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Low Cost Sensor Node for Monitoring River Floods

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River floods occupy a respectable percentage among all natural disasters, are presenting high risk, and usually cause great damage. Important tools in managing and preventing river floods are the Early Warning Systems (EWS), which are usually consisted both by a hardware infrastructure (sensors, communication network) and a relevant software infrastructure (data logging, signal processing, modeling, risk detection).

In the current work we are presenting preliminary results from a novel, low-cost and low-power hardware system, part of a EWS aimed for river floods. The system consists of multiple sensing nodes, each to be strategically positioned at certain points along the route of river Evros, Greece. Each sensing node will bear a low-cost and high-quality ultrasonic water level sensor, along with an embedded microcomputer to control its functionality. An additional novelty of the proposed work is the design and utilization of a private low-power wide-area wireless network (LPWAN), taking advantage of IoT technologies and especially the LoRaWAN implementation. This way, the proposed system will have even lower power demands, together with greater expandability by allowing many nodes to be simultaneously connected and measuring, and having the ability to utilize crowd-sensing techniques. The power supply is battery based and autonomously recharged with the aid of small solar panel. Each node will measure the water level of the river, and upload the data to a cloud server at variable time intervals, depending on the actual water level variation and the system's power consumption optimization.

Future upgrades of the system will involve extra sensors, allowing the nodes to measure water quality parameters i.e. suspended solids, pH, etc. Although of secondary importance, these parameters might prove to be important in the development of the risk detection and alarm issuing algorithms.