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Transistors recommendation system

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ABSTRACT

The Transistors recommendation system helps learners make choices without sufficient personal experience transistors datasheet. In our research, the user-based and the main recommendation algorithm combined with Datasheets for all selective transistors. We analysed the concern of the recommendation system and also an architecture is proposed, based on which improvements can be achieved. In this architecture, there are seven modules are presented. The crucial aim of this research paper is to perceive the basis of a recommendation system that will assist students in culling the best transistors for their respective work.

Keywords— *Transistors, Recommendation system, Collaborative filtering algorithm, Datasheets, Students*

1. INTRODUCTION

A human brain contains about 100 billion cells called neurons- these small switches allow you to think and remember. Computers also contain billions or tiny "brain cells." They are called transistors and are made of silicon, which is a common chemical element in the sand. A transistor is basically a semiconductor which contains a hybrid of two diodes and a diode is an esoteric electronic component with two electrodes called the anode and the cathode. Mainly diodes are made with semiconductor materials such as silicon, germanium, or selenium. The principal property of a diode is its tendency to conduct electric current in only one direction. There are many types of transistors like Bipolar Junction Transistor, Field Effect Transistor, MOSFET, Darlington pair Transistor, Unijunction Transistor, Avalanche Transistor, Schottky Transistor and Heterojunction Transistor and many more to know about more Transistors refer other research paper. In this research paper, our main focus in on Bipolar Junction Transistors and the overview of the bipolar junction transistors are transistors composed of 3 regions, the base, the collector and the emitter. A small current entering the region of the transistor base causes a much larger current flow from the emitter to the collector region.

Bipolar junction transistors come mainly in two main types, NPN and PNP. An NPN transistor is one in which mainly the current carriers are electrons. The electron flowing from the emitter to the collector forms the basis of the most current flux through the transistor. The other type of cargo, the holes, are a minority. PNP transistors are the opposite. In PNP transistors, most of the current carriers are holes.

As a result, this study uses the recommendation system where the purpose of the algorithm is to provide the most relevant information to a user by making a discovering pattern in a set of data. The algorithm sorts the items and shows the user the items they would rate highly. The information collected through the datasheets of the specific transistor where some characteristic of transistors are sorted out for further manipulation around 50 datasheets are used for this research paper and sorted out data is made Excel datasheet which is further given to recommendation system.

The paper is divided into five sections. Section 2 describes several of the related studies in this research. Section 3 describes the methodology, Section 4 presents result, discussion, and Section 5 draws conclusions of this study.

2. RELATED WORK

The work done for this research paper is divided into 6 steps:

(a) The data is collected from the trusted website of www.alldatasheet.com where some important parameters were sorted out.
(b) The important parameters which are useful for this research paper are Hfe (Gain), Vce (collector-emitter saturation voltage), (P) power dissipation, Iceo (the open base collector-to-emitter current), Vebo (Base Emitter Open Collector Breakdown Voltage) are sorted out from every datasheet of transistors.
(c) The Excel sheet is made as a datasheet with the help of all these characteristics for 50 transistors.

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(d) Then with the help of Python programming language in Anaconda software the Excel sheet is uploaded as a CSV file.
(e) Python programming language has a pre-defined library as TfidVactorizer which is imported using sklearn command line.
(f) The recommendation is briefly explained in research [1] and this type of architecture is briefly explained in research [2].
(g) The brief insight about the transistors in www.learningaboutelectronis.com website is given.

