner recently left and is still available
- Online Expansion
  - Remote usability
  - Get notified on certain updates in an easy-to-read format
  - See a broader week schedule without having to look in-person
  - Sign up or schedule meetings easily
  - Push notifications to phones and other devices for better spreading of information
- Chat or Forum Addition
  - Allows people to ask about more information in a future meeting
  - Inquiries on certain topics to be further discussed
  - Possibility of coworkers or students to interact more outside of class
  - Push for possibility of easy polling on specific topics and questions

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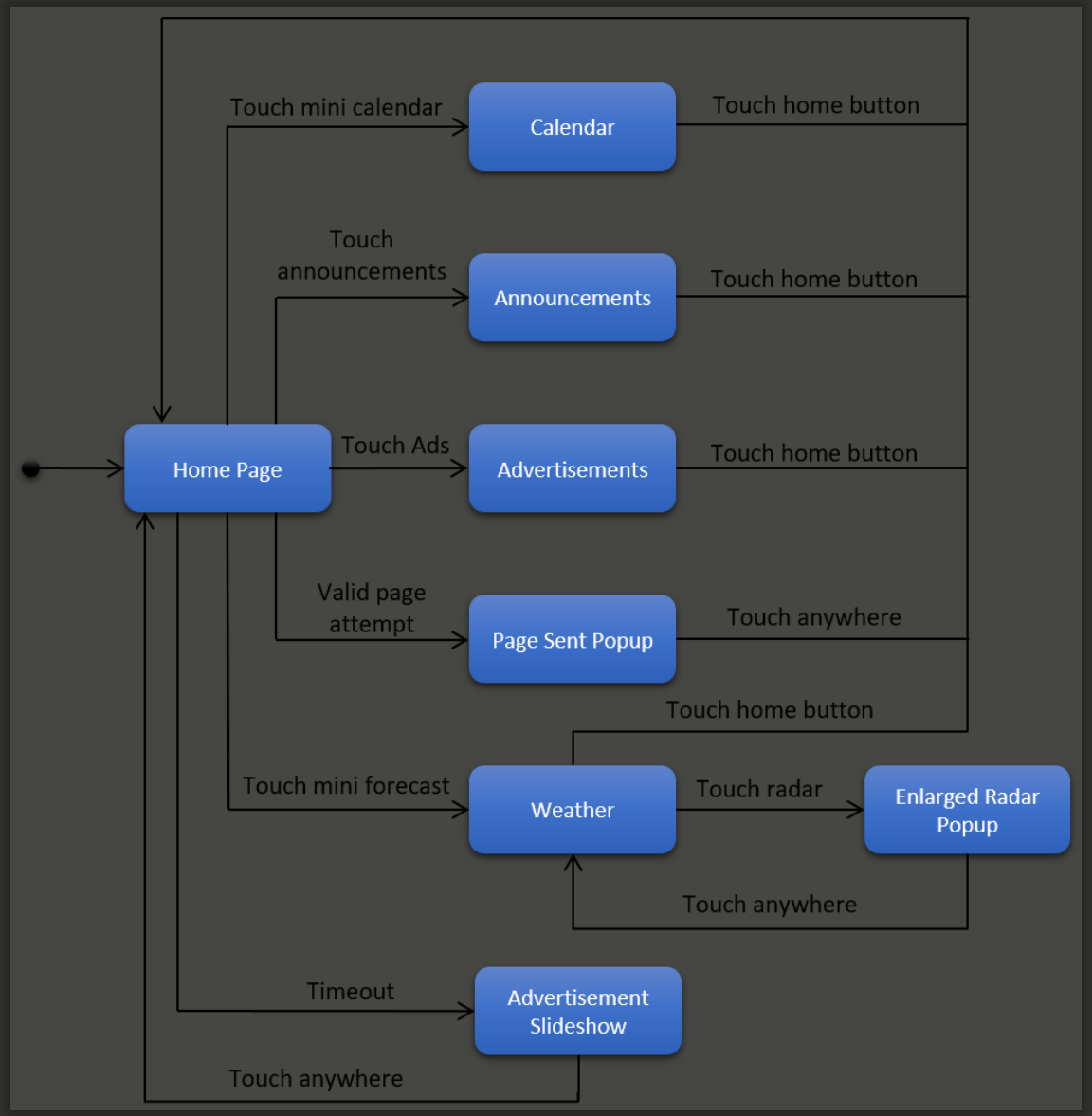
High Level State Transition Diagram

