# **Executive Summary**



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- 1. Title of the Project: : "Development of high resolution and large format (640x512 and 1Kx1K) prototype Thermal Imagers for night vision and surveillance applications"
- 2. Date of Start of the Project: 5 Feb 2020
- 3. Aims and Objectives:
  - a. Demonstration of T2SL based single-pixel devices with high responsivity and detectivity, which ultimately ensures device quality material development.
  - b. Demonstration of proof-of-concept prototype of 640 x 512 FPA.
  - c. Development and demonstration of readout and image processing electronics with the 640 x 512 FPA
  - d. Extended objective to develop a prototype of infrared thermal camera based of 640 x 512 and 1K x 1K formats
- Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc)

Achieved improved large format focal plane array fabrication results from wafer level. New growth system – Molecular Beam Epitaxy system is been installed and initiated the growth conditioning and optimization process. Readout electronics is been designed and fabricated and