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**Allie Ray\*** ([allie.ray@mavs.uta.edu](mailto:allie.ray@mavs.uta.edu)). *From graphs to Lie algebras to nilmanifolds*. Preliminary report.

I will present if and only if conditions for extending a certain two-step nilpotent Lie algebra associated with a colored, directed graph to a three-step nilpotent Lie algebra. The two-step construction is a generalization of a method used by S. Dani and M. Mainkar. Three step nilpotent Lie algebras are more delicate to construct since the Jacobi equation becomes a consideration. In addition, starting with pairs of Schreier graphs of a Gassmann-Sunada triple, I will consider issues of isospectrality and isometry of the associated nilmanifolds. Methods used include graph theory, combinatorics, Lie theory, group actions, and differential geometry. (Received August 11, 2014)