

# Citation Analysis of Genetic Circuit Design Literature CPSC 706

Galen Seilis

UNBC

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# Overview

- 1 Purpose
- 2 Quick review of genetic circuit design
- 3 Web scraping from Web of Science
- 4 Exploratory network analysis

# Purpose

## (Best) Use Case

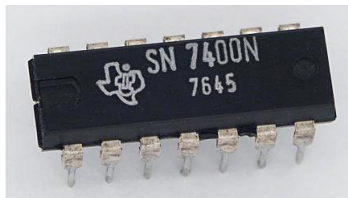
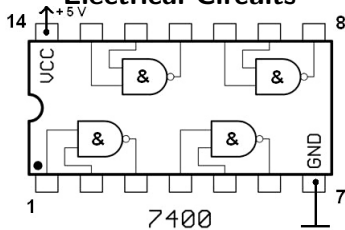
- 1 New to a field
- 2 Lack of landmark papers
- 3 Lack of review papers
- 4 Lack of background knowledge about the field

## Questions

- Which articles to read?
- Which authors examine publication history?
- What are some of the concepts associated with the discipline?

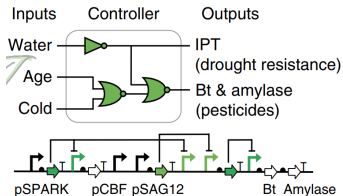
# Genetic Circuits

## Electrical Circuits



(Wikipedia)

## Biological Circuits



(Wikipedia)

# Gates

YES



INPUT		OUTPUT
A		
0		0
1		1

NOT



INPUT		OUTPUT
A		
0		1
1		0

AND



INPUT		OUTPUT
A	B	
0	0	0
1	0	0
0	1	0
1	1	1

OR



INPUT		OUTPUT
A	B	
0	0	0
1	0	1
0	1	1
1	1	1

XOR



INPUT		OUTPUT
A	B	
0	0	0
1	0	1
0	1	1
1	1	0

NAND



INPUT		OUTPUT
A	B	
0	0	1
1	0	1
0	1	1
1	1	0

NOR



INPUT		OUTPUT
A	B	
0	0	1
1	0	0
0	1	0
1	1	0

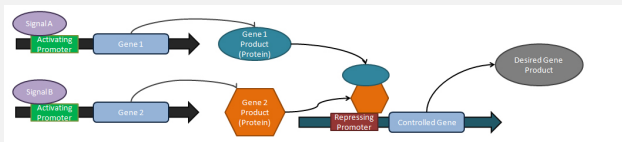
XNOR



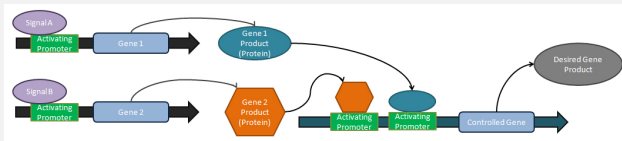
INPUT		OUTPUT
A	B	
0	0	1
1	0	0
0	1	0
1	1	1

# Wetware Implementation

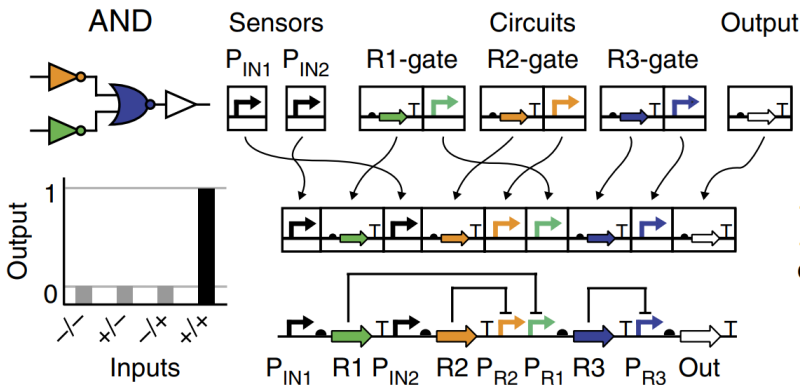
## NAND Gate



## OR Gate

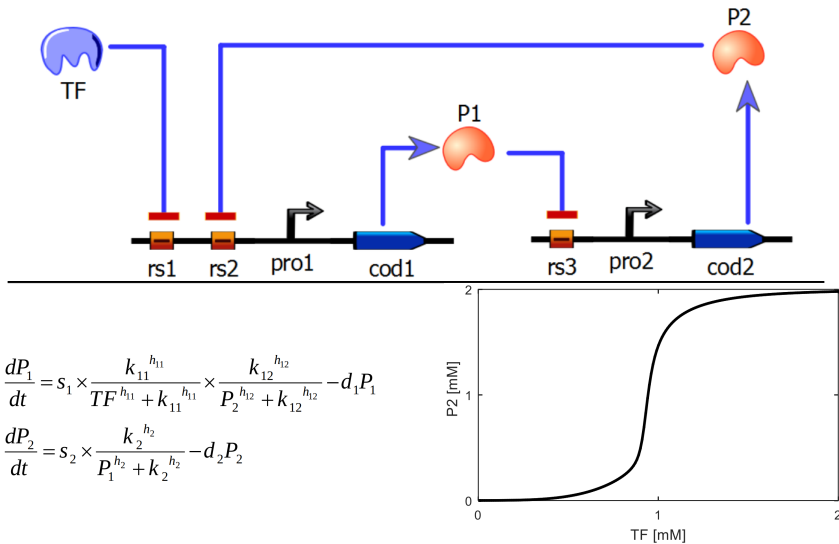


# Composable



(Brophy et al 2014)

