1109-05-203 **Mark Ellingham*** (mark.ellingham@vanderbilt.edu) and **Bin Jia**. *Link graphs and an unexpected application of topological graph theory.* Preliminary report.

A k-link in a graph is a walk of length k that never uses the same edge twice in succession; a link and its reverse are considered equal. For a given graph G, the k-link-graph $L_k(G)$ has as its vertices the k-links of G, where two k-links are adjacent if they are initial and final subsequences of the same $(k+1)$-link. This generalizes the idea of the line graph, which is the 1-link graph. A natural question is whether $L_k(G)$ uniquely determines the graph G. Whitney proved that $L_1(G)$ determines G for connected G, except in one small case. Xueliang Li showed that $L_2(G)$ determines G for G of minimum degree at least 3. We show that $L_k(G)$ determines G for G of minimum degree at least 3 for all $k \geq 2$. Somewhat surprisingly, part of the proof uses the classification of quadrangular embeddings of 4-regular graphs, which are always on the torus or Klein bottle. (Received February 01, 2015)