In [33]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
import seaborn as sns
from sklearn.linear_model import Ridge, RidgeCV, Lasso
from sklearn.preprocessing import StandardScaler
df=pd.read_csv(r"C:\Users\Y.Saranya\Downloads\fiat500_VehicleSelection_Dataset
print(df)
```

```
        ID   model  engine_power  age_in_days      km  previous_owners  \
0        1  lounge            51          882   25000                1
1        2     pop            51         1186   32500                1
2        3   sport            74         4658  142228                1
3        4  lounge            51         2739  160000                1
4        5     pop            73         3074  106880                1
...    ...     ...           ...          ...     ...              ...
1533  1534   sport            51         3712  115280                1
1534  1535  lounge            74         3835  112000                1
1535  1536     pop            51         2223   60457                1
1536  1537  lounge            51         2557   80750                1
1537  1538     pop            51         1766   54276                1

            lat        lon  price
0     44.907242   8.611560   8900
1     45.666359  12.241890   8800
2     45.503300  11.417840   4200
3     40.633171  17.634609   6000
4     41.903221  12.495650   5700
...         ...        ...    ...
1533  45.069679   7.704920   5200
1534  45.845692   8.666870   4600
1535  45.481541   9.413480   7500
1536  45.000702   7.682270   5990
1537  40.323410  17.568270   7900

[1538 rows x 9 columns]
```

In [3]:
```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn import preprocessing,svm
df=df[['km','price']]
df.columns=['Km','Price']
df.head(10)
```

Out[3]:

	Km	Price
0	25000	8900
1	32500	8800
2	142228	4200
3	160000	6000
4	106880	5700
5	70225	7900
6	11600	10750
7	49076	9190
8	76000	5600
9	89000	6000

In [5]:
```
df.tail()
```

Out[5]:

	Km	Price
1533	115280	5200
1534	112000	4600
1535	60457	7500
1536	80750	5990
1537	54276	7900

In [6]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1538 entries, 0 to 1537
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Km      1538 non-null   int64
 1   Price   1538 non-null   int64
dtypes: int64(2)
memory usage: 24.2 KB
```

In [7]:
```
df.describe()
```

Out[7]:

	Km	Price
count	1538.000000	1538.000000
mean	53396.011704	8576.003901
std	40046.830723	1939.958641
min	1232.000000	2500.000000
25%	20006.250000	7122.500000
50%	39031.000000	9000.000000
75%	79667.750000	10000.000000
max	235000.000000	11100.000000