Breaks down steady states of software and transition triggers



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Previous Work & Research

DAKboard

- Customizable Interface
- Photos, Calendar, and Weather

Smart Mirror

- (Amazon) Alexa Option
- 2-way mirror with Monitor attached

Raspberry Pi Framed Informational Display

- Monitor enclosed within a frame
- Buttons on side to toggle between sections

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Similar Ideas with Patents

- A display device and content display system
  https://patents.google.com/patent/WO2016061626A1/en?q=smart

- Smart interactive billboard device
  https://patents.google.com/patent/US20050021393A1/en?q=smart

- Raspberry Pi based smart device control apparatus and control method
  https://patents.google.com/patent/CN106789459A/en?q=smart
  (Originally written in Chinese)

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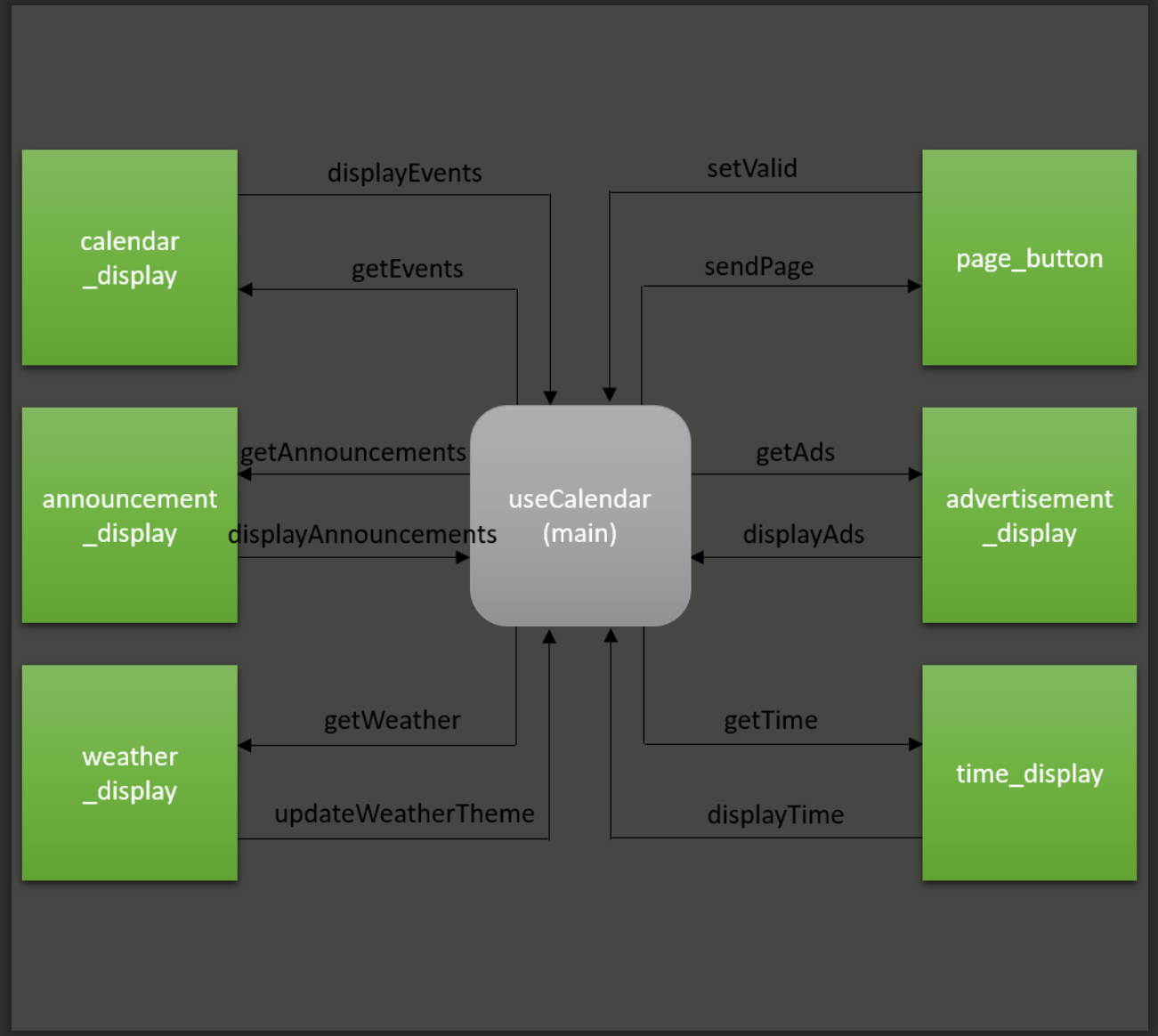
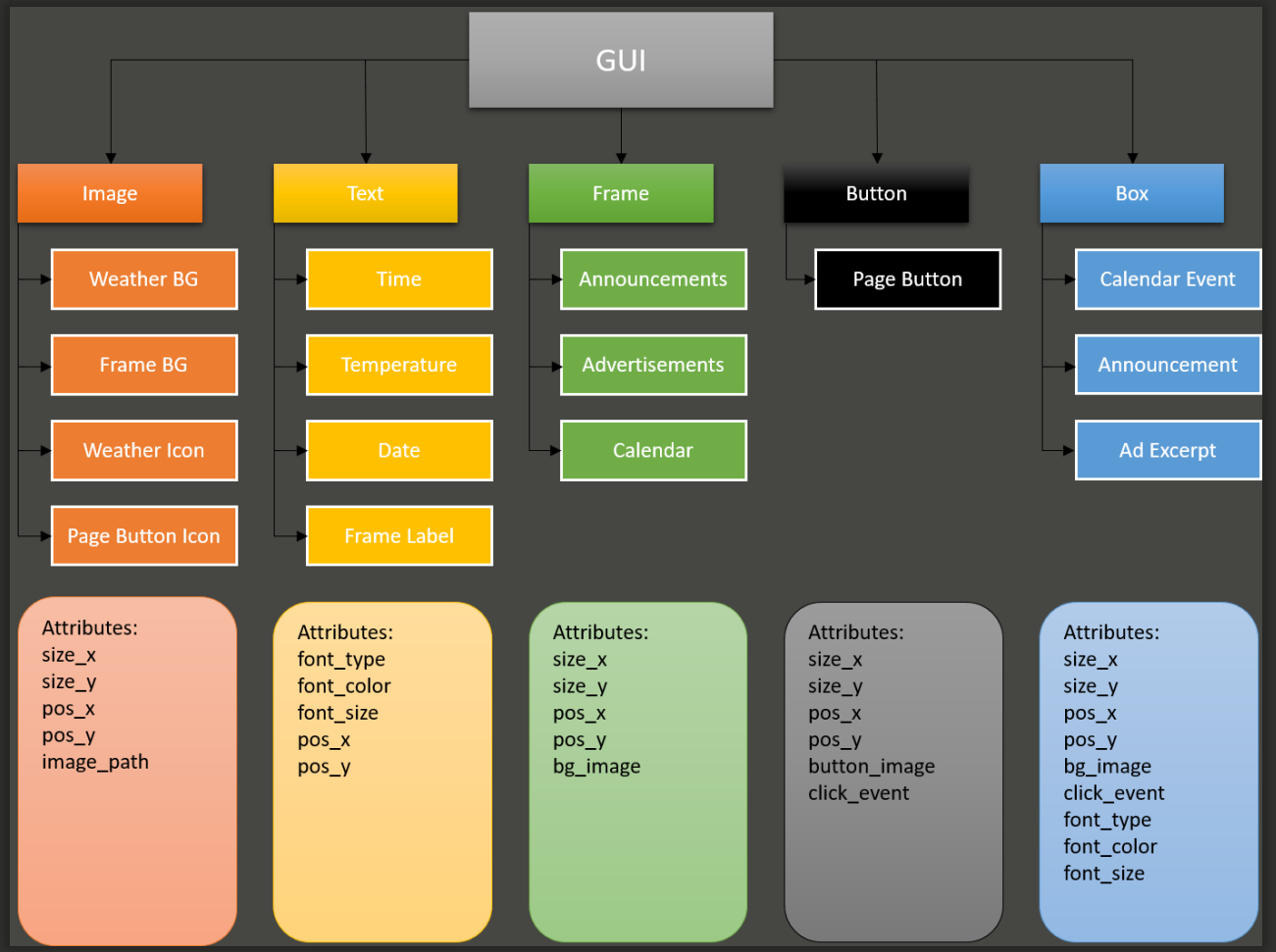
Context Data Flow Diagram