3. METHODOLOGY

In this case, there are a few steps to implement a recommendation system, web browsing for the characteristic of transistors. The figure below this illustrates step-by-step using the architectural diagram (a) denotes power dissipation (P)

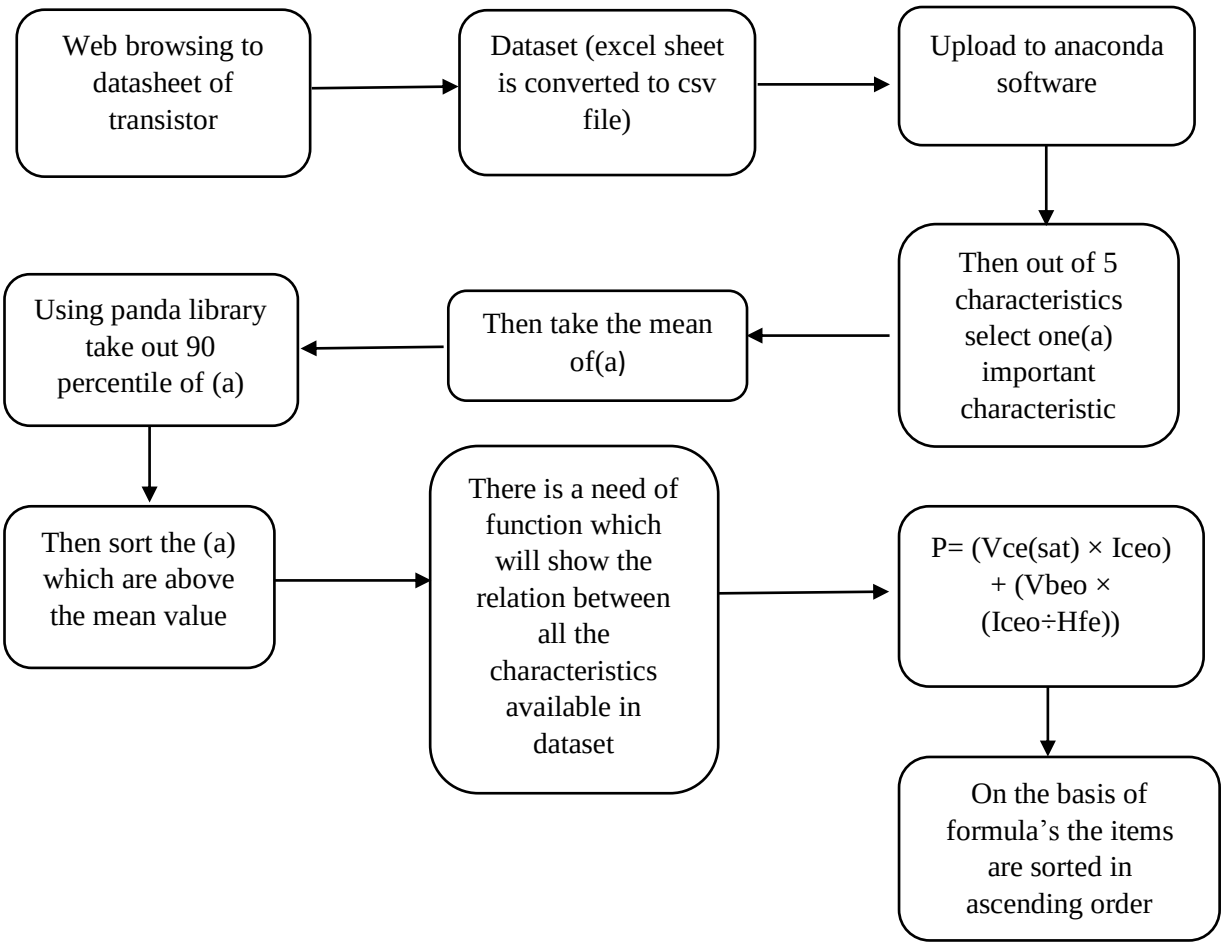

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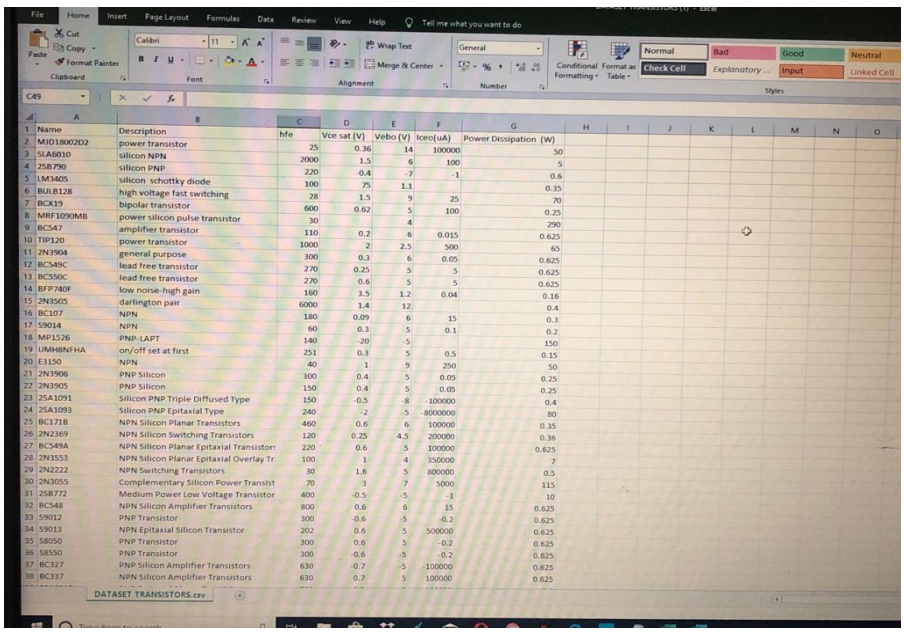
Fig. 1: Methodology

3.1 Dataset

This type of dataset is required.



Name	Description	hfe	Vce sat (V)	Vebo (V)	Iceo(uA)	Power Dissipation (W)
MJD18002D2	power transistor	25	0.36	14	100000	50
SLA6010	silicon NPN	2000	1.5	6	100	5
2SB790	silicon PNP	220	-0.4	-7	-1	0.6
LM3405	silicon schottky diode	100	75	1.1		0.35
BULB128	high voltage fast switching	28	1.5	9	25	70
BCX19	bipolar transistor	600	0.62	5	100	0.25
MRF1090MB	power silicon pulse transistor	30		4		290
BC547	amplifier transistor	110	0.2	6	0.015	0.625
TIP120	power transistor	1000	2	2.5	500	65
2N3904	general purpose	300	0.3	6	0.05	0.625
BC549C	lead free transistor	270	0.25	5	5	0.625
BC550C	lead free transistor	270	0.6	5	5	0.625
BFP740F	low noise-high gain	160	3.5	1.2	0.04	0.16
2N3505	darlington pair	6000	1.4	12		0.4
