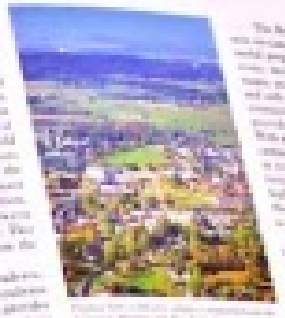VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY