

## ■ A Testbed Platform for UVA Emergency Deployment

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### **Abstract**

Despite the safety measures taken by manufacturer, accidents, fires, or even explosions still remain a daily reality. To reduce the likelihood of such events, prevention plays a very important part. Some of these measures include: housekeeping, work habits, workforce training, regular maintenance, equipment inspection and testing. It is also important to train staff, schedule emergency drills to identify weaknesses, check secondary emergency systems (lighting, pumps, ventilations, etc.), and update emergency contacts and any necessary first aid supplies.

Industries with die casting facilities need to carry out extra prevention precautions, such as clean and dry site maintenance, and other process precautions such as planned preheating, cooling and dust control. While prevention measures significantly reduce the damage and recovery time, they should always be accompanied by emergency action plans before, during, and after accidents take place.

The presented work fits within the prevention, emergency actions, and the aftermath of accidents. The final goal will be to deploy Unmanned Aerial Vehicles (UAVs) within installations such as the Meridian, to search for survivors, and to assess damage, in the event of an accident. To achieve this, the research introduces the new concept of Hardware-Virtual Environment (UAV-VE) Coupling, and presents a testbed platform that allows a UAV to navigate a VE that duplicates real surroundings, such as the Meridian's (or other facilities such as: nuclear reactors, oil rigs, etc.). The testbed will be used to map accurate and calibrated UAV manoeuvres onto VEs, and vice versa. In the event of an accident, a trained operator will deploy a UAV to search the facility, through steering the UAV paths within the VE. The UAV will in turn transmit back live pictures and data to assess damage and report the presence of survivors. The approach will help rescue teams in evacuating survivors and also eliminate unnecessary risks to the team.

Moreover, this approach can also be used on regular basis to carry out maintenance inspections to areas around the plant that are not easily accessible, for example, roofs, ceiling and ventilation systems.

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