Autopilot

Developed by Zach Montgomery

Full 12 state LQR controller

- User can choose to control either climb angle or altitude
- User can choose to control either bank angle or heading
- These options are combined giving 4 different control scenarios

Full 12 state LQR controller

- Aircraft controllers usually consist of two separate controllers
  - One for longitudinal motion and the other for lateral motion
  - Aerodynamic coupling from the two modes are simple treated as disturbances
- Full 12 state controllers are uncommon
  - This accounts for any aerodynamic coupling that may happen
  - More robust method, allowing for more states

Algebraic Riccati Equation

$$\dot{x} = Ax + Bu$$

$$y = Cx + Du$$

$$0 = PA + A^T P + Q - PBR^{-1}B^T P$$

$$K = R^{-1}B^T P$$

Block Diagram