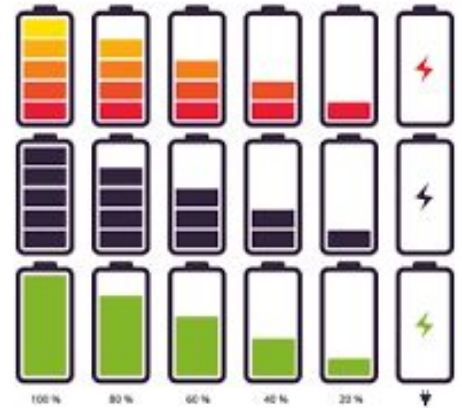


Energy Awareness

Kayla Wheeler



- Battery life is a common problem throughout all devices
 - iPhone X battery life - 10-17 hours
 - “Apple is estimating one battery will last for 400 charges — probably about two years’ worth of use.”
 - Galaxy s9 battery life- 15 hours



Why is this necessary?

- As more features requiring extra energy and hardware space are added to each new model of phones, battery life will always remain a concern
- Help reduce the amount of charges needed in a day
- Help preserve battery life



Alternative Idea /Strategy

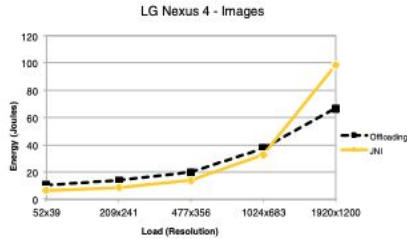
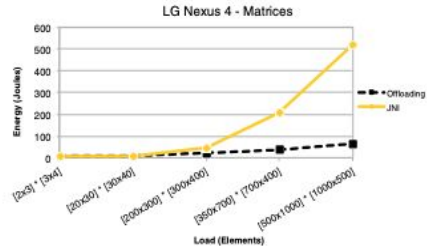
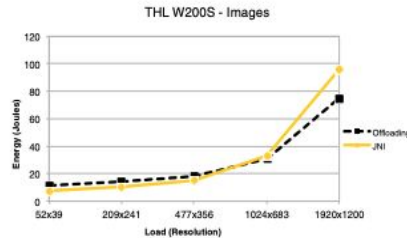
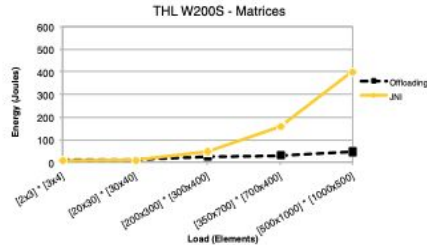
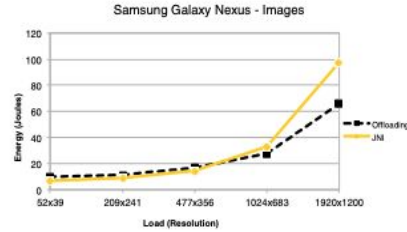
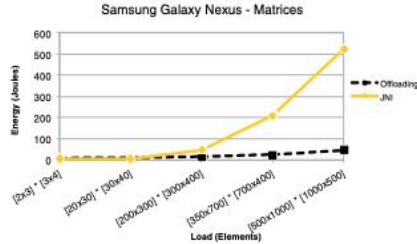


Process Offloading

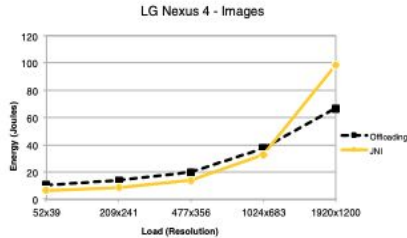
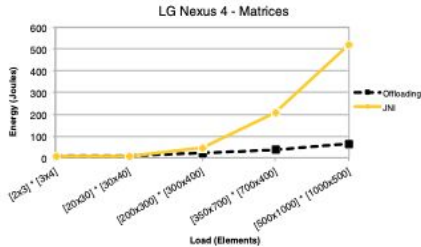
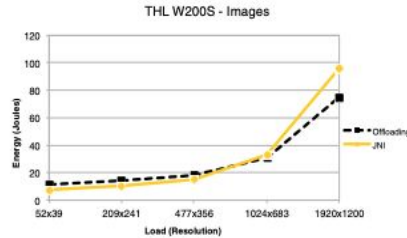
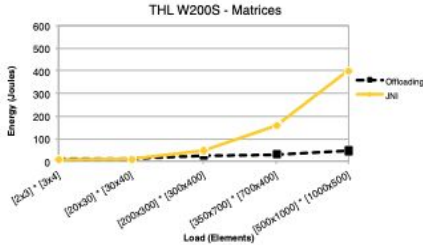
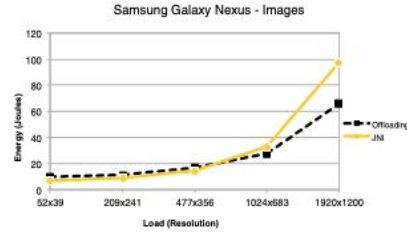
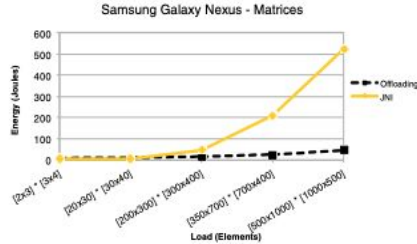
- The process in which heavy computation jobs are sent to remote computers to save energy on the local mobile device
 - At the expense of response overhead while waiting
- Only beneficial if amount of energy to establish a connection with the remote computer, send the request and the associated information, wait until the task is completed, receive the result and close the connection is less than the one that the mobile device has to spend on executing the operation using its own processing resources

- The Setup

- Two benchmarks, matrix multiplication and image filtering to show benefits
- Matrix Multiplication- the input is a text file with two matrices, a Java program was developed to generate the file with random values of the elements of the matrix. The actual input is a string indicating the full path to the file, but if offloading comes into act, all the bytes of the file are sent over the Internet. The system must read the input file from the phone storage, convert the matrices from text format into numerical two dimensional arrays and apply the "dot product" multiplication. The output of the operation is two-dimensional array of integers written to another text file and stored in the phone with different name



- Image Filtering- The input is an image file of the most used formats, the actual input parameter of the system's function is a string indicating the full path to the file but when the execution is offloaded, all the bytes of the file are sent over the Internet. The server method reads the input file and applies the same algorithm settings for filtering and in both cases the resulting image is stored on the phone



Implementation Assessment

- The implementations of the image filtering and matrix multiplication with different loads were meant to simulate various real world image processing application's behavior and the energy spent by a heavy computational job
- Not always beneficial to transmit data over the Wi-Fi adapter, keep the connection alive while waiting for a result and finally receive the actual result
- Beneficial for the cases of heavy computations
 - When big load is given to the app, the processor is free of all those instructions involved in computing the result. Therefore, in this case the amount of battery drained is lower

The Future..?



- Energizer Power Max P18K
 - Benefits:
 - 18,000mAh
 - (most phones has 3,000mAh)
 - Good for 100 hours of music playback, 90 hours of calls
 - Cons:
 - Enormous body
 - Slow to use
 - Heavy
 - 30-40mm thick
 - iPhones are 6.9 mm thick
- Unfortunately, this never got released.
- Is this the best way to solve the never ending battery crisis?