BC107	NPN	180	0.09	6	15	0.3
S9014	NPN	60	0.3	5	0.1	0.2
MP1526	PNP-LAPT	140	-20	-5		150
UMH8NFHA	on/off set at first	251	0.3	5	0.5	0.15
E3150	NPN	40	1	9	250	50
2N3906	PNP Silicon	300	0.4	5	0.05	0.25
2N3905	PNP Silicon	150	0.4	5	0.05	0.25
2SA1091	Silicon PNP Triple Diffused Type	150	-0.5	-8	-100000	0.4
2SA1093	Silicon PNP Epitaxial Type	240	-2	-5	-8000000	80
BC171B	NPN Silicon Planar Transistors	460	0.6	6	100000	0.35
2N2369	NPN Silicon Switching Transistors	120	0.25	4.5	200000	0.36
BC549A	NPN Silicon Planar Epitaxial Transistor	220	0.6	5	100000	0.625
2N3553	NPN Silicon Planar Epitaxial Overlay Tr	100	1	4	350000	7
2N2222	NPN Switching Transistors	30	1.6	5	800000	0.5
2N3055	Complementary Silicon Power Transist	70	3	7	5000	115
2SB772	Medium Power Low Voltage Transistor	400	-0.5	-5	-1	10
BC548	NPN Silicon Amplifier Transistors	800	0.6	6	15	0.625
S9012	PNP Transistor	300	-0.6	-5	-0.2	0.625
S9013	NPN Epitaxial Silicon Transistor	202	0.6	5	500000	0.625
S8050	PNP Transistor	300	0.6	5	-0.2	0.625
S8550	PNP Transistor	300	-0.6	-5	-0.2	0.625
BC327	PNP Silicon Amplifier Transistors	630	-0.7	-5	-100000	0.625
BC337	NPN Silicon Amplifier Transistors	630	0.7	5	100000	0.625

