

HACKMEGA-UNO 2023

DAYANANDA SAGAR COLLEGE OF ENGINEERING, BANGALORE

DOMAIN – CIRCUIT (EMBEDDED)

TEAM NAME – TEAM PHANTOM

TEAM MEMBERS – SURAJ MUKHERJEE (2nd YEAR, EEE)

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PROBLEM STATEMENT – Developing an embedded system for detecting and analysing structural integrity of bridges and buildings. The system should be able to collect data from various sensors such as strain gauges, accelerometers and cameras and use machine learning algorithms to detect any variations in the structure and predict potential failures. The system should also be able to send alerts to the relevant authorities and engineers to inspect the structure in case of any issues. Various parameters should be considered like length of the bridge, traffic rate, wind speed, unequal loads, etc.

INTRODUCTION :

In a smart city, a smart and safe infrastructure plays a vital role for workspace, parking, shopping, etc. managing infrastructure plays a major role in managing smart cities. Smart infrastructure could be defined as a cyber-physical system that provides for an integral management of all elements that it comprises by means of different technological tools that help compile and analyse data to meet efficiency, sustainability, productivity and safety objectives, those

smart infrastructures are based on providing data, analytics, feedback, adaptability.

Structural health monitoring involves observation and analysis of a system over time using periodically sampled response measurements to monitor changes in the materials and geometric properties of bridges and buildings. A modern structural integrity analysis method employs several types of sensors embedded or attached to the sensors. The information obtained from these sensors provides necessary inputs for damage detection and characterization techniques for the maintenance of these structures.

IMPORTANCE OF IoT IN STRUCTURAL HEALTH MONITORING SYSTEM

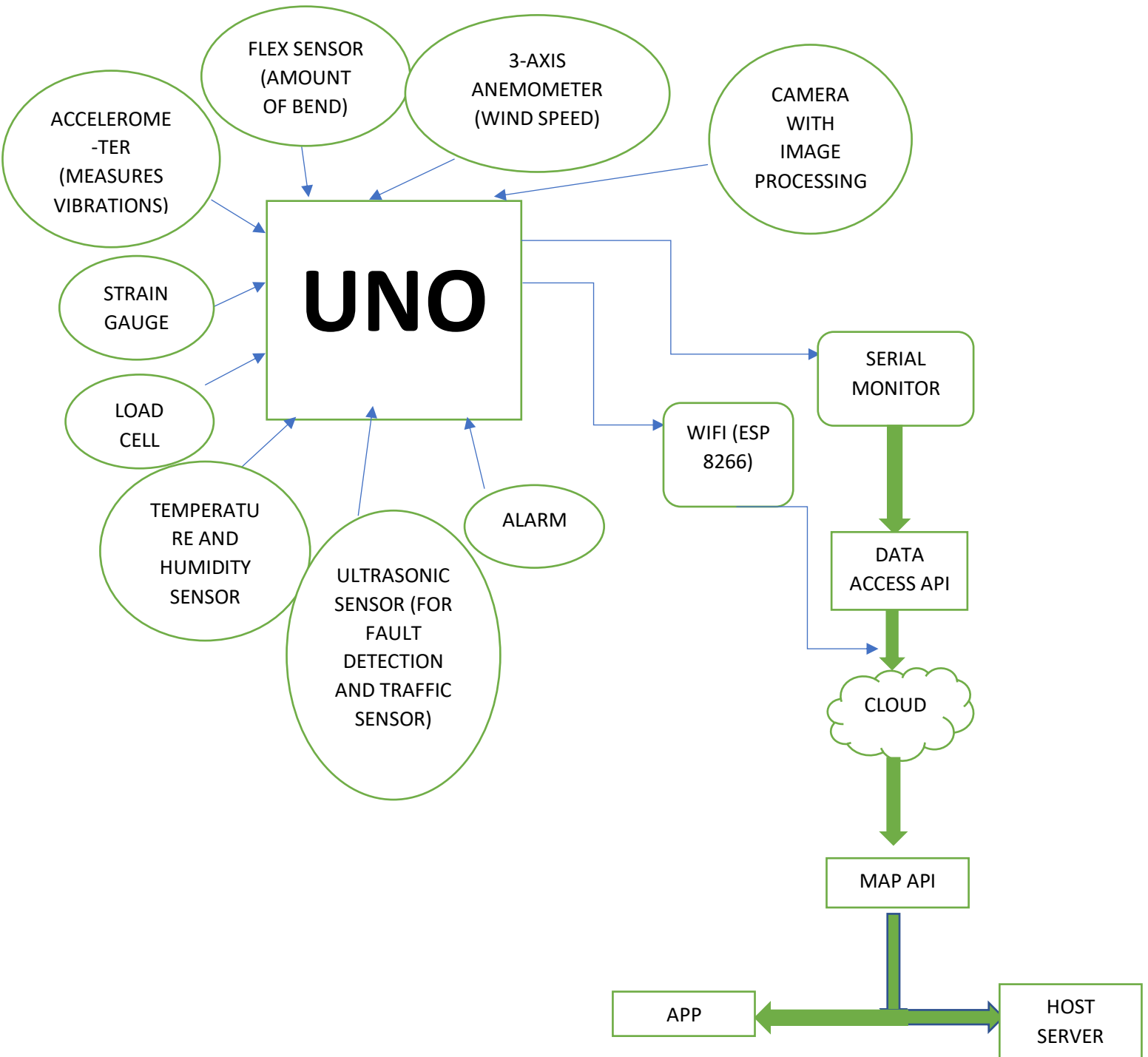
- Reliable and timely data in construction and critical infrastructure management is highly crucial. Manual data collection is slow, unreliable and highly inefficient, therefore an IoT – based approach can resolve the issue profoundly. It gathers information on its current state by tracking variables like vibration, strain, stress and other physical phenomena, responses and conditions. It seeks to assist in non-destructive evaluations aimed to detect location and extent of damage, calculate the remaining life of an asset and predict upcoming accidents.
- There is a significant reduction in the cost of sensors connectivity, combined with growth in platform-as-a-service business models, enabling lots of data remotely, aggregate it and make critical analysis for fault detection and maintenance.
- Helps in predictable and efficient management by minimizing downtime, and avoiding or carefully planning costly repairs and the need for manual supervision is reduced for the safety of the workers. Thus, it helps to add value for an asset owner or operator.

- It can recognize stresses which are invisible to the human eye before they result into a significant damage.

FUTURE SCOPE

In future the prototype of this system can be implemented as various structures like giant walls, other than buildings and bridges which makes it robust, portable and more user friendly than already existing technologies.

DESIGN:



WORKING :

