1086-92-1641 **Tilahun A Muche*** (`muchet@savannahstate.edu`), Savannah State University, Engineering Technology and Mathematics Dept., 3219 College Street, Savannah, GA, 31404, Savannah, GA 31404. *Hamiltonian sets of polygonal paths in a 4-valent spatial graphs.* Preliminary report.

Graphs with 4 valent rigid vertices and two end points are called simple assembly graphs. The *assembly number* of Γ, denoted by $An(\Gamma)$, is defined by$An(\Gamma) = \min\{k|$there exists a Hamiltonian set of polygonal paths $\{\gamma_1, \ldots, \gamma_k\}$ in $\Gamma\}$ where polygonal paths are paths that take "$90°$ *turn*" at each vertex. For a positive integer n, we define *minimal realization number for* n to be $R_{min}(n) = \min\{|\Gamma| : An(\Gamma) = n\}$, where $|\Gamma|$ is the number of 4-valent vertices in Γ. For a positive integer n, a graph Γ such that $R_{min}(n) = |\Gamma|$ is called minimal realization graph. We denote by $\mathcal{R}_{min}(n)$, the set of minimal realization graphs for some positive integer n. Each $\Gamma \in \mathcal{R}_{min}(n)$ has the property that $|\Gamma| \leq 3n - 2$ and $R_{min}(n) < R_{min}(n + 1)$ for every natural number n. The assembly graph $\hat{\Gamma}^0$ obtained from a given assembly graph Γ by substituting every edge with a loop, is called *loop-saturated graph*. We prove that loop saturated assembly graphs achieve the bound of $3n - 2$ and if a simple assembly graph Γ with $An(\Gamma) = k$ has no loops then it is not in $\mathcal{R}_{min}(k)$. (Received September 23, 2012)