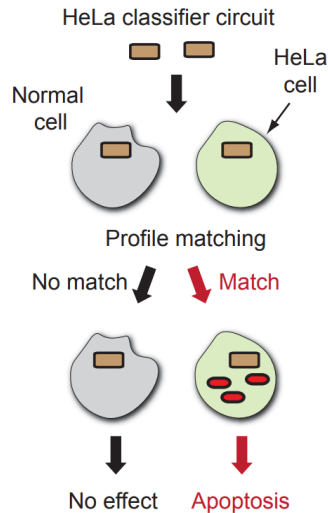
# Continuous Response Variables





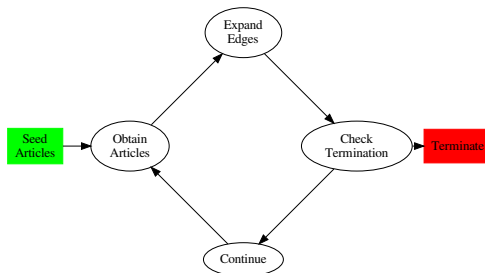
# Applications

- Disease diagnosis
- Environmental sensing
- Research and development
- Material and chemical production



(Xie et al 2011)

# Webscraping Web of Science



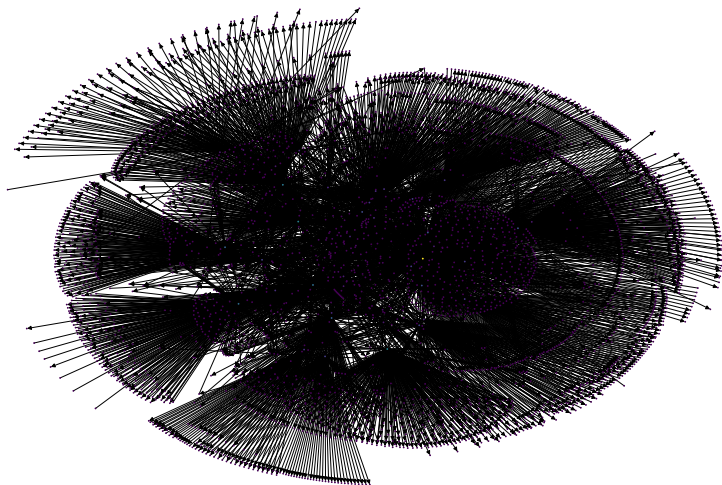
## Seed Articles

Type	First Author	Publication Date
Article	Al-Radhawi	2020
Article	Menon	2019
Article	Misirli	2014
Article	Xiang	2018
Review	Brophy	2014
Review	Karkaria	2020
Review	Xia	2019

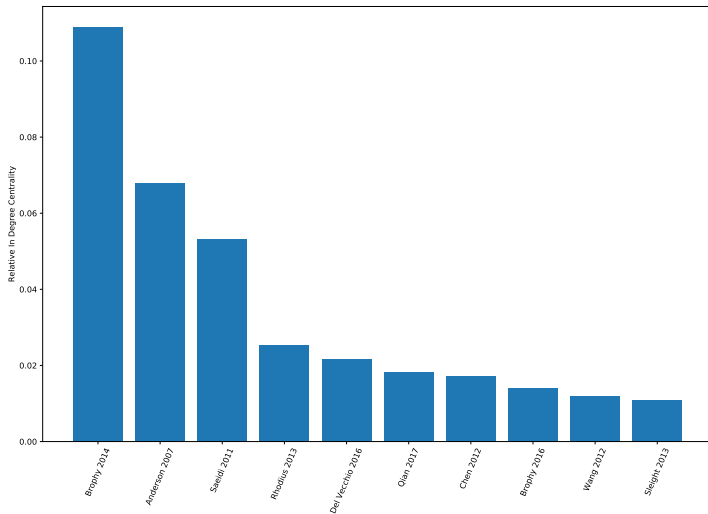
## Closure Keywords

- genetic circuit
- genetic circuits
- genetic circuit design
- gene circuits
- genetic logic gate
- synthetic biological circuit
- biological circuit

