

Qian Liu¹, WenPeng Yu¹, and Yilu Liu^{1,2}

¹ The University of Tennessee, Knoxville, TN ² Oak Ridge National Laboratory, Oak Ridge, TN

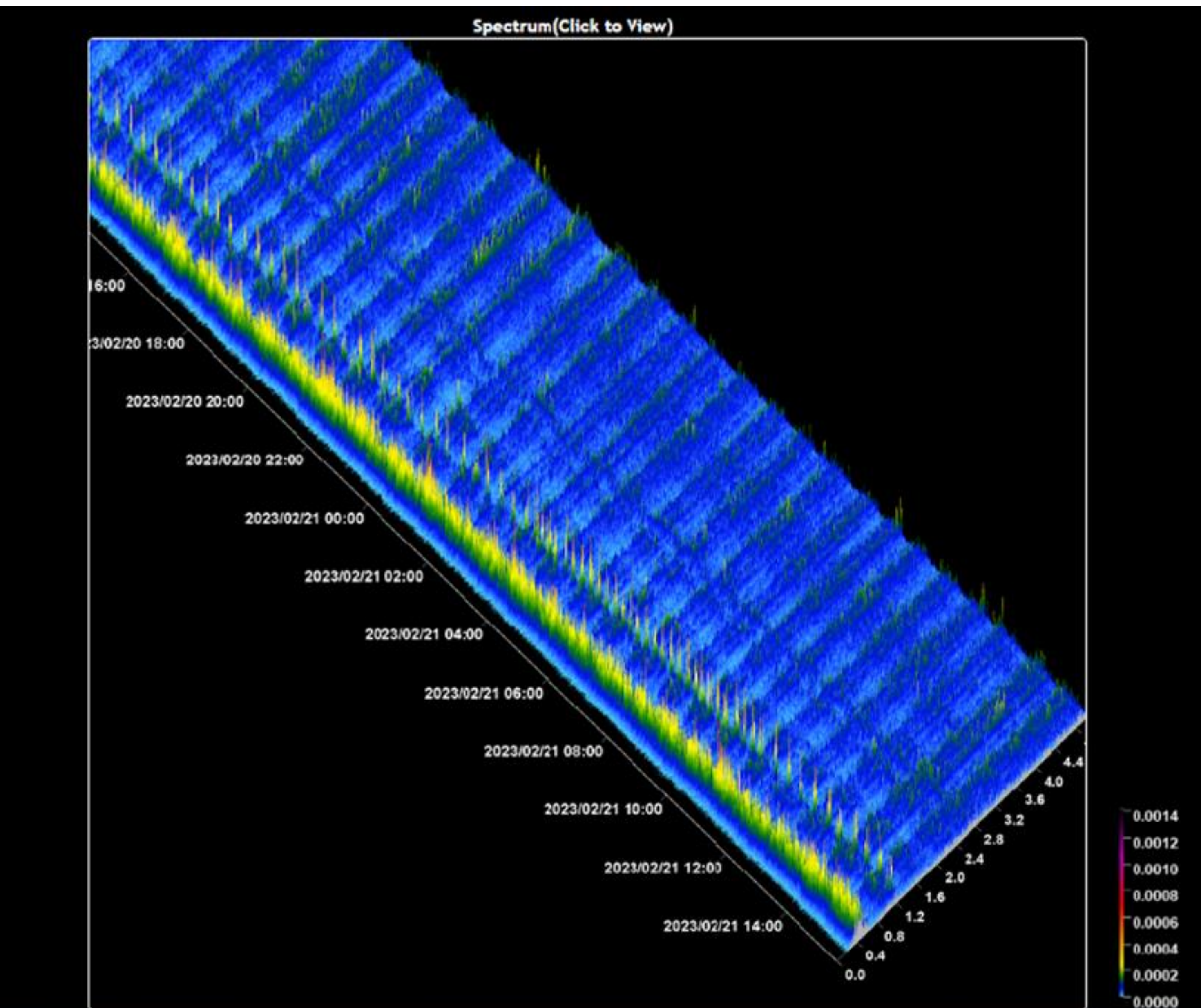
INTRODUCTION

The goal of this project is to implement an FFT algorithm in an online application, which is executed every minute for each of the selected FDRs. A web page is designed to display the FFT Spectrum of the frequency data received from FDR units. The web page will contain a U.S. map which displays the selected FDR units of the 4 power grids in North America: EI, WECC, ERCOT and QUEBEC. For each of the selected FDRs, there will be a spectrum display to show the FFT spectrum in the last 24 hours of the corresponding unit. Also, there will be a spectrum display area to display the FFT spectrum corresponding to the selected unit.



Accomplishments

The FDR distribution map displayed the selected FDR units from 4 power grid, and each color represents one power grid, for example, yellow for WECC, blue for EI, violet for ERCOT and orange for QUEBEC. Select and click one of the FDR unit will lead to the spectrum display area which contains a spectrum as shown below, green marker represents the current selected FDR unit.



The right figure is the FFT spectrum display area, and this 3-D graph is generated with a visualization algorithm in an online application called FnetServer. This figure demonstrates the FFT spectrum for EI unit UsVaRvcs686. The application receives the selected FDR data from FNET Server. A rolling buffer will keep the data of the last 120 seconds. For every minute the application will check if the received data percentage meets the required 98%, and then conduct the FFT analysis against the data. After the FFT analysis is done, the spectrum result will be appended to the visualization picture.

The Y-axis in the left side of the picture shows the time stamp, and the time interval is 2 hours. The X-axis in the right side is the frequency scale, which is from 0 to 5 hertz, and the right bottom corner displays the color reference of the spectrum amplitude.