In [8]:
```
df.shape
```

Out[8]:
```
(1538, 2)
```

In [9]:
```
df.isnull().sum()
```

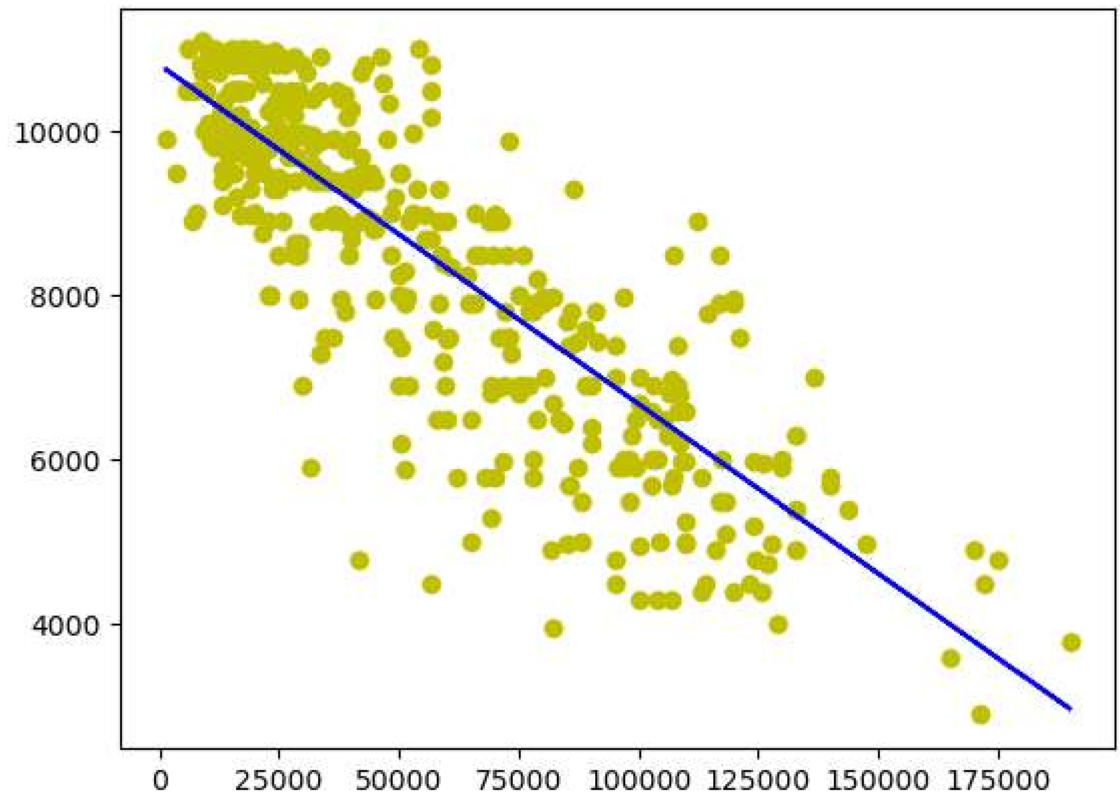
Out[9]:
```
Km       0
Price    0
dtype: int64
```

In [10]:
```
x=np.array(df['Km']).reshape(-1,1)
y=np.array(df['Price']).reshape(-1,1)
```

In [11]:
```
df.dropna(inplace=True)
X_train,X_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
regr=LinearRegression()
regr.fit(X_train,y_train)
regr.fit(X_train,y_train)
print(regr.score(X_test,y_test))
```

