SMART WATER MANAGEMENT

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INNOVATION

- SMART WATER MANAGEMENT INVOLVES THE USE OF INNOVATIVE TECHNOLOGIES AND PRACTICES TO ENSURE EFFICIENT AND SUSTAINABLE WATER USAGE. HERE ARE SOME INNOVATION'S IN THIS FIELD :
- CONSUMER ENGAGEMENT: CREATE MOBILE APPS AND PLATFORMS TO EDUCATE AND ENGAGE CONSUMERS IN WATER CONSERVATION EFFORTS, OFFERING TIPS AND REAL-TIME USAGE DATA.
- GREEN INFRASTRUCTURE: INTEGRATE GREEN INFRASTRUCTURE SOLUTIONS LIKE PERMEABLE PAVEMENTS AND GREEN ROOFS TO NATURALLY MANAGE STORMWATER AND REDUCE THE BURDEN ON TRADITIONAL SEWER SYSTEMS.

Block chain: Implement block chain technology for transparent and secure water transactions and tracking, improving accountability and reducing water theft.

Desalination: Invest in innovative desalination technologies to turn seawater into freshwater, particularly in regions with water scarcity.

Water Recycling: Implementing systems for treating and reusing wastewater in industries and homes.

Smart Irrigation Systems: Automated irrigation systems that adjust based on weather forecasts and soil moisture levels to .

IoT Sensors: Installing sensors in water infrastructure to monitor water quality, leak detection, and consumption in real-time.

INTRODUCTION

- SMART WATER MANAGEMENT IS A CUTTING-EDGE APPROACH THAT LEVERAGES TECHNOLOGY AND DATA-DRIVEN SOLUTIONS TO EFFICIENTLY AND SUSTAINABLY MONITOR, CONSERVE, AND DISTRIBUTE OUR MOST PRECIOUS RESOURCE: WATER. BY INTEGRATING SENSORS, REAL-TIME MONITORING, AND ADVANCED ANALYTICS, SMART WATER MANAGEMENT SYSTEMS AIM TO TACKLE WATER SCARCITY, REDUCE WASTE, AND ENSURE A CLEAN AND RELIABLE WATER SUPPLY FOR BOTH CURRENT AND FUTURE GENERATIONS.

SMART CITY WATER MANAGEMENT

- CITY ADMINISTRATORS NEED TO KEEP A CLOSE EYE ON WATER SUPPLY, CONSUMPTION, AND EQUIPMENT. WITH IOT, THE WHOLE WATER SUPPLY CHAIN CAN BECOME MORE TRANSPARENT AND EASIER TO CONTROL.
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- WITH THE HELP OF SENSORS, A SMART CITY WATER MANAGEMENT SYSTEM CAN ENABLE YOU TO COLLECT REAL-TIME DATA—INFORMATION THAT HELPS YOU VISUALIZE WATER DISTRIBUTION ACROSS THE NETWORK. RESIDENTS WITH SMART METERS CAN MAKE MORE INFORMED DECISIONS AS A RESULT, LEADING TO A MORE SUSTAINABLE CITY OVERALL.
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- WATER WASTE AND DISRUPTED WATER SUPPLY CHAINS ARE A DRAIN ON THE CITY'S BUDGET. IOT CAN HELP YOU WATCH THE HEALTH OF WATER EQUIPMENT AND DETECT PROBLEMS, LIKE LEAKS IN PIPES. THIS ALLOWS OPERATORS TO RECEIVE ALERTS AND START FIXING ISSUES IMMEDIATELY. IN THE MEANTIME, AI PREDICTIONS ALLOW YOU TO NIP PROBLEMS IN THE BUD BY PREVENTING FAILURES BEFORE THEY CAUSE SEVERE INCIDENTS. WITH AI, CITY ADMINISTRATORS CAN ALSO WATCH THE WATERSHED AND PREDICT WHICH AREAS ARE LIKELY TO FLOOD, INFORMATION THAT WILL HELP LOCAL AUTHORITIES WARN RESIDENTS, MANAGE TRAFFIC, AND KEEP THE CITY ON ITS FEET.

SMART WATER MANAGEMENT AND HOW TO THEY SOLVE

- SMART WATER MANAGEMENT IS THE ACTIVITY OF PLANNING, DEVELOPING, DISTRIBUTING AND MANAGING THE USE OF WATER RESOURCES USING AN ARRAY OF IOT TECHNOLOGIES WHICH ARE DESIGNED TO INCREASE TRANSPARENCY, AND MAKE MORE REASONABLE AND SUSTAINABLE USAGE OF THESE WATER RESOURCES.
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- IT APPLIES TO MULTIPLE SECTORS: AGRICULTURE, FARMING, INDUSTRY, SERVICES, CITIES… MONITORING WATER CONSUMPTION IN HOUSES, CHECKING WATER LEVELS, CHECKING THE QUALITY OF DRINKING WATER, DETECTING CHEMICAL LEAKAGES IN RIVERS AROUND PLANTS, TRACKING PRESSURE VARIATIONS ALONG PIPES OR CHECKING WATER QUALITY IN AQUARIUMS ARE A FEW EXAMPLES OF THE MANY USEFUL APPLICATIONS.
- MICROCONTROLLERS AND SENSORS —SUCH AS ULTRASONIC SENSORS, FLOW SENSORS, TEMPERATURE, SALINITY, CONDUCTIVITY, HUMIDITY, PRESSURE, OR LUMINOSITY SENSORS— PLACED ON PIPES OR PUMPS MEASURE THE WATER LEVELS, FLOW, TEMPERATURE AND QUALITY OF THE WATER IN REAL TIME. MESSAGE ALERTS AND DATA GENERATED BY THE SENSORS ARE TRANSMITTED OVER THE INTERNET TO A CLOUD SERVER, WHERE IT IS PROCESSED, ANALYZED, SOMETIMES WITH THE HELP OF AI, AND SENT TO A TERMINAL FOR THE USER TO CONSULT.
- THE SYSTEM CAN THEN CONTROL AND REGULATE THE USAGE AND QUALITY OF WATER RESOURCES AS WELL AS FACILITATE THE MAINTENANCE OF THE DEFAULT EQUIPMENT.

5 BENEFITS OF SMART WATER MANAGEMENT

- HERE ARE FIVE SPECIFIC BENEFITS OF WATER MANAGEMENT TECHNOLOGIES AND ACTIVITIES, AND HOW THEY CAN HELP ADDRESS THE GROWING PROBLEMS OF WATER SCARCITY.
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- 1. REDUCING WASTE OF WATER-INTENSIVE INDUSTRIES
- AGRICULTURE, MANUFACTURING OR POWER PRODUCTION USE VERY HIGH VOLUMES OF WATER. FARMING ALONE ACCOUNTS FOR 70% OF ALL WATER CONSUMPTION. THE SAME SECTOR IS LIABLE FOR WASTING APPROXIMATELY 60% OF THAT WATER ACCORDING TO THE UN'S FOOD AND AGRICULTURE ORGANIZATION.
- PRODUCERS HAVE TO CONTEND WITH INCREASINGLY ERRATIC WEATHER PATTERNS WHICH RESULT IN HOTTER AND DRIER GROWING SEASONS.
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- REAL-TIME WATER METERING AND OTHER APPLICATIONS SUCH AS SMART IRRIGATION SYSTEMS OR CROP WATER MANAGEMENT SYSTEMS CAN HELP FARMERS REDUCE WASTE WHILE MAINTAINING SOIL HEALTH, IMPROVING WATER CONSERVATION, AND INCREASING CROP YIELD:
- - WATER FLOWS, HUMIDITY, AND TEMPERATURE DATA COLLECTED BY IOT DEVICES, CAN BE USED TO TRAIN MACHINES TO TRACE TREATMENT PROCESSES.
- - IT CAN BE USED TO EVALUATE THE IMPACT OF AN INDIVIDUAL TREATMENT PROCESS.
- - THE DATA COLLECTED USING SOIL AND LIGHT SENSORS CAN BE ANALYZED TO RECOMMEND THE QUANTITY OF WATER AND FERTILIZERS REQUIRED IN A FIELD.

- 2. MONITORING WATER QUALITY TO FIGHT POLLUTION AND DISEASES
- MANUFACTURING AND OTHER HUMAN ACTIVITIES CAN BE RESPONSIBLE FOR POLLUTING RIVERS AND THE GROUNDWATER TABLE. SENSORS AND IOT TECHNOLOGY FOR REAL-TIME MONITORING AND CONTROL CAN HELP MONITOR AND PREVENT POLLUTION AND EVEN IMPROVE THE WATER QUALITY.
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- TO DO SO, IOT SYSTEMS CONNECTED WITH AI-BASED SOFTWARE ARE DEPLOYED TO CAPTURE STANDARD PARAMETERS FOR MONITORING THE WATER QUALITY: PH, TOTAL DISSOLVED SOLIDS (TDS)—INCLUDING OXYGEN, THE OXIDATION REDUCTION POTENTIAL (ORP) OR THE TEMPERATURE OF DIFFERENT TYPES OF WATER. USING MACHINE LEARNING ALGORITHMS, THE DEVICES CAN BE TRAINED TO PREDICT THE QUALITY OF WATER, MONITOR THE EFFECTIVENESS OF A SANITIZING AGENT OR ADJUST THE WATER TREATMENT PLAN ACCORDINGLY.
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- IN THE UK FOR EXAMPLE, OUTBREAKS OF THE LEGIONNAIRES' DISEASE HAVE BEEN REPORTED OVER THE PAST FEW YEARS. IT IS CAUSED BY LEGIONELLA, A BACTERIA THAT DEVELOPS IN UNCONTROLLED SOIL AND WATER ENVIRONMENTS. IT INFECTS THE BODY THROUGH INHALATION OF CONTAMINATED WATER DROPLETS AND CAN CAUSE A POTENTIALLY FATAL FORM OF PNEUMONIA. TO COMBAT THIS ILLNESS, WAVETREND, CREATED LEGIONELLA DETECTING SENSORS THAT USE SAFT BATTERIES. THE IOT ACTIVELY MONITORS HOT AND COLD OUTFLOW, AND WILL ACTIVATE AN ALERT ON HIGH-RISK TEMPERATURES THAT COULD LEAD TO SPREAD OF THE BACTERIUM, ENABLING QUICK ACTION TO BE TAKEN. READ THE COMPLETE CASE STUDY HERE: HELPING TO PROTECT UK'S WATER FROM LEGIONELLA WITH THEIR TEMPERATURE SENSORS.

- 3. IMPROVING THE EFFICIENCY OF WATER SYSTEMS
- SMART WATER SYSTEMS ALLOW THE COLLECTION, TREATMENT, DISTRIBUTION AND RECYCLING OF WATER. THESE SYSTEMS, OFTEN DEPLOYED UNDERGROUND, CAN LEAK, FREEZE, OR BREAKDOWN. THESE SYSTEMS ARE WIDELY DEPLOYED ON INFRASTRUCTURES NOWADAYS.
- BY MONITORING THE PRESSURE, FLOW, MOISTURE, TEMPERATURE, TIME DIFFERENCE BETWEEN POINTS AND OTHER PARAMETERS DIRECTLY WITHIN THE SYSTEMS, THE IOT CAN FACILITATE MAINTENANCE PREDICTION AND AVOID BREAKAGE, LEAKAGE, AND EQUIPMENT DOWNTIME.
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- ONE SUCH EXAMPLE IS FUJI TECOM'S "QUATRO CORE" LC-5000, A SYSTEM POWERED BY SAFT BATTERIES, THAT CAN AUTOMATICALLY PINPOINT THE LOCATION OF A LEAK BY CALCULATING THE TIME DIFFERENCE OF THE DETECTED NOISE CAUSED BY THE WATER LEAKAGE BETWEEN SENSORS. A COMBINATION OF 4 SENSORS ALLOWS FOR COMPLETE ACCURACY OF THE SYSTEM AND DISTANCE CALCULATION FROM THE MEASURING POINT. THE SENSORS ARE ALSO USED AS A RADIO REPEATER, EXTENDING THE WIRELESS COMMUNICATION, AND AVOIDING POOR CONNECTIONS DUE TO OBSTACLES. THE SOLUTION CAN RECORD UP TO 6 ROUTES SIMULTANEOUSLY AND DISPLAY THE DATA ON ONE SCREEN, WHICH EXPEDITES MAINTENANCE OPERATIONS. FIND OUT MORE ABOUT THEIR PRODUCT IN OUR CASE STUDY: FUJI TECOM IS OFFERING MORE EFFICIENT OPERATION THANKS TO AN INNOVATIVE WATER LEAKAGE DETECTOR.

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- 4. CREATING AWARENESS OF HOUSEHOLD WATER USE THANKS TO SMART METERS
- MANY HOUSEHOLDS ARE GUILTY OF WASTING WATER, WITHOUT REALLY KNOWING HOW OR HOW MUCH A CHANGE OF BEHAVIOR COULD BENEFIT THEM.
- MOST UTILITY PROVIDERS HAVE NOW DEPLOYED SMART METERS TO EASILY AND REMOTELY MONITOR AND BILL CONSUMPTION. THE INFORMATION IS ALSO READILY AVAILABLE TO FINAL USERS, WHICH IS A REAL INCENTIVE. INDIVIDUAL CONSUMERS CAN NOW MAKE SAVINGS BY LOWERING THEIR WATER BILL WHILE PRESERVING WATER SUPPLIES ON A DAILY BASIS.
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- TECHEM, IS THE EUROPEAN LEADER IN INDIVIDUAL WATER AND HEATING METERING IN COLLECTIVE HOUSING. THE COMPANY CREATED AN INNOVATIVE SMART READING SYSTEM FOR UTILITY METERS CONNECTED TO END DEVICES WIRELESSLY PER OMS THROUGHOUT A BUILDING. THESE SMART READERS SEND CONSUMPTION AND STATUS INFO PER MOBILE COMMUNICATION VIA CLOUD TO THE TECHEM DATA CENTER WHICH THEN AUTOMATICALLY CREATES BILLING AND ENERGY REPORTS FOR THE PROPERTIES.
- NOT ONLY DOES THE SYSTEM OFFER PRECISE AND AUTOMATIC MONITORING AND BILLING, BUT THE RESIDENTS ARE INFORMED OF THEIR EXACT CONSUMPTION AND ARE SUBSEQUENTLY INCENTIVIZED TO REDUCE CONSUMPTION. THE COMBINATION OF BILLING AND CONSUMPTION MONITORING VERIFIABLY REDUCES HEATING AND WATER CONSUMPTION BY ABOUT APPROXIMATELY 20%

- 5 THROUGH INNOVATIVE SOLUTIONS ALL AROUND THE WORLD
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- MANAGING WATER IS NOT JUST ABOUT DELIVERING IT EFFICIENTLY. SOMETIMES IT IS ABOUT DELIVERING IT TO ALL. IN MANY DEVELOPING COUNTRIES, MANY PEOPLE DO NOT HAVE EASY ACCESS TO RUNNING WATER. WATER UTILITY INFRASTRUCTURES SUFFER FROM LACK OF INVESTMENT, LACK OF PUBLIC WATER POINTS, IRREGULAR DELIVERY SERVICES. CHLORINE PILLS ARE EXPENSIVE AND UNRELIABLE. AS A RESULT, PEOPLE WITH IRREGULAR OR LOW INCOMES ARE FACED WITH DAILY HARDSHIPS IN PROCURING WATER.
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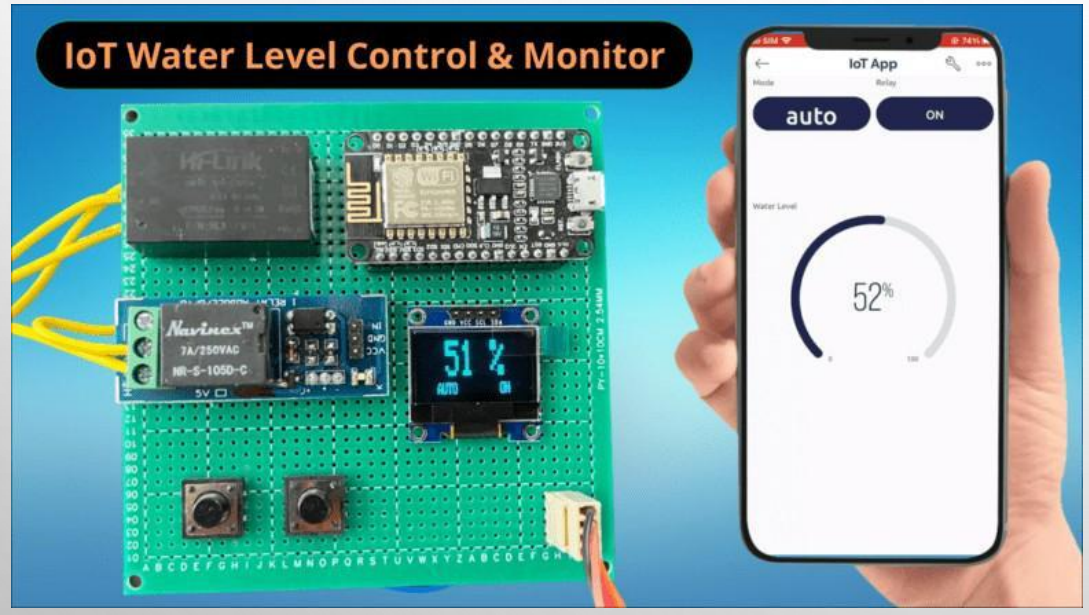
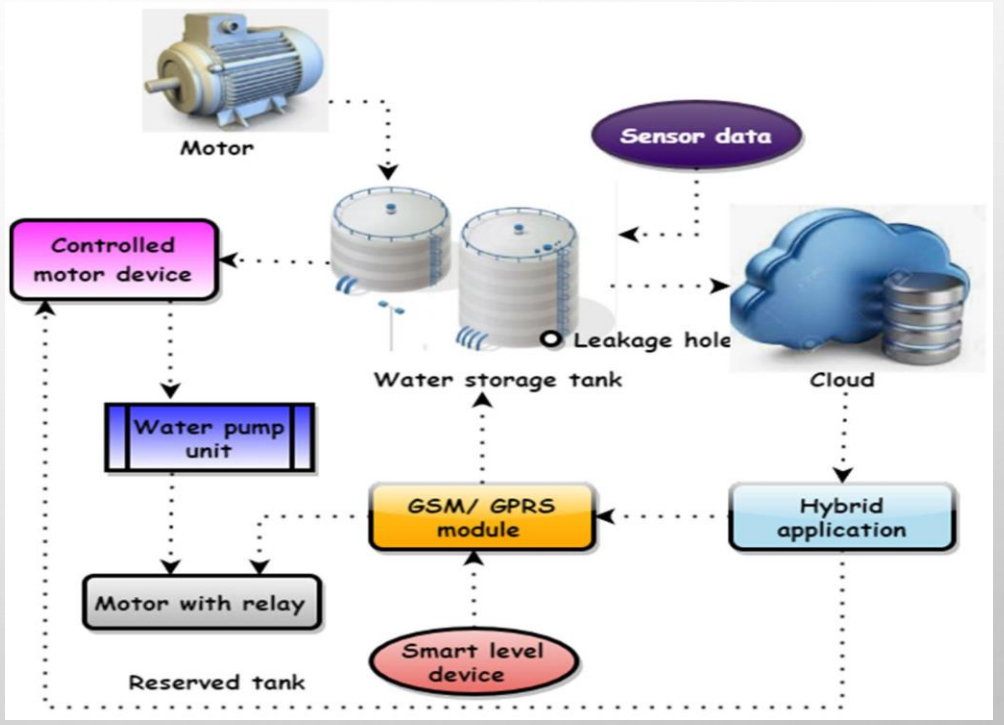
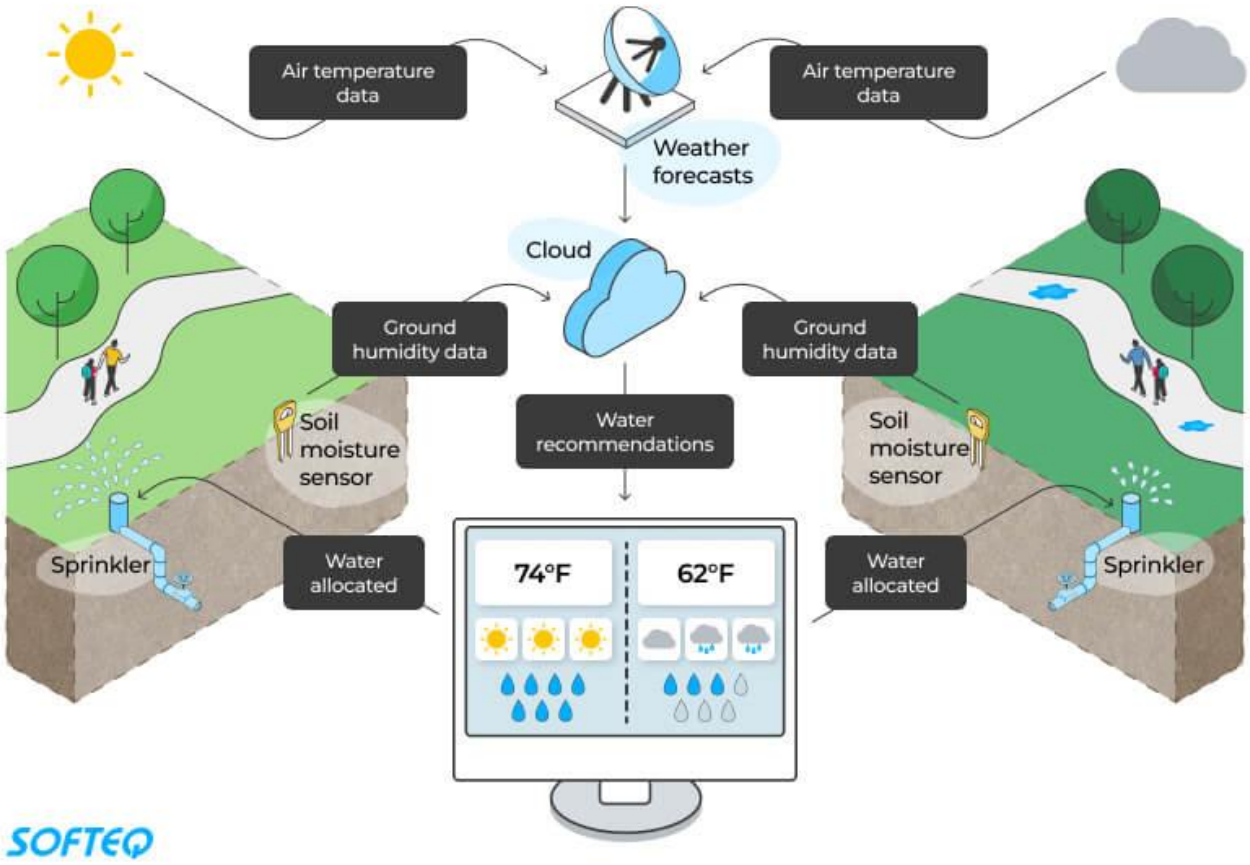
- CITYTAPS HAVE DEVELOPED AN INNOVATIVE SOLUTION TO ADDRESS THE PROBLEM: THE FIRST PREPAID WATER SERVICE, CTSUITE. THE SOFTWARE AND PAY-BY-PHONE SOLUTION RELIES ON A SMART AND PREPAID WATER METER. CUSTOMERS CAN PAY MONEY WITH THEIR PHONE ON THEIR WATER ACCOUNT USING MOBILE MONEY. WHEN THE ACCOUNT IS CHARGED, WATER BECOMES AUTOMATICALLY AVAILABLE UNTIL THE MONEY RUNS OUT. THE SMART PREPAID WATER METER MEASURES AND SENDS WATER USAGE DATA IN NEAR REAL-TIME. IT ALSO PROVIDES THE WATER UTILITY WITH LIVE KEY HYDRAULIC AND COMMERCIAL INDICATORS AND IDENTIFIES THEFTS AND LEAKS TO REDUCE NON-REVENUE WATER (NRW). FIND OUT

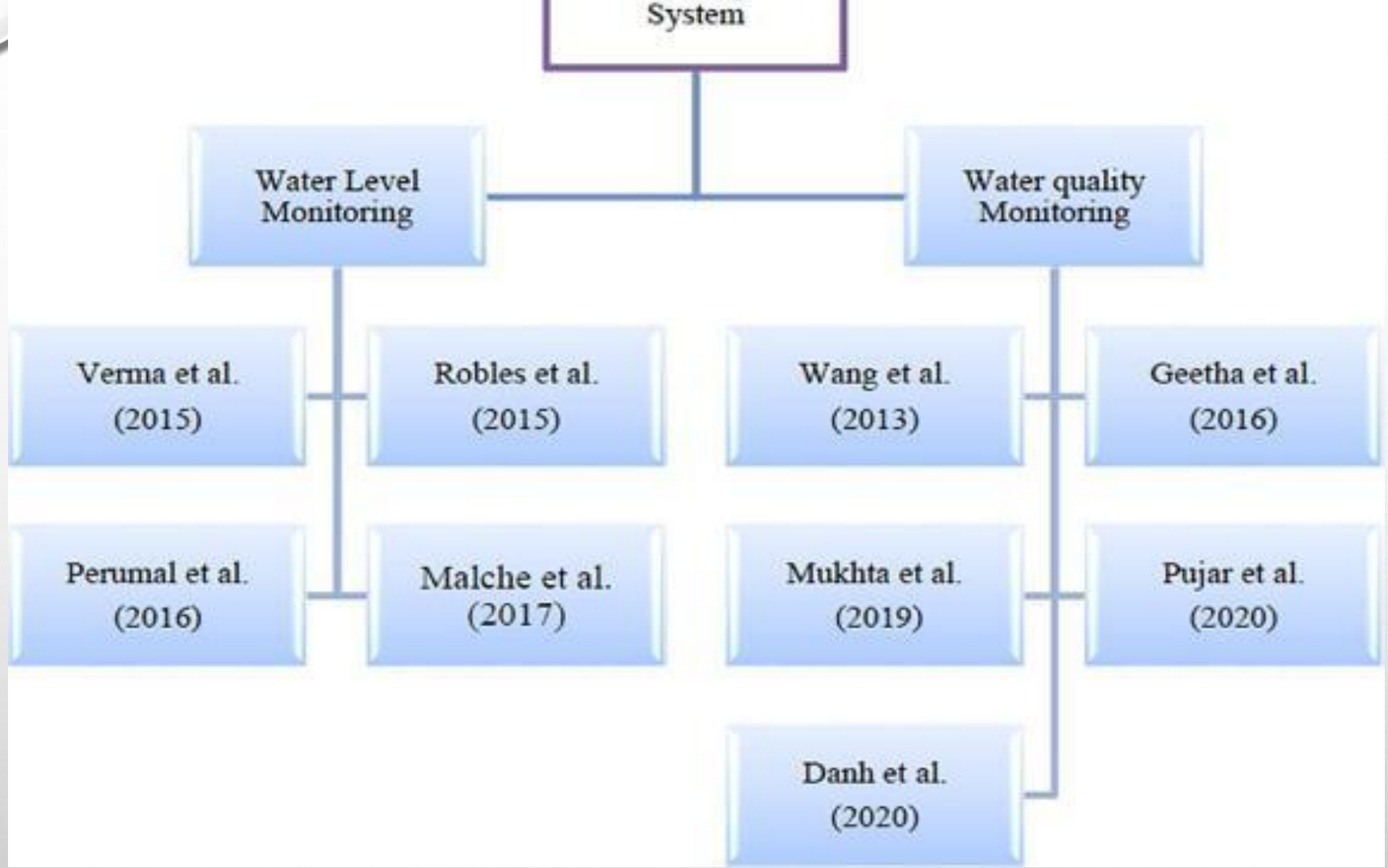
SMART WATER MANAGEMENT



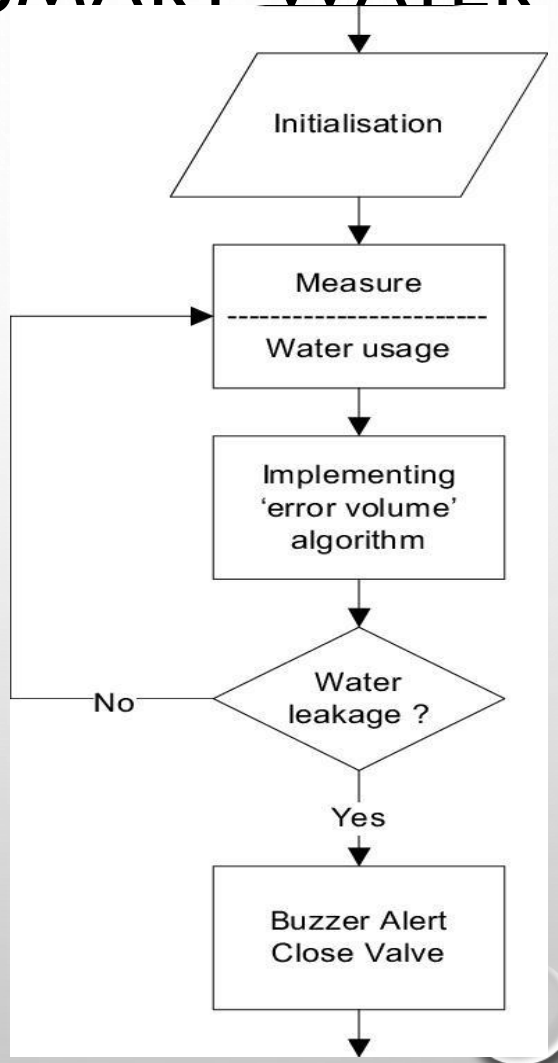


A smart park irrigation system relies on the soil state, weather forecasts, and current weather conditions




System
Water Level Monitoring
Water quality Monitoring
Verma et al. (2015)
Robles et al. (2015)
Perumal et al. (2016)
Malche et al. (2017)
Wang et al. (2013)
Geetha et al. (2016)
Mukhta et al. (2019)
Pujar et al. (2020)
Danh et al. (2020)

FLOW CHART FOR SMART WATER MANAGEMENT



CONCLUSION

- IN CONCLUSION, SMART WATER MANAGEMENT REPRESENTS A VITAL AND FORWARD-THINKING APPROACH TO ADDRESSING THE GROWING CHALLENGES ASSOCIATED WITH WATER SCARCITY, QUALITY, AND SUSTAINABILITY. BY LEVERAGING CUTTING-EDGE TECHNOLOGIES SUCH AS IOT SENSORS, DATA ANALYTICS, AND AUTOMATION, WE CAN OPTIMIZE WATER USAGE, DETECT LEAKS, AND IMPROVE OVERALL EFFICIENCY IN WATER DISTRIBUTION SYSTEMS. THIS NOT ONLY CONSERVES A PRECIOUS RESOURCE BUT ALSO REDUCES OPERATIONAL COSTS AND ENVIRONMENTAL IMPACTS. WITH CONTINUED INNOVATION AND WIDESPREAD ADOPTION, SMART WATER MANAGEMENT HAS THE POTENTIAL TO SAFEGUARD OUR WATER RESOURCES FOR FUTURE GENERATIONS WHILE ENHANCING THE RESILIENCE OF OUR COMMUNITIES IN THE FACE OF CHANGING CLIMATE CONDITIONS.


Thank
you