

# Drain monitor and prediction

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Github link: <https://github.com/aadilmehdis/Megathon2K19.git>

# Idea proposal

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Our idea is to monitor real time flow rate and velocity using IOT sensors placed at strategic locations inside drainage pipes in a given region to be able to point out clogs and predict flow rates.

Our web app has the following capabilities:

- Predict flow rate in different regions given weather forecast data.
- Real time IOT sensor information about flow rate and velocity.
- Data visualization to help rescue operators to reach the affected areas.

# Assumptions

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- Following structural data of pipe is known for training our predictive model:
  1. Radius of pipe
  2. Angle of inclination of pipe
  3. Altitude of region
  4. Weather forecast data
- We place IOT devices across storm water drainage network across strategic positions.
- Each IOT device has a GSM chip to send data over the network to our cloud.

# Tech stack

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- Django
- Scikit.learn
- Arduino
  1. GSM module
  2. Flow rate module
  3. Volume module

# Pipe data used to generate training data

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## Water Flow Capacity in Steel Pipes (sch 40)

Pipe Size	Maximum Flow (gal/min)	Velocity (ft/s)	Head Loss (ft/100 ft)
2"	45	4.3	3.9
2-1/2"	75	5.0	4.1
3"	130	5.6	3.9
4"	260	6.6	4.0
6"	800	8.9	4.0
8"	1,600	10.3	3.8
10"	3,000	12.2	4.0
12"	4,700	13.4	4.0
14"	6,000	14.2	4.0
16"	8,000	14.5	3.5
18"	10,000	14.3	3.0
20"	12,000	13.8	2.4
24"	18,000	14.4	2.1

# ML model

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- Input parameters
  - a. Rainfall forecast
  - b. Radius of pipe
  - c. Angle of inclination of pipe
  - d. Altitude of location
- Output parameter
  - a. Flow rate at region
  - b. Expected velocity considering no clogging

The model is trained with MSE loss function having 5 weight parameters (4 + 1 for bias).