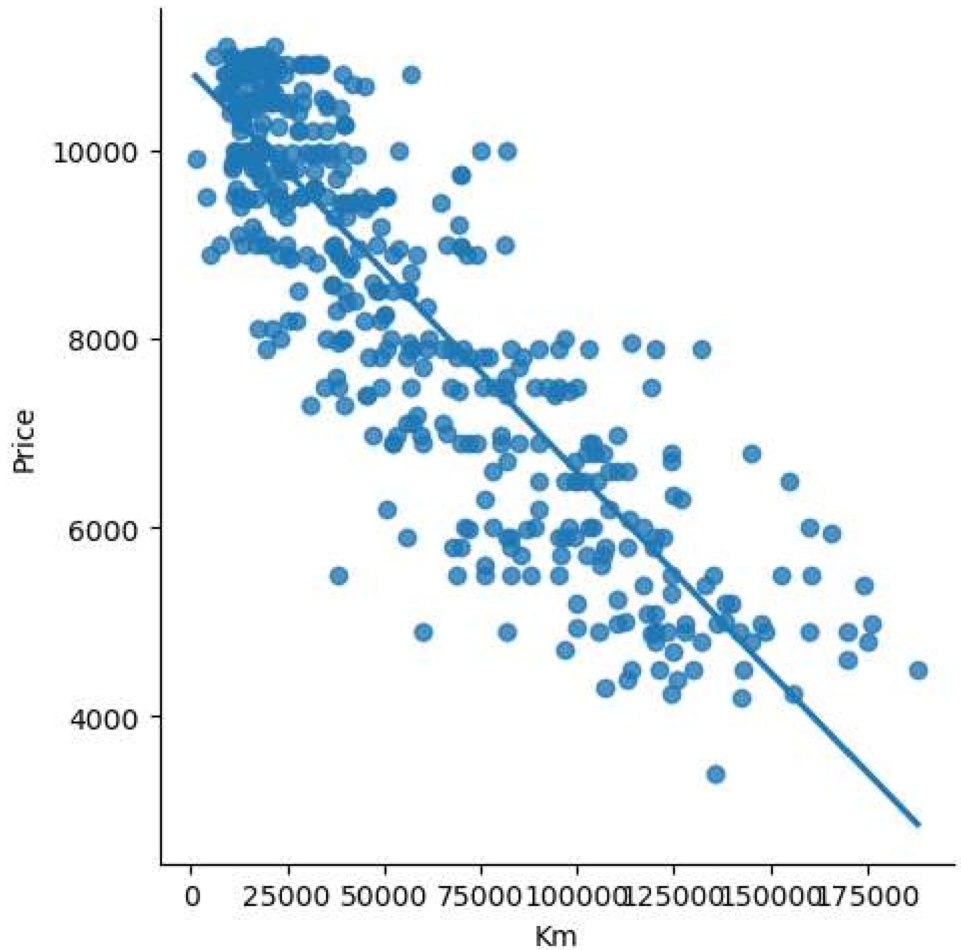
```
0.7157349071219881
```

In [12]:
```
y_pred=regr.predict(X_test)
plt.scatter(X_test,y_test,color='y')
plt.plot(X_test,y_pred,color='b')
plt.show()
```



In [15]:
```
udf=df[:][:500]
sns.lmplot(x="Km",y="Price",data=udf,order=1,ci=None)
```

Out[15]: <seaborn.axisgrid.FacetGrid at 0x11ddf6e1d20>

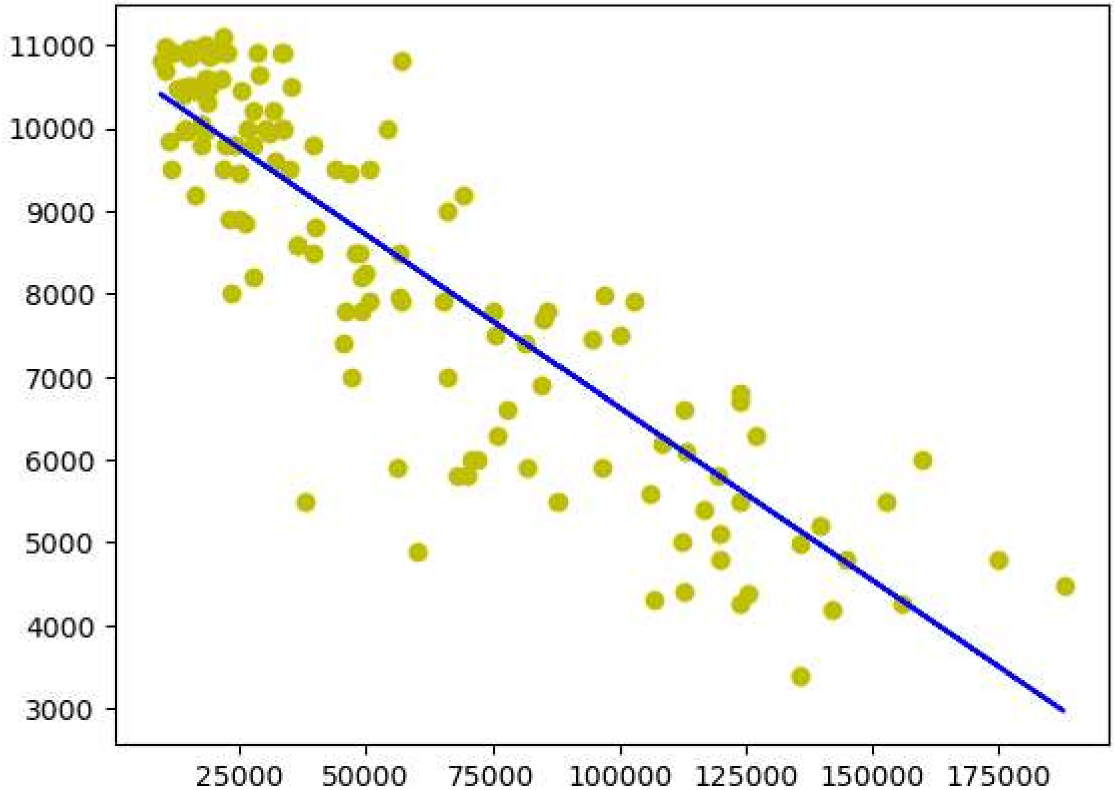


In [16]:
```
udf.fillna(method='ffill',inplace=True)
X=np.array(udf['Km']).reshape(-1,1)
y=np.array(udf['Price']).reshape(-1,1)
udf.dropna(inplace=True)
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3)
regr.fit(X_train,y_train)
```