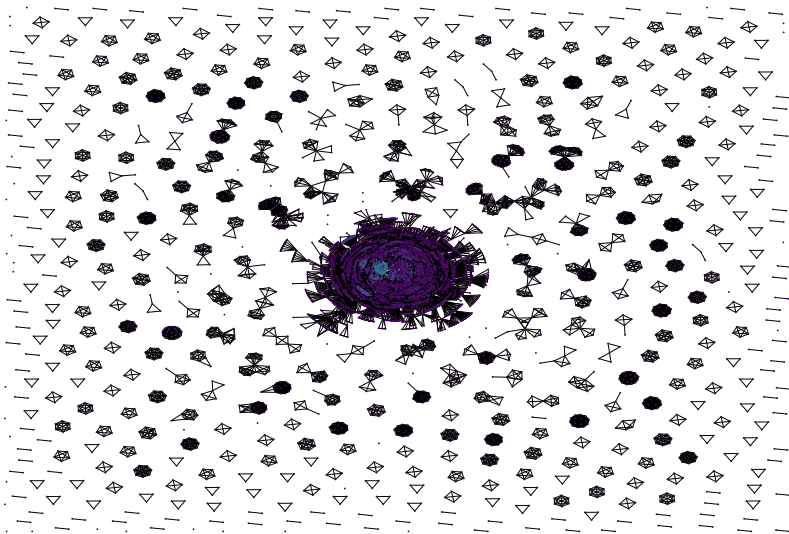
# Citation Network



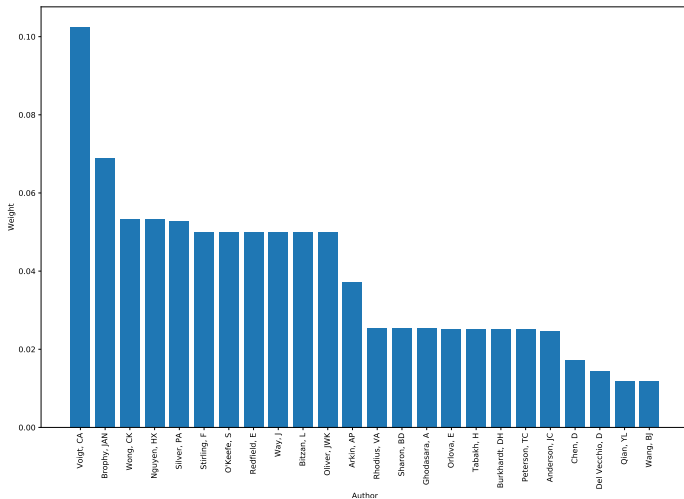
# Citation Network



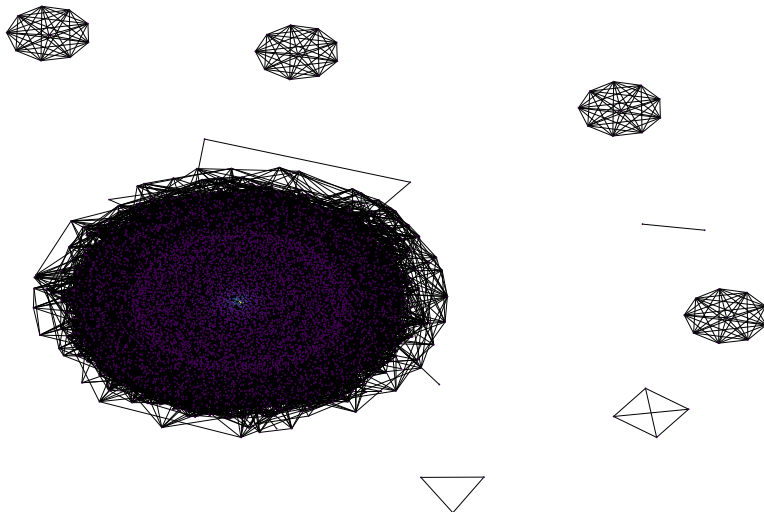
# Coauthorship Network



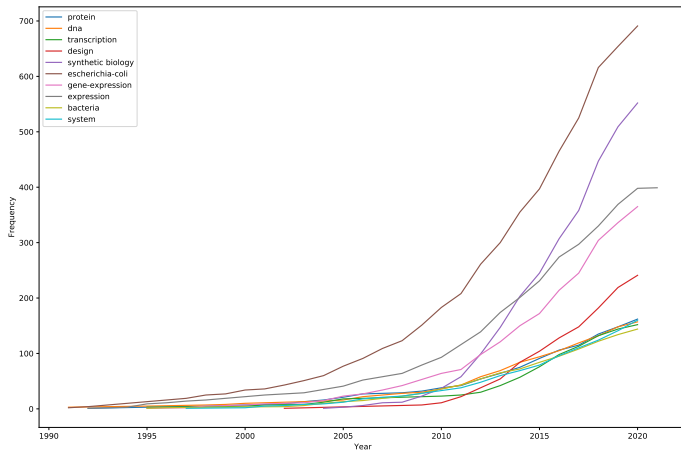
# Coauthorship Network



# Keyword Network



# Keyword Network





# Limitations

- Seed articles
- Closure keywords
- Access to Web of Science

# Contributions

- Demonstrated proof of concept