Executive Summary

Krishnan Balasubramanian
Institute and Chair Professor,
Department of Mechanical Engineering,
IIT Madras, Chennai

1. Title of the Project: **Ultrasonic Waveguide Sensor Systems**

2. Date of Start of the Project: **1 Jan 2018**

3. Aims and Objectives:

The key milestones of this proposed work over a 5 year period of fellowship includes:

1. To develop custom built electronics that is cost effective and robust for the generation, reception, analysis, and display of ultrasonic data.
2. To develop waveguide sensor configurations for 3 applications (initially)
    a. Skin temperature measurement for hot heater tubes in process industries.
    b. Fluid Rheology-Temperature Sensor
    c. Fluid Level Sensing
3. To integrate the electronics with waveguides and test and calibrate.
4. To develop a team of entrepreneurs and incubate a company through IIT Madras Incubation Process.
5. Complete the product design, testing, and validation of the technology on industrial field conditions.
6. Complete the certifications for commercialization including IP54, UC, etc.

4. Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc)

    a. Developed an Ultrasonic Waveguide based Skin Temperature Sensor for high temperature process tubes in Refinery with Trials successfully completed in 2020 in BPCL Refinery
    b. Developed an Ultrasounic Waveguide based Fluid Rheology &Temperature Sensor with Field-Trials underway in Saint Gobain Research India (SGRI).
    c. Developed an Ultrasonic Waveguide based Fluid Level Sensor with Laboratory-Trials underway for LAM Research which is a semiconductor manufacturing industry.

d. A new startup company **XYMA Analytics Pvt Ltd (www.xyma.in)**, incubated under the IITMadras Incubation Cell, has been registered. This company is also now registered under MSME, Startup India, and also approved by DIPP.
e. The company has entered into an agreement for licensing the IP and knowhow from IIT Madras.
f. Four new Intellectual Property Filings and 5 Journal Papers in first 3 years.

5. Concluding remarks

The waveguide sensor technology creates new jobs, both in the MSME sector and in the large industries by making the process more efficient and making Indian industries more competitive. The startup XYMA Analytics will be supplying technology primarily and at a price advantage to Indian Industries. It will also export the technology in the form of sensors and IIOT system to manufacturing and petrochemical industries worldwide, thereby promoting the “Aathma-Nirbhar-INDIA, made-for-the-WORLD” mantra of the GoI.