Out[16]: LinearRegression()

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

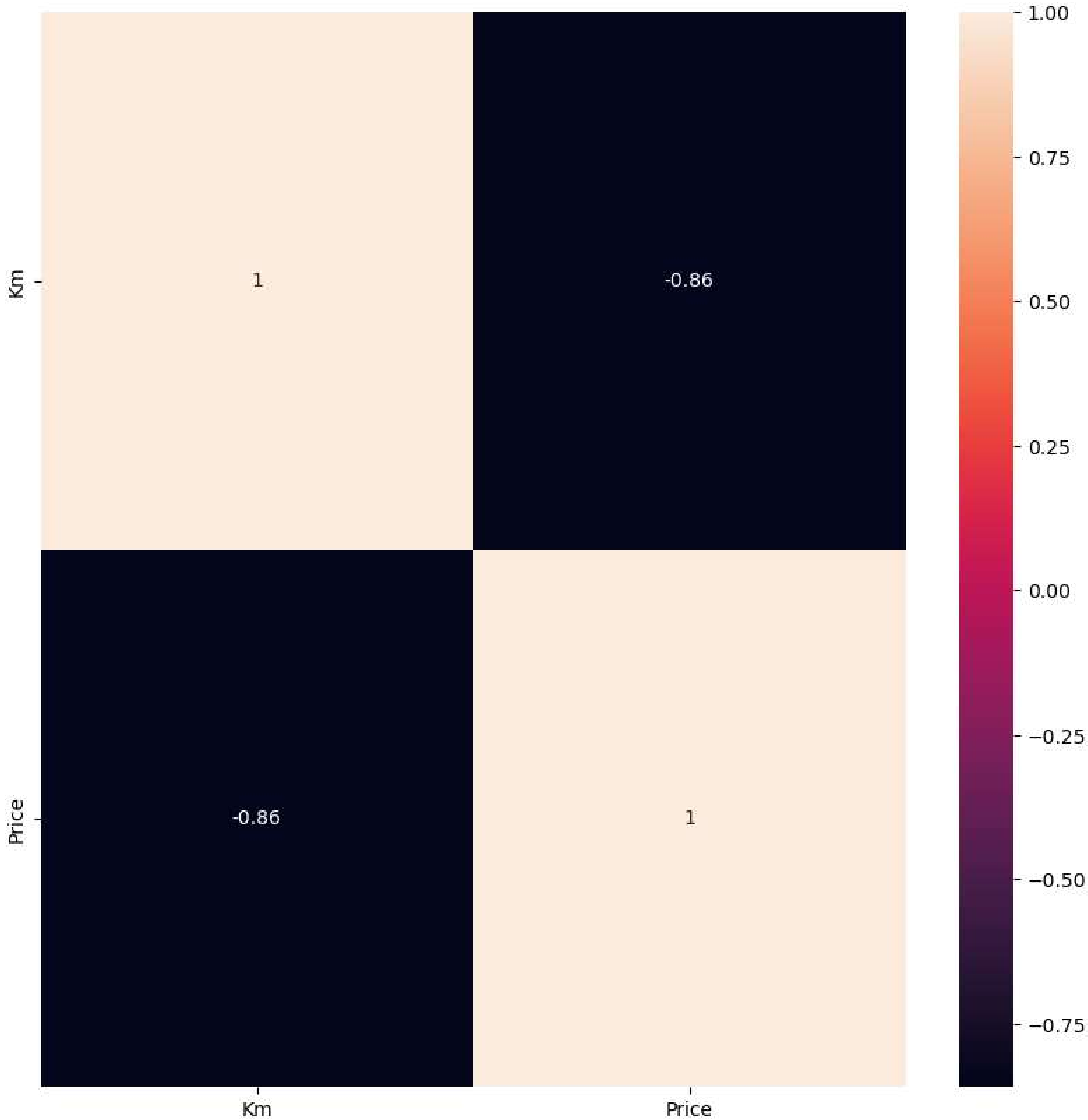
In [17]:
```
y_pred=regr.predict(X_test)
plt.scatter(X_test,y_test,color='y')
plt.plot(X_test,y_pred,color='b')
plt.show()
```



In [18]:
```
from sklearn.linear_model import Ridge,Lasso,RidgeCV,LassoCV
```

In [19]:
```
plt.figure(figsize=(10,10))
sns.heatmap(df.corr(),annot=True)
```

Out[19]: <Axes: >



In [21]:
```
from sklearn.preprocessing import StandardScaler
features=df.columns[0:2]
target=df.columns[-1]
X=df[features].values
y=df[target].values
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=
print("The dimension of X_train is {}".format(X_train.shape))
print("The dimension of X_test is {}".format(X_test.shape))
scaler=StandardScaler()
X_train=scaler.fit_transform(X_train)
X_test=scaler.transform(X_test)
```

```
The dimension of X_train is (1076, 2)
The dimension of X_test is (462, 2)
```

In [22]:
```
#Linear regression model
regr=LinearRegression()
regr.fit(X_train,y_train)
actual=y_test #actual value
train_score_regr=regr.score(X_train,y_train)
test_score_regr=regr.score(X_test,y_test)
print("\nLinear model:\n")
print("The train score for Linear model is {}".format(train_score_regr))
print("The test score for Linear model is {}".format(test_score_regr))
```

```

Linear model:

The train score for Linear model is 1.0
The test score for Linear model is 1.0
```

In [23]:
```
#ridge regression model
ridgeReg=Ridge(alpha=10)
ridgeReg.fit(X_train,y_train)
#train and test score for ridge regression
train_score_ridge=ridgeReg.score(X_train,y_train)
test_score_ridge=ridgeReg.score(X_test,y_test)
print("\nRidge model:\n")
print("The train score for ridge model is {}".format(train_score_ridge))
print("The test score for ridge model is {}".format(test_score_ridge))
```

```

Ridge model:

The train score for ridge model is 0.9997095924476731
The test score for ridge model is 0.9997198323998524
```

In [24]:
```
#using the linear cv model for ridge regression
from sklearn.linear_model import RidgeCV
#ridge cross validation
ridge_cv=RidgeCV(alphas=[0.0001,0.001,0.01,0.1,1,10]).fit(X_train,y_train)
#score
print(ridge_cv.score(X_train,y_train))
print(ridge_cv.score(X_test,y_test))
```