Fig. 2: Dataset

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3.2 Formula

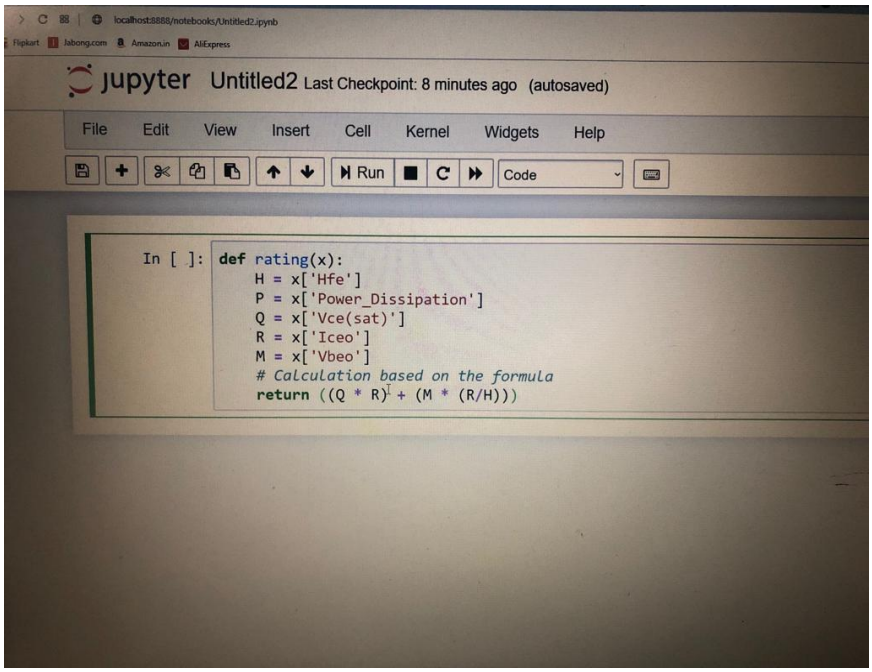

Fig. 3: Formula

3.3 Recommendation system

2 Types in recommendation system:

3.3.1 Content-based recommender systems: This will try to build a system that recommends Transistor that is similar to a specific transistor. More specifically, you will compute pairwise similarity scores for all transistors based on their plot descriptions and recommend transistors based on that similarity score.

3.3.2 The global process: Our system expects to receive user's data in its input, and generates the convenient recommendations in its output in the function of the algorithms we are using.

4. RESULT

Transistors Recommendation Application is developed using created in Python's programming language in Anaconda software platform running on Windows Operating System 10.1, is created using TfidVactorizer library and Sklearn, pandas, Numpy and seaborn libraries.

The user just has to put the desired value of P (power dissipation), the algorithm will find the best transistor for the user. It will surely prevent the wastage of time in checking every transistor manually, it will also decrease the error produced by humans.

5. CONCLUSION AND FUTURE WORKS

In this paper, we introduced the topic of transistors and dealt with the factors that operate the use of transistors. We discussed the solutions that improve user's work performance by assisting them to choose their best transistor. As the choice of a transistor depends on many factors, we propose a solution based on recommendation systems. The data obtained is very comprehensive and can be used for further data analysis which was beyond the scope of this research paper.

This paper is restricted to only 50 transistors but can use for very large scale where a further number of studies are conducted and can use to predict many useful characteristics of transistors. In Dealing with a large number of users, filtering of their data is used to provide them with the relevant decision. Consequently, we need to find out methods with the highest performance in terms of time and precision. Consequently, we need to find out a method with apex performance in terms of time, precision and accuracy.

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