Shows data transfer between main function and subsystems



GUI Design Model

Breaks down GUI elements and major attributes



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Engineering Efforts Completed to date

- Design Decisions
  - How interactions between user and device function
  - The layout of the display
  - Functionality and added features
- Prior Design and Research
  - Other ideas for interactive / informative displays
    - Layout and design choices of these devices
  - What sorts of devices and systems are others implementing with
    - Parts list
    - Price list
    - Availability of materials
- Documents
  - Problem Statement completed
  - Functional Description Document completed
- Graphics & GUI
  - Aspects of the home screen already created
    - Further fine tuning
  - HTML example created
    - Done as side project
    - Design similar to main project
- Parts
  - Listed with price and links to purchase
  - Price total added
  - Ordering sheet constructed and sent
  - Arrival and assembly to be done spring 2018

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Parts List

Qty	Item Description	Source	Price/Unit	Price
1	Eleduino 13.3” 1080P IPS Capacitive Touch Display (sky black)	Amazon.com	$198.00	$189.00
2	CanaKit Raspberry Pi 3 Kit	Amazon.com	$49.99	$99.98
2	SanDisk Ultra 8GB Class 10 UHS-I MicroSDHC	Amazon.com	$9.99	$19.98
1	Rankie Micro HDMI to HDMI Cable, 10 Feet	Amazon.com	$9.99	$9.99
1	Micro USB Cable, 3 Pack 10 ft Braided High Speed USB 2.0 A Male to Micro B	Amazon.com	$10.99	$10.99
			Subtotal:	$329.94

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Deliverables Schedule (Fall 2017)

Date	Item Due / Requirement Met
Fall 2017	
11/16/17	Proposal presentation draft
11/30/17	Project proposal and presentation
12/7/17	Website with proposal presentation and report
12/7/17 +	Non-functional, rough layout prototype for display written in python
12/7/17 +	Majority of graphical project aspects created

Deliverables Schedule (Spring 2018)

Date	Item Due / Requirement Met
Spring 2018	
2/15/18	Proposal presentation draft
3/9/18	Project proposal and presentation
3/29/18	Website with proposal presentation and report
3/30/18	Non-functional, rough layout prototype for display written in python
4/5/18	Majority of graphical project aspects created
4/10/18	Student Expo poster setup
4/12/18	Expo poster judging
4/13/18	Award ceremony
4/27/18	IAB poster session
4/28/18	Project Conference
5/1/18	All deliverables completed and uploaded to website

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Division of Labor

- GUI
  - Ben
  - Main aspect of the whole project will be to sort the components of the project out in a way that makes them functional and flow well into each other, intuitively
- Graphics
  - Jacob
  - Unique engineering project that will require the design of many graphic components, then they can be laid out in the GUI
- Programming
  - Jacob & Ben
  - The code will be multilayered by python and different python modules that can easily assist in developing the project in an efficient and easily-managed manner.
- Device Configuration
  - Ben & Jacob
  - Once the parts arrive, installation and configuration of the device and its systems will be done using the prior knowledge and design discussed, as well as the most current iterations of the code developed.

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Discussion & Future Direction

- Expansion of future apps and features
  - Games?
  - Better Paging Utilities?
- Push past college
  - Usefulness in offices
  - Effectiveness in work environment
- Continuing on improvement
  - Increasing usability
  - Creating more eye-appeal

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References

Previous Senior Project Iteration:

IoT Smart Calendar – Jason Morris, Cole Lindeman

http://ee.bradley.edu/projects/proj2017/iotsc/index.html

Archambault, Michael. “DAKboard Is a Customizable Wall Display for Photos, Calendar Events, and Weather.” PetaPixel. N.p., 19 Aug. 2015. Web. https://petapixel.com/2015/08/19/dakboard-is- a-customizable-wall- display-for- photos-calendar- events-and- weather.

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Questions