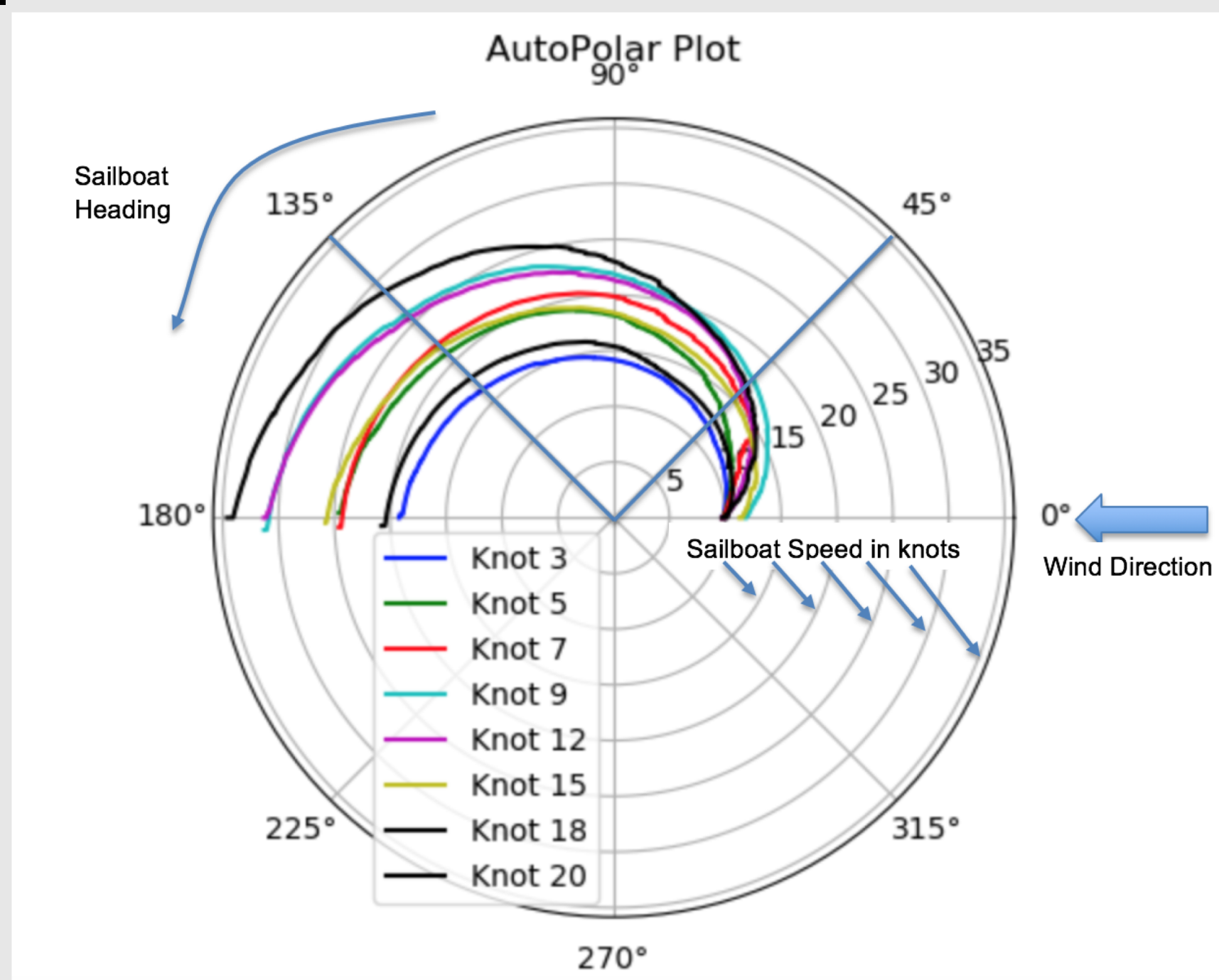


AutoPolar

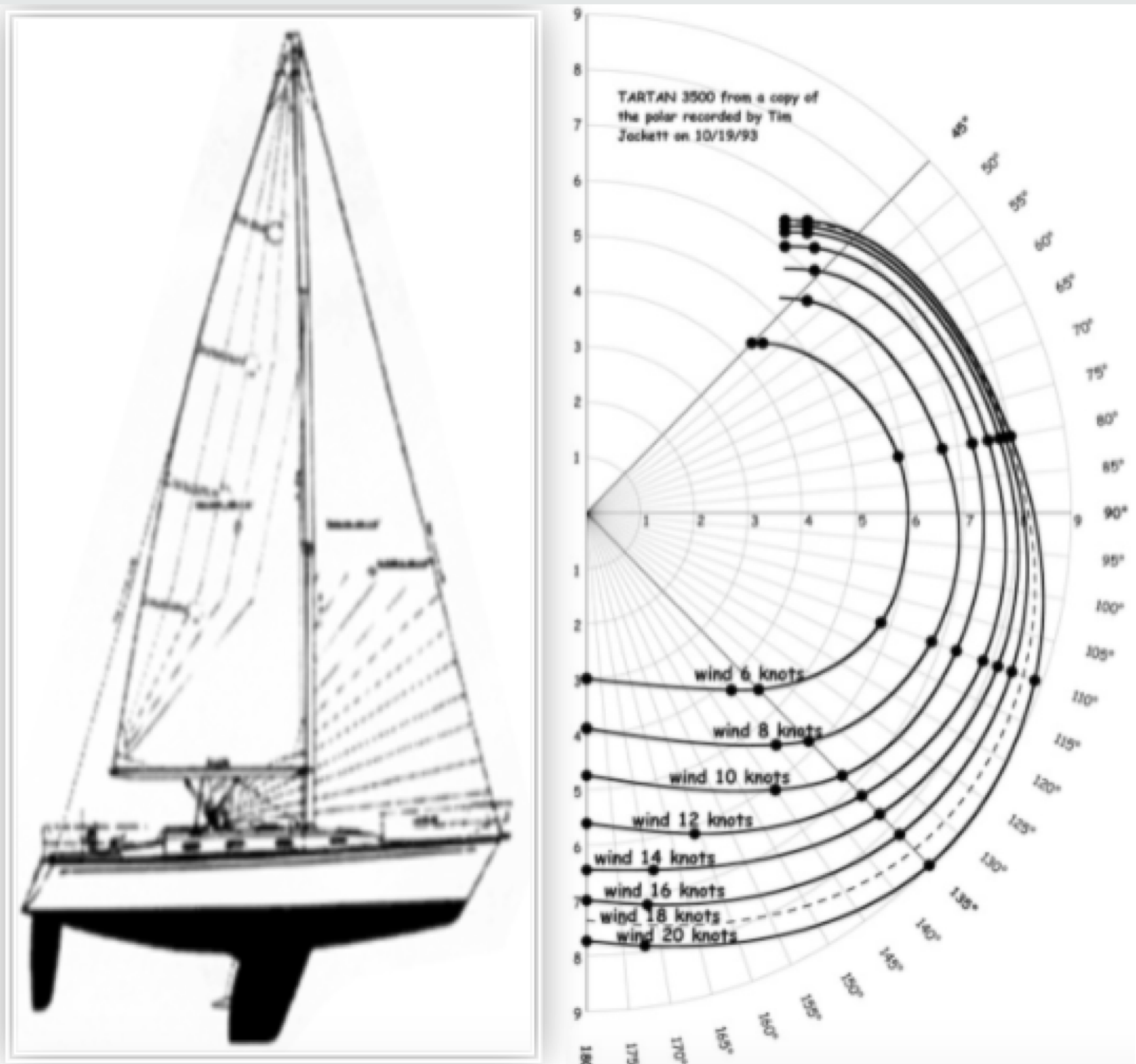
Introduction

The AutoPolar is a fully automated analysis system designed towards improving the sailing performance for all types of sailboats. Smart algorithm architecture can connect to any sailboat NMEA 0183 network, acquire, log and analyze the NMEA 0183 sentence messages to determine the best approach to sail relative to the wind conditions. The data is presented on display (tablet, phone) using a polar plot that describe the fastest velocity a sailboat can reach to attain VMG.

