



INVESTMENTS IN EDUCATION DEVELOPMENT

# FUZZY MODELS FOR EFFICIENT TRAFFIC MANAGEMENT

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StantGis Team



# WHAT I'M GOING TO TALK ABOUT

Fuzzy logic

Fuzzy control of traffic intersection

Smarter Cities



# FUZZY LOGIC







RGB:163 148 151

RGB:147 149 138

RGB:126 128 127

RGB:169 170 85

RGB:113 112 110

RGB:189 176 80

RGB:137 129 108

RGB:116 87 29

RGB:59 30 0

RGB:27 30 0

RGB:32 45 0





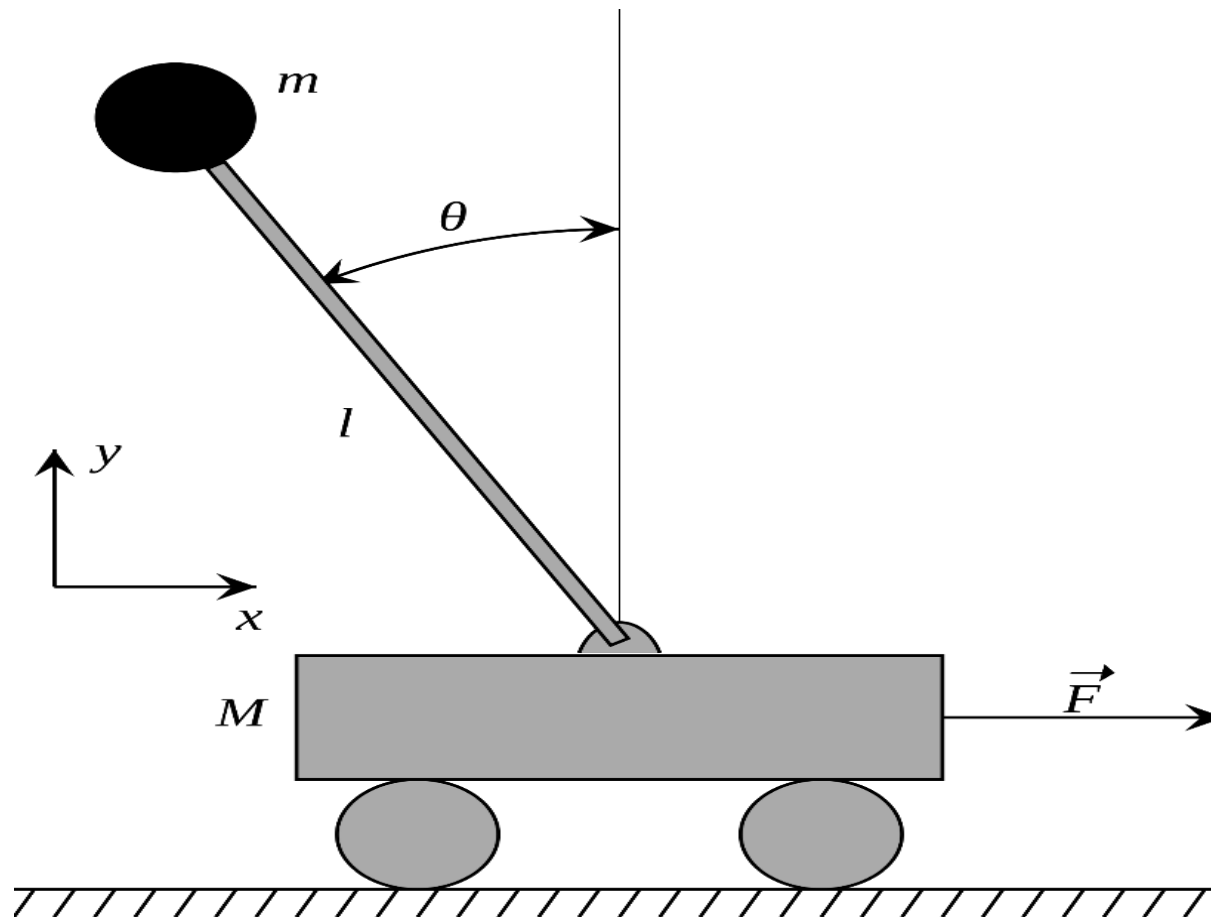




# Fuzzy logic



Prof. Lotfi A. Zadeh



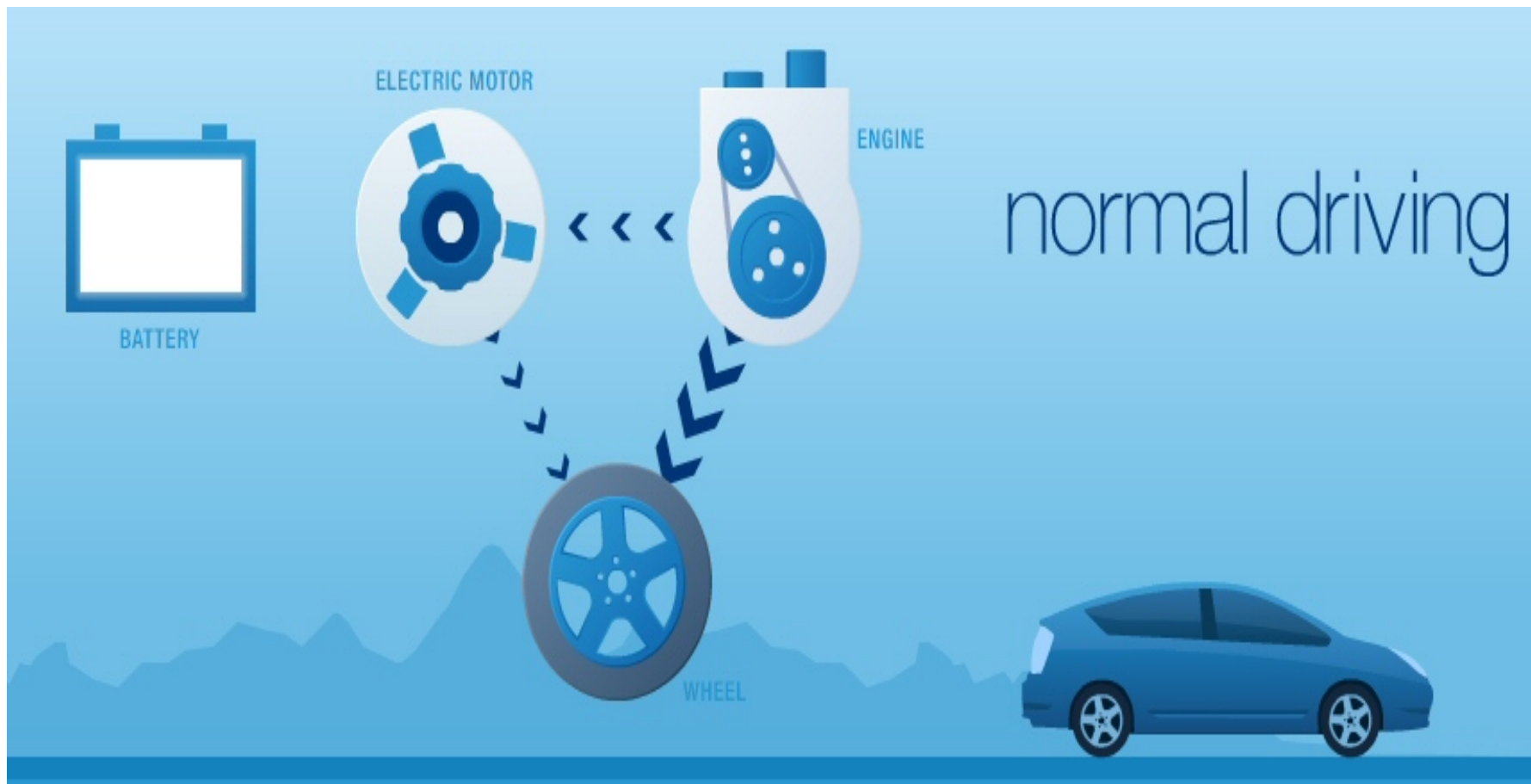






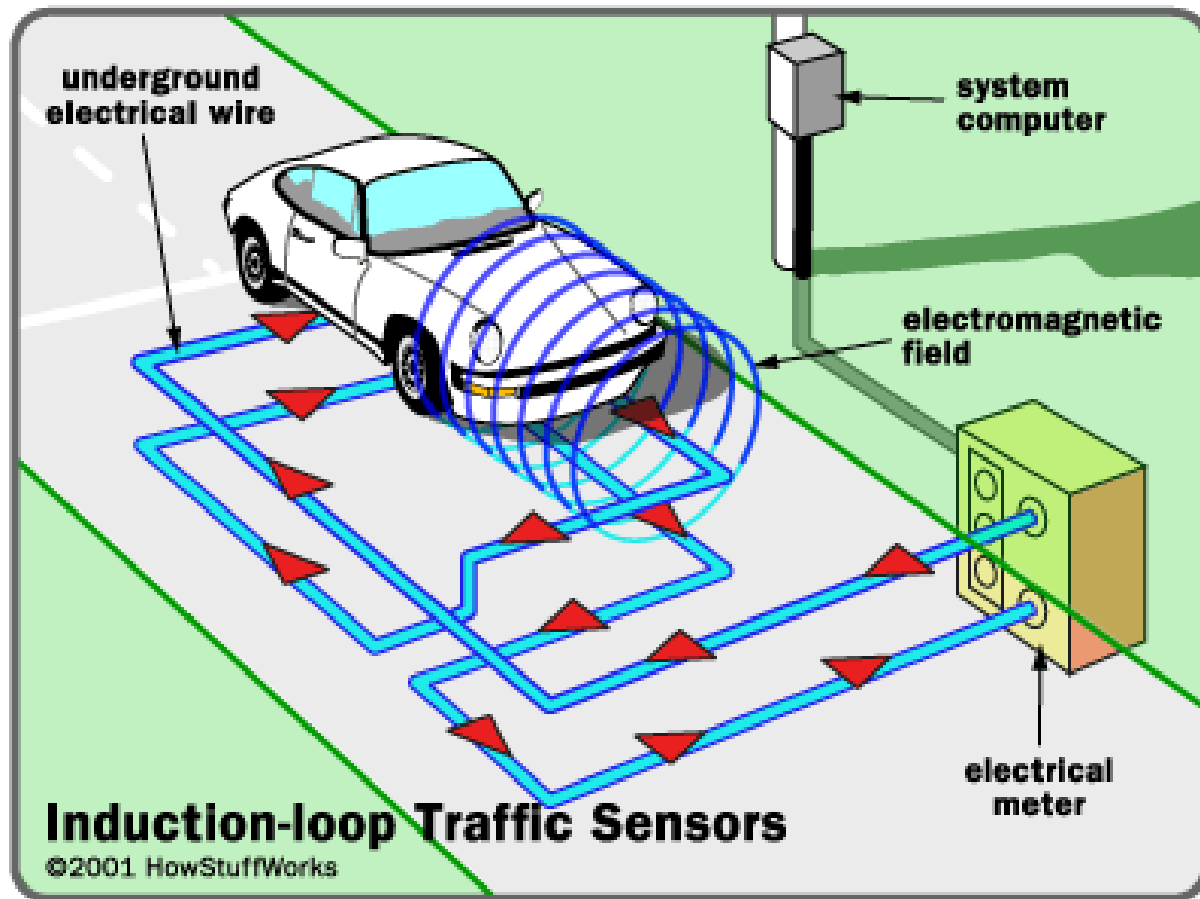


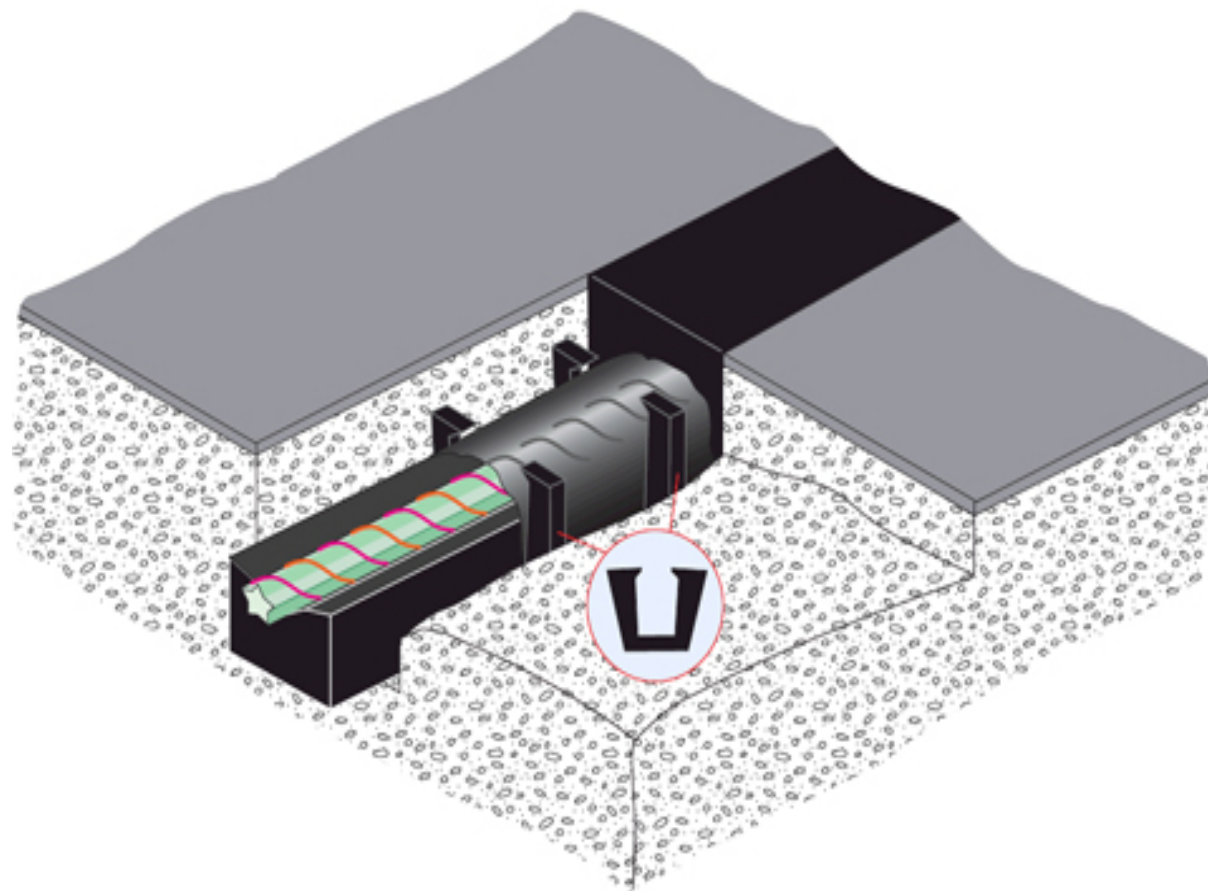






# SENSORS







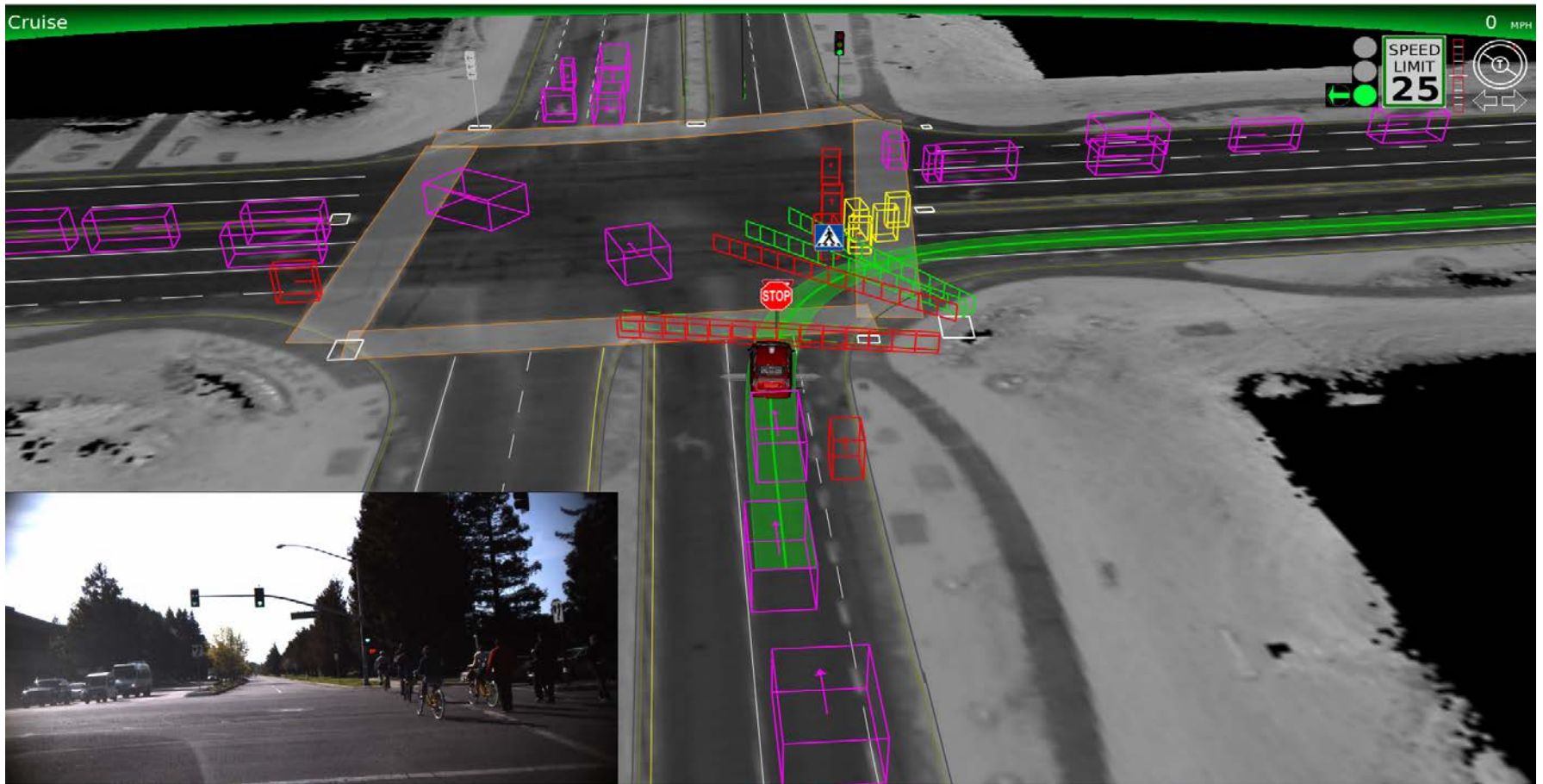








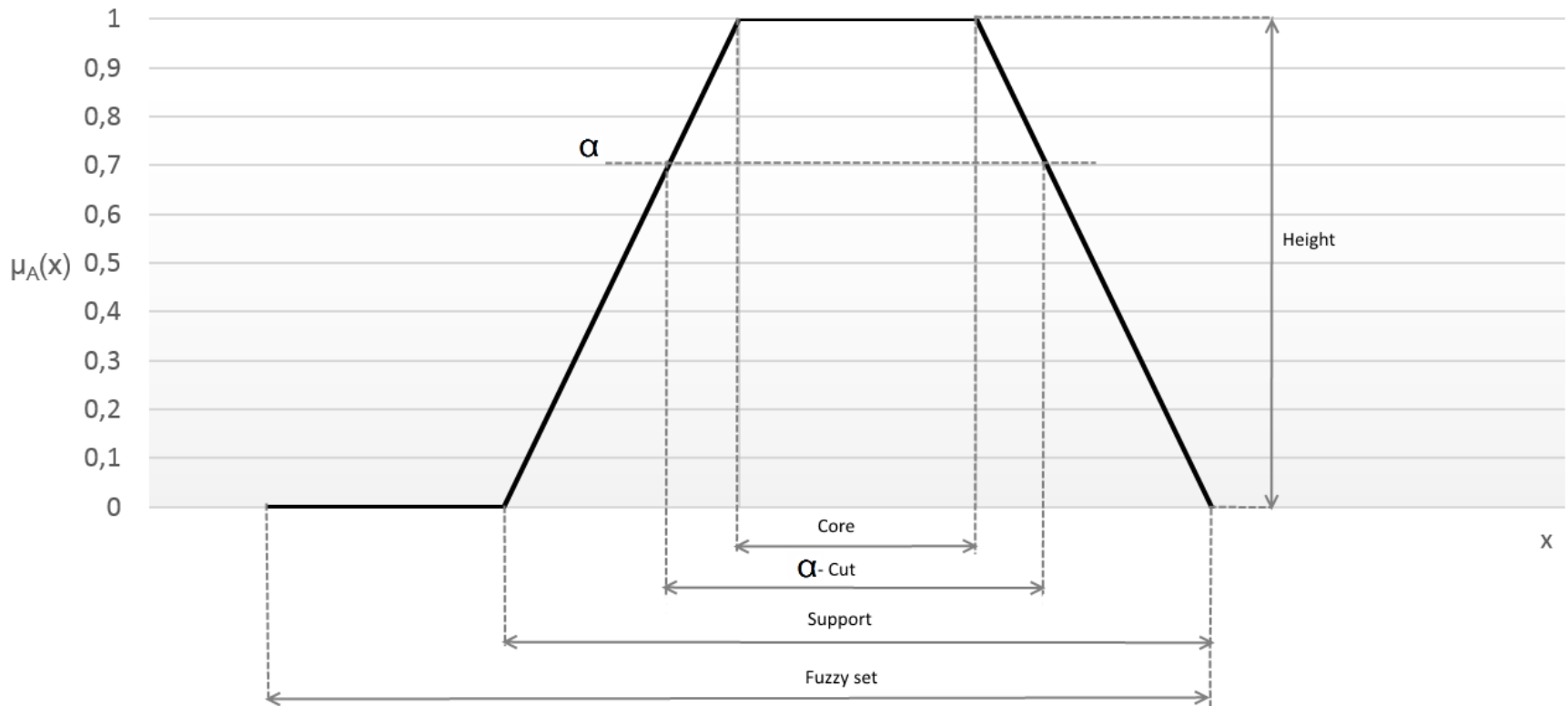
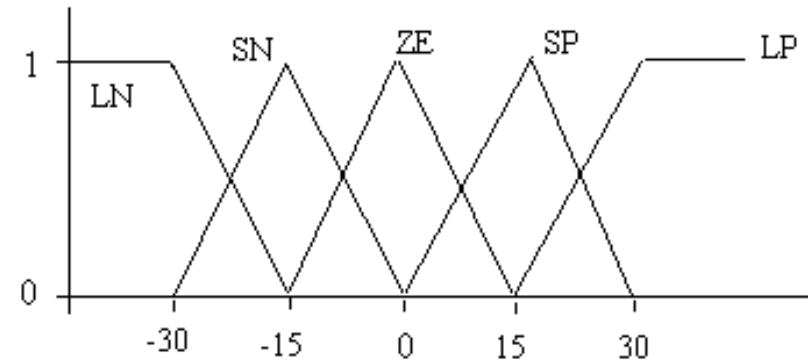




# THEORY

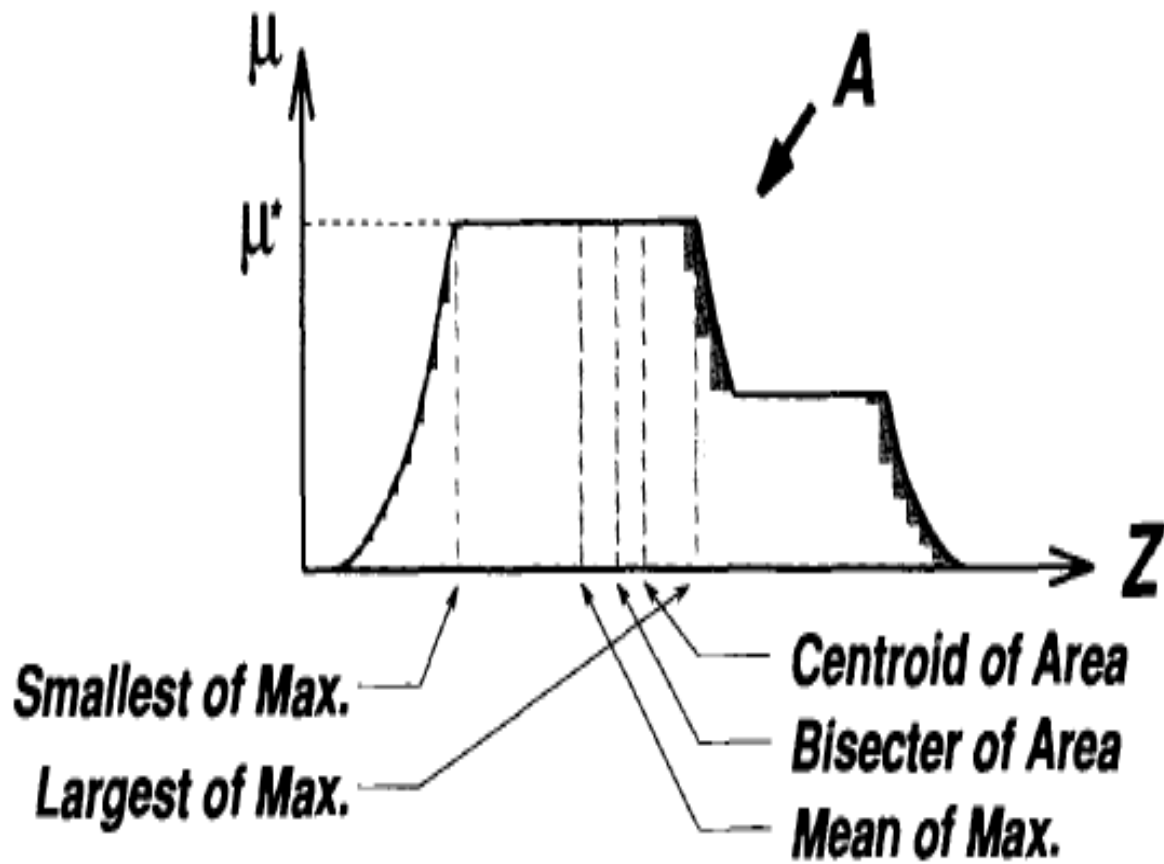


# From crisp to fuzzy

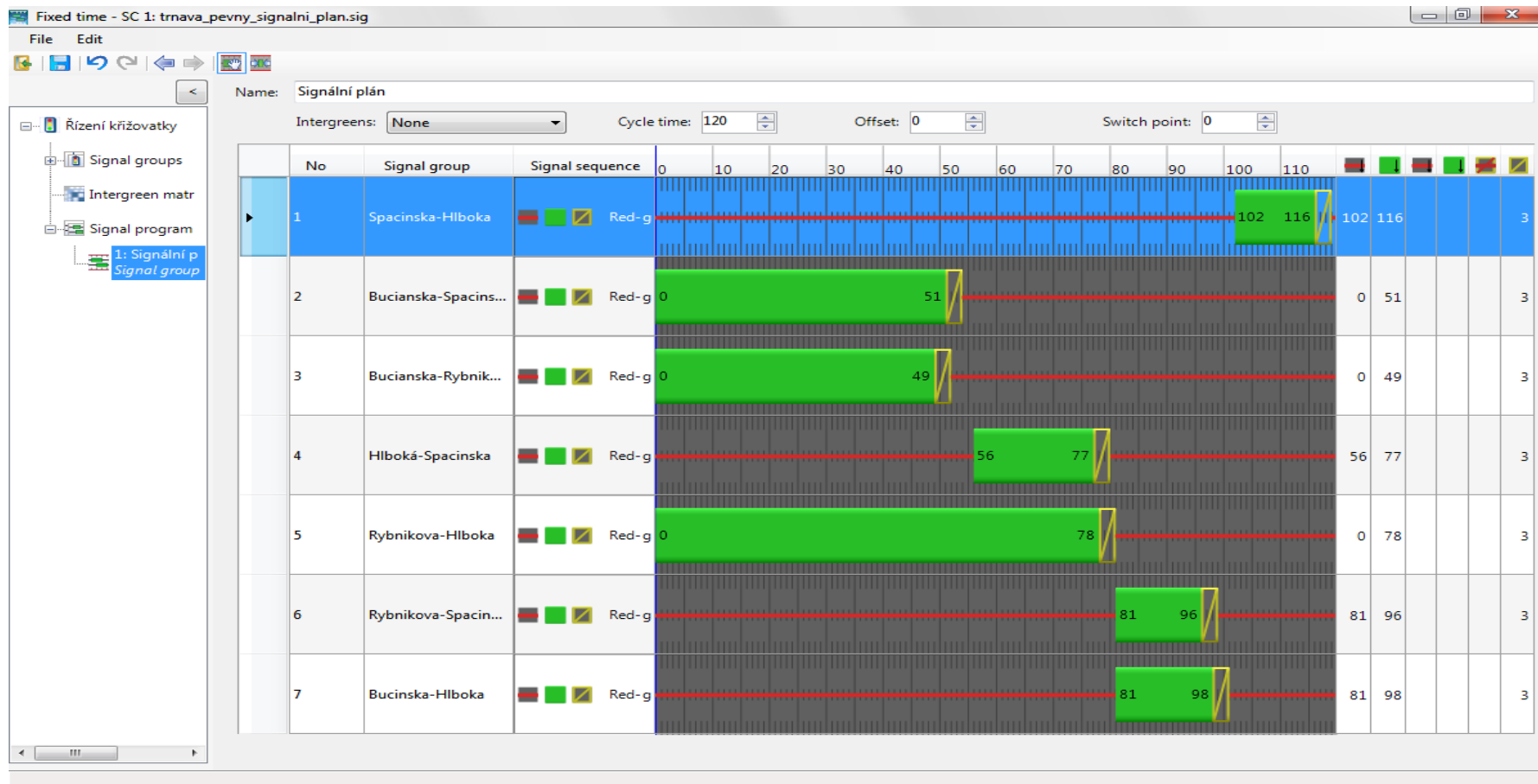








# APPLICATION





FUSICO (Nittymäki, 1998) - **Fuzzy Signal Control**

FLSC (Yulianto, 2003) - **Fuzzy Logic Signal Controller**

FLMuSiC (Murat, 2005) - **Fuzzy Logic Multi-phased Signal Control**

FLA (Nair, 2007) - **Fuzzy Logic Model with Abnormalities**

NFM (Azimirad, 2010) - **Novel Fuzzy Model**

SFTSC + TFTSC (Yang, 2012)

**Standard traffic signal single-stage fuzzy control + Traffic signal two-stage fuzzy control**

Average waiting time [s]	Queue 1	Queue 2	Queue 3	Queue 4	Sum of queue
Fixed-time control	11 000	5 000	11 000	5 000	32 000
<b>FUZZY control</b>	1 350	1 335	1 300	1 313	5300
Percentage of improvement	87,72	73,3	88,18	73,74	<b>83,43</b>

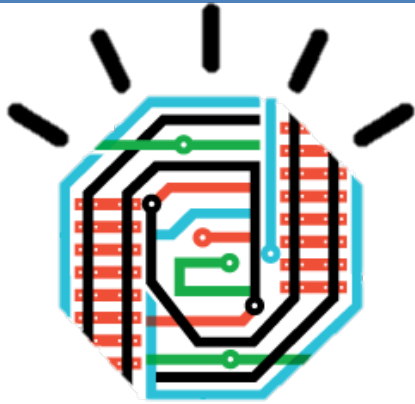
NFM (Azimirad, 2010) - Novel Fuzzy Model

	Fuzzy controller	Fixed-time control	Acyclic mode
Total time of traffic capacity	<b>18 hours 35 min.</b>	20 hours 51 min.	22 hours 4 min.
Total sum of stops	1092	1102	1181

Fuzzy controller by Dr. Marcina Stanieka

# SMARTER CITIES





More efficient source use

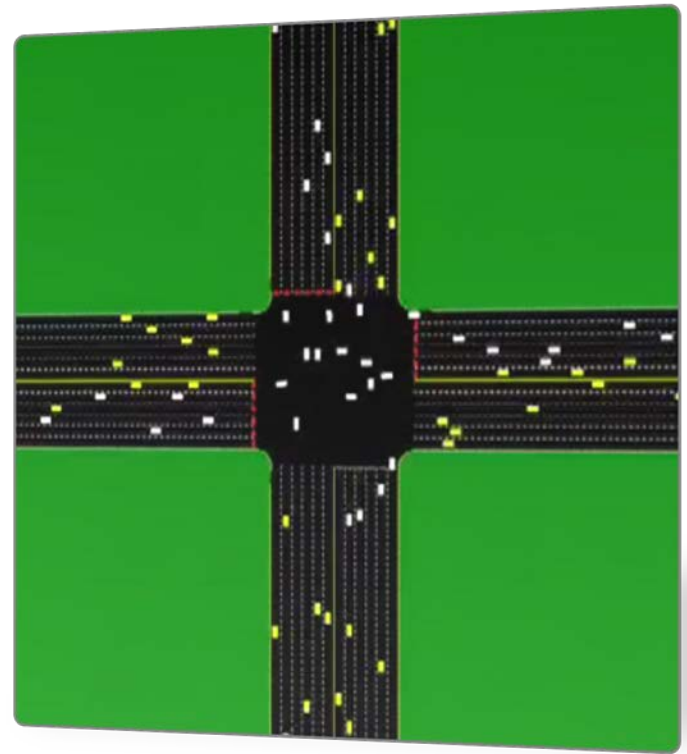
More efficient data processing

Communication

More frequent GIS use

Benefit from new technologies

More information for better decisions-making





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# THANK YOU

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# TRAFFIC MANAGEMENT

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