



Development of a smart flood warning system in urban areas: A case study of Huwei area in Taiwan

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In this study, we developed a smart flood warning system to clearly understand flood propagations in urban areas. The science and technology park of Huwei, located in the southwest of Taiwan, was selected as a study area. It was designated to be an important urban area of optoelectronics and biotechnology. The region has an area about 1 km² with approximately 1 km in both length and width. The discrepancy between the highest and lowest elevations is 6.3 m and its elevation decreases along the northeast to the southwest. It is an isolated urban drainage area due to its urban construction plan. The storm sewer system in this region includes three major networks that collect the runoff and drain to the detention pond where is located in the southwest corner of the region.

The proposed smart flood warning system combines three important parts, *i.e.* the physical world, the cyber-physical interface, and the cyber space, to identify how the flood affects urban areas from now until the next three hours. In the physical world, when a rainfall event occurs, monitoring sensors (*e.g.* rainfall gauges and water level gauges built in the sewer system and ground surface), which are established in several essential locations of the study area, collect in situ hydrological data and then these data being transported to the cyber-physical interface. The cyber-physical interface is a data preprocess space that includes data analysis, quality control and assurance, and data integration and standardization to produce the validated data. In the cyber space, it has missions to receive the validated data from the cyber-physical interface and to run the time machine that has flood analyses of data mining, inundation scenarios simulation, risk and economic assessments, and so on, based on the validated data. After running the time machine, it offers the analyzed results related to flooding planning, mitigation, response, and recovery. According to the analyzed results, the decision supporting system, therefore, can publish warning information in urban areas at the right time.

Keywords: flood warning system, flood mitigation, inundation.