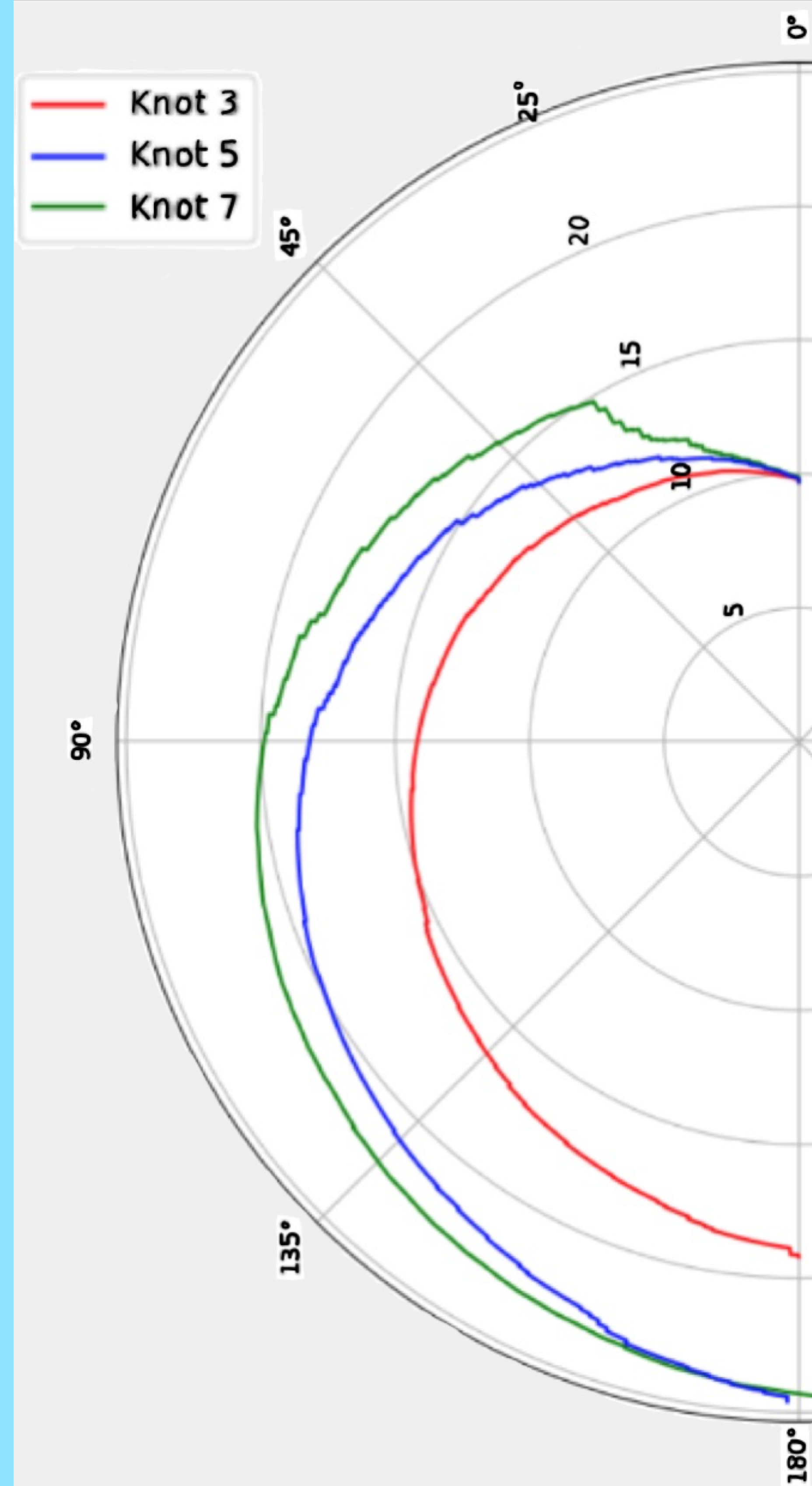
