SEMS: RESEARCH PROJECT DESCRIPTION

1. Project Background and Description

*A project title and description with clear aims **(300 words)***

Miniature intelligent robot for inspection and monitoring in extreme environment

Nowadays, there is a significant demand for robots with the ability to work in extreme environment including confined spaces where humans have very limited or no access. The applications of such robots include leakage detection in water pipe network, monitoring, and measurements in nuclear plant, condition monitoring of flood and earthquake affected areas, vulnerable bridges and buildings. For example, Mexico City has over 1000km of main water pipes and a secondary water pipe network of more than 12000km. However, ageing pipelines and leaks mean that 11 cubic meters of water are lost per second, causing a huge loss to the economy of the country. Early detection of leakages using miniature robot can save the country from this loss. Some countries lose as high as 35% of produced water through leakages in the distribution pipe-network. As a part of the smart water system, sensing, detection and minimisation of water loss through leakages in water distribution network in a sophisticated way is highly essential.

The project aims to design, model and fabricate a miniature robot to be able work in extreme environment as mentioned above. The design and fabrication of the robot will include both rigid and soft robotic approaches. The robot will be designed to be easily controllable remotely and be accurate in sensing from any angle around the extreme environment. The robot needs to be fitted with video capturing capability to transmit data real-time to a ground station. The efficacy of the fabricated prototype will be tested in an in house built extreme environment or confined space.

2. Project Scope

Three research project objectives

Design, modelling and fabrication of a miniature robot capable of working in extreme environment
Development of sophisticated control and communication methodologies for the operation of the robot
Sensor integration and efficacy testing of the developed robotic system in a real-time scenario

3. Desired Skills from the Student

Key skills needed for the PhD project

Knowledge of Engineering design, Instrumentation and Control

4. Supervisory Team

Add supervisory team details

Primary: (Name (inc title)**:** Dr M Hasan Shaheed
Secondary: (Name (inc title): Dr Ranjan Vepa
Additional: (Name (inc title)/ department or company if outside SEMS):