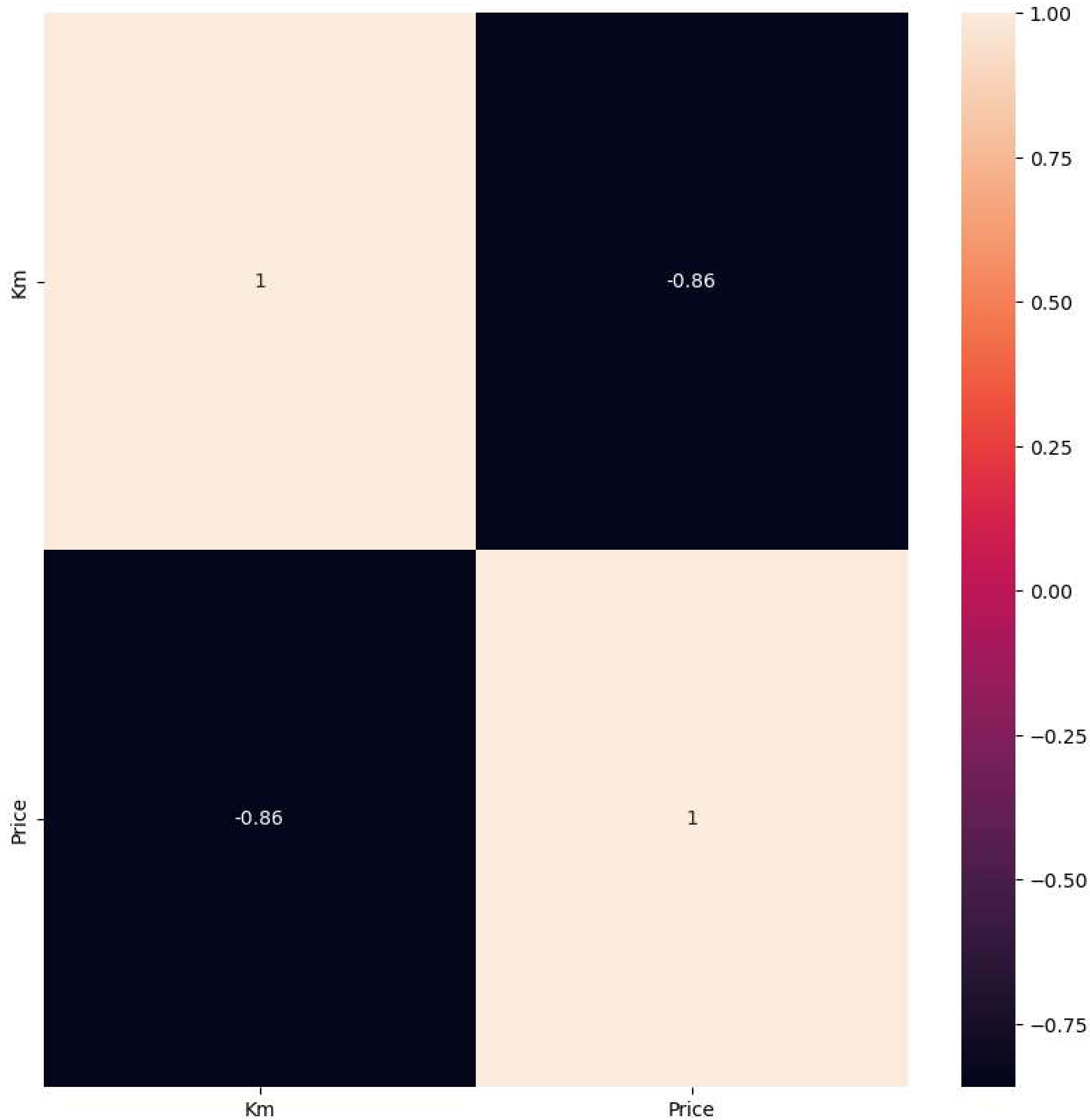
```
0.9999999999999676
0.9999999999999686
```

In [25]:
```
#using the linear cv model for lasso regression
from sklearn.linear_model import LassoCV
#lasso cross validation
lasso_cv=LassoCV(alphas=[0.0001,0.001,0.01,0.1,1,10],random_state=0).fit(X_tra
#score
print(lasso_cv.score(X_train,y_train))
print(lasso_cv.score(X_test,y_test))
```

```
0.9999999877496772
0.9999999874481674
```

In [27]:
```
#ridge regression
plt.figure(figsize=(10,10))
sns.heatmap(df.corr(),annot=True)
```

Out[27]: <Axes: >



In [28]:
```
#lasso regression model
lassoReg=Lasso(alpha=10)
lassoReg.fit(X_train,y_train)
#train and test score for ridge regression
train_score_lasso=lassoReg.score(X_train,y_train)
test_score_lasso=lassoReg.score(X_test,y_test)
print("\nLasso model:\n")
print("The train score for lasso model is {}".format(train_score_lasso))
print("The test score for lasso model is {}".format(test_score_lasso))
```

```
Lasso model:

The train score for lasso model is 0.9999728562194999
The test score for lasso model is 0.9999728508562553
```

In [32]:
```
pd.Series(lassoReg.coef_,features).sort_values(ascending=True).plot(kind="bar"
```

Out[32]: <Axes: >