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Code

```
void Robot::JacobiH(Eigen::MatrixXd &H, const Eigen::VectorXd &X, double
px, double py)
{
    double var = (px - X(0)) * (px - X(0)) + (py - X(1)) * (py - X(1));
    const double dist = sqrt(var);

    H << -(px - X(0)) / dist, -(py - X(1)) / dist, 0;
}

void Robot::LocalizeS(void)
{
    int i;
    Eigen::MatrixXd K(3, 1);
    Eigen::MatrixXd I(3, 3);
    I.setIdentity();
    Eigen::MatrixXd S(1, 1);
    Eigen::MatrixXd error(1, 1);

    for (i = 0; i < num_satellites; i++)
    {
        double o_dist = satellites[i]->getDistance(px, py);
        o_dist += d_noise(generator);

        error << o_dist - satellites[i]->getDistance(X(0), X(1));

        JacobiHD(JHD, X, satellites[i]->getX(), satellites[i]->getY());
        S = JHD * P * JHD.transpose() + Rs;
        K = P * JHD.transpose() * S.inverse();
        X = X + K * error;
        P = (I - K * JHD) * P;
    }
}
```

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Plots