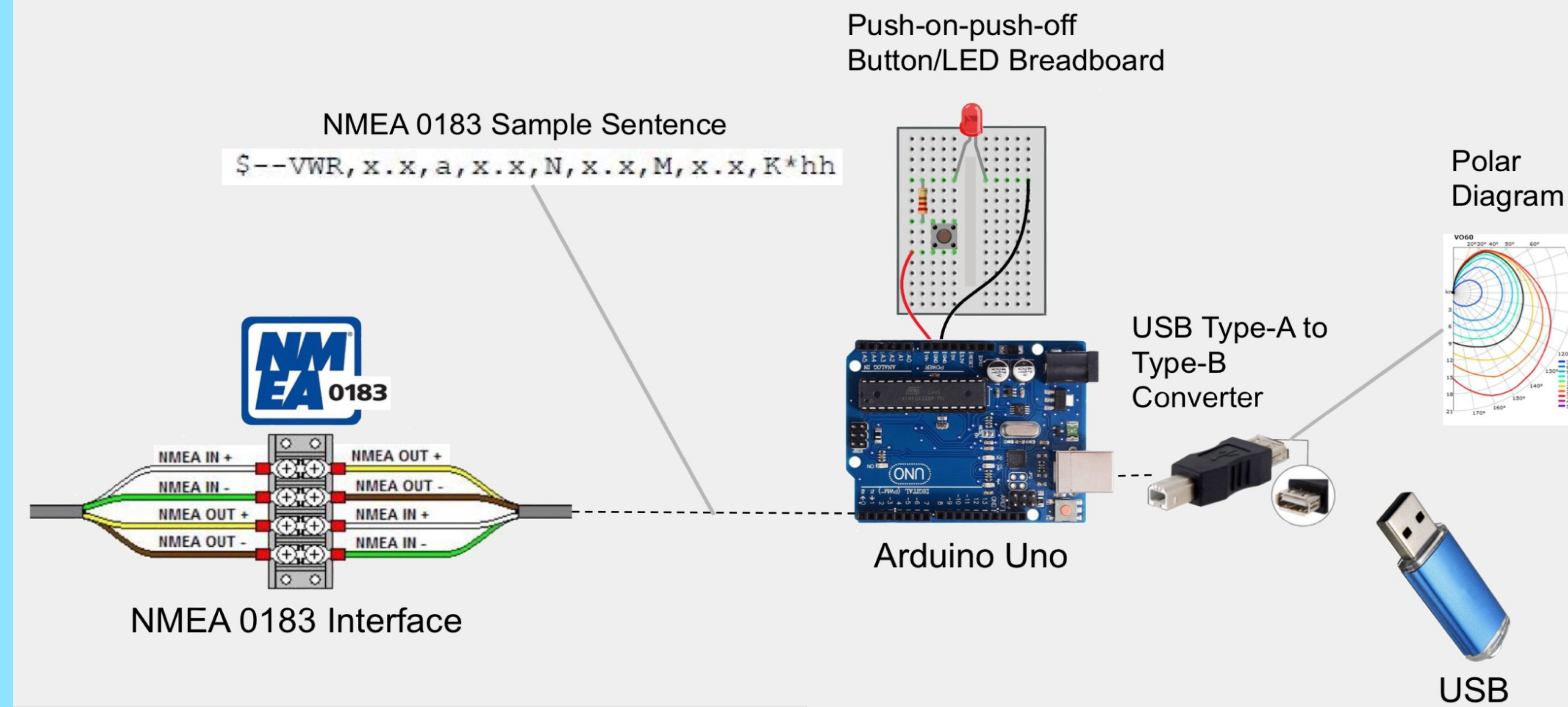


Design Process

- Identified all client needs and wants, assigned each team member a task as such to ensure all design requirements are met
- Designed and implemented a user-friendly, simple to use system by limiting the interaction with user to bare minimum
- Use the provided client polar diagram to compare the AutoPolar output with



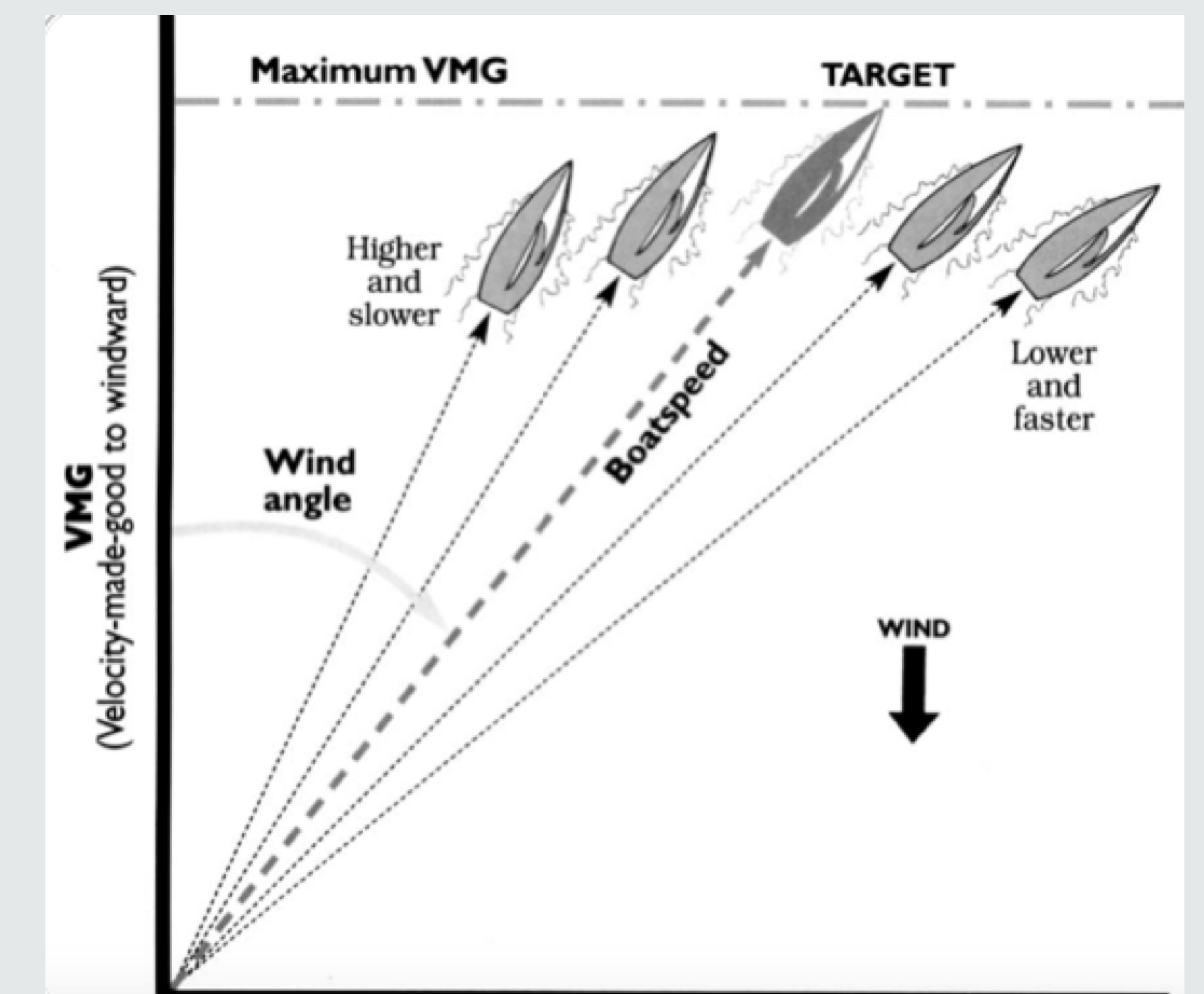
Details of Design



- The AutoPolar (constructed of the Arduino Uno, breadboard and converter, in the above diagram) connects to the NMEA 0183. When the push-on, push-off button is activated, the AutoPolar logs NMEA sentences until the button is deactivated, terminating the session. The AutoPolar then parses the log for wind speed, wind angle and boat speed. These values are interpolated and organized for plotting. They are outputted to the USB port where the user can transport the data to land or an onboard tablet for plotting.
- For a proof of concept, an NMEA simulator streamed sentences to the AutoPolar program running on a PC. The output coordinates were plotted with 'matplotlib', a python plotting library. The resulting polar plot (image to the right, whose radial axis is boat speed in knots) features lines for wind speeds of 3, 5 and 7 knots.

Conclusion and Recommendations

- With the AutoPolar a sailor can be rest assured the data provided by the polar plot is representative of their actual performance in the seas.
- AutoPolar easy to carry tool is able to remember sail runs from as far back as months to enable sailor to track back and compare performance.
- Strongly recommend using Autopolar to improve sailing navigational performance as the system uses analysis methods not used by any other system.
- To use the AutoPolar, an NMEA 0183 is required on the sailboat. The NMEA provides sensory data such as wind speed, wind angle and boat speed to the AutoPolar, in the form of ASCII sentences.
- Sailors optimize Velocity Made Good (VMG) using plots created with the AutoPolar.



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