Innovative geo-monitoring system to assess hydro-hazards at road embankments

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Road infrastructure is expected to face extreme pressure due to ageing and climatic extremes [1] as evident by recent cases of flash floods followed by drought periods. Among the most vulnerable elements of civil infrastructure are considered to be the road embankments that are not expected to withstand the prospective flood extremes. Seepage and internal erosion patterns inside the body of embankments are difficult to be assessed with conventional methods (e.g. visual inspections) and therefore go undetected leading to irreversible effects with major disruption and costs to road asset owners and maintainers. Flood-induced hazards can cause sudden collapse of bridge infrastructure without prior warning, and with significant socio-economic impacts [2]. Various sensor applications have focused on the development of monitoring systems to assess in real-time hydro and geo-hazards [2, 3, 4, 5].

This study focuses on the development and application of a real-time geo-monitoring system at a pilot road embankment in Scotland (UK) to remotely assess the evolving characteristics of hydro-hazards. The system will also provide early warning of such hazards and timely information to asset owner for proactive actions and early maintenance to avoid irreversible and costly major rehabilitation activities.


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