Hardware device to conserve water using IOT and Machine Learning

Problem statement:

Do you know how much water we waste in a day? Many of us are wasting water on a daily basis without even realising it. Not turning off the tap when brushing your teeth, leakages, washing your vehicle with fresh water are some of the ways we are wasting water on a daily basis. These are some of the major reasons for water wastage in the developed countries.

Water is essential for our everyday activities. We use about 27% of water for bathing and toilet use. Approximately, a leaking faucet can waste 4,000 drops of water, which is equal to a liter of water. A flush of the toilet uses six and a half gallons of water. With the recent reports of India's Silicon Valley facing a man-made water crisis, it is high time take appropriate steps to save water. On this World Water Day, let's pledge to take an initiative to stop wasting water

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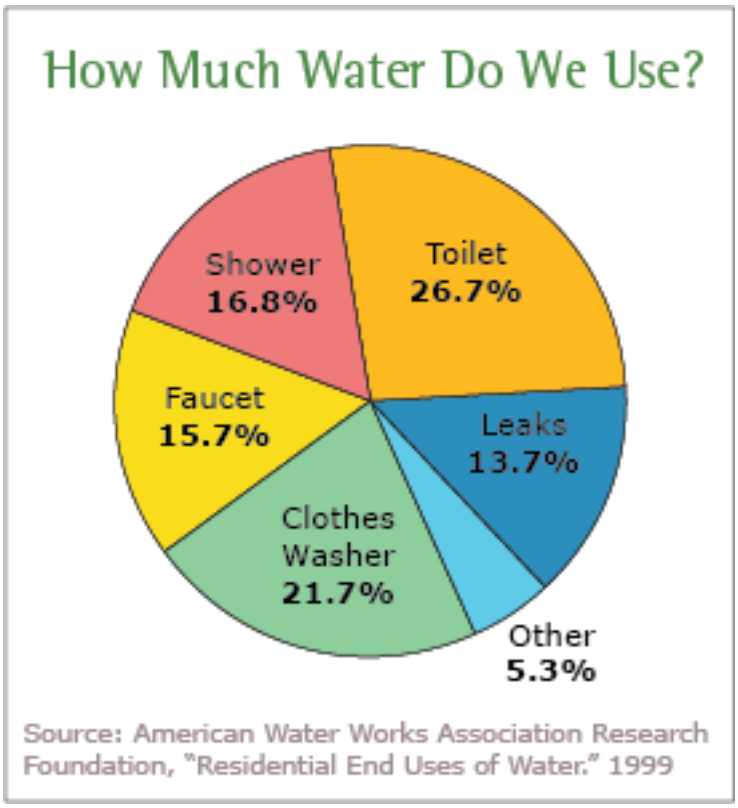
Statistics of Activity-wise Consumption of Water:

Activity	Gallons Used (conventional)	Gallons used (conservation*)
Toilet flushing	5-7 gallons-per-flush	1.5-3.5 gallons-per-flush
Shower	7-10 gallons-per-minute	2-4 gallons-per-minute
Bath	36-50 gallons	30-40 gallons (conventional tub)
Laundry	60 gallons	42 gallons
Dishwasher	15 gallons (normal load)	7.5-10 gallons (normal load)
Dishwashing by hand	30 gallons (tap running)	10-20 gallons (tap running)
Shaving	20 gallons (tap running)	2-5 gallons (tap running)
Brushing teeth	10 gallons (tap running)	2-3 gallons (tap running)
Washing hands	2 gallons (tap running)	1-2 gallons (tap running)



Solution:

The innovative solution involves the development of the product which includes water flow sensor which calculates water flow rate for each individual outlet (here, the outlet refer to the different areas in household from which we receive water like shower, sink, flush..etc) and sends water flow rate to raspberry pi which detect the wastage of water at different outlets by using machine learning algorithm , and sends alerts and suggestions to user through mobile application in order to conserve the water effectively. Water pipe-line leakage area is also detected which can be viewed in mobile application .so that it can be repaired as soon as possible avoiding wastage of water. And, a microprocessor with IR sensor and a buzzer is installed to intimate overflow and wastage of water .

Hardware Components:

- Raspberry pi
- Water flow sensor (YF-S201 Hall-effect)
- IR Sensor
- Buzzer

Software:

- Python
- Android Studio

Block Diagram:

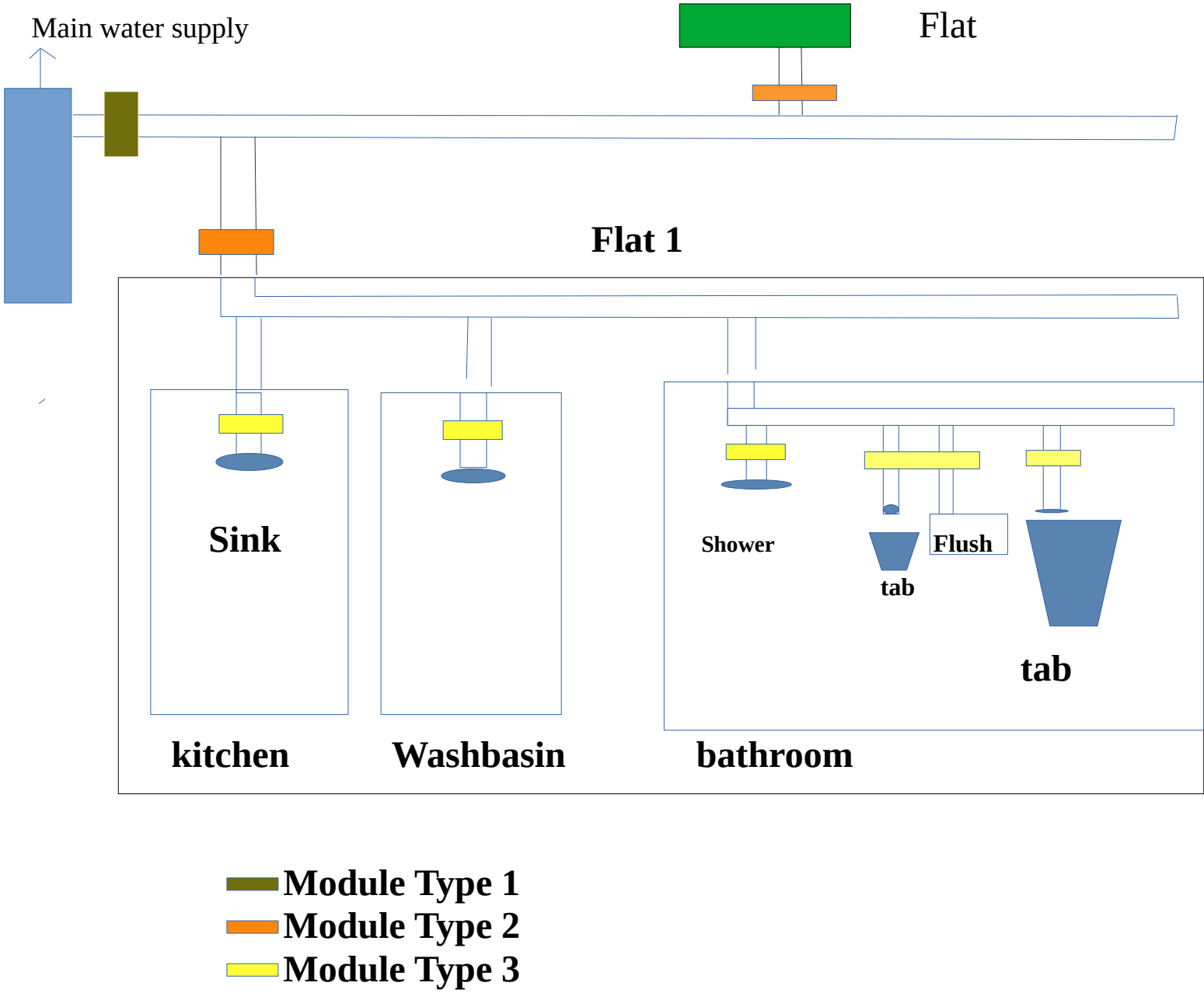
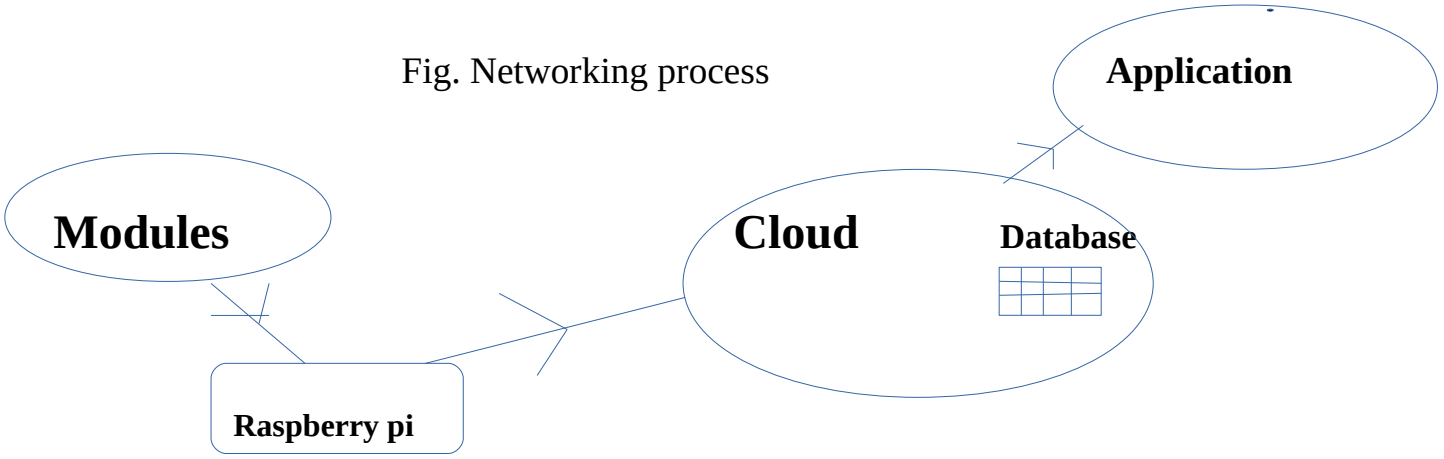


Fig. Networking process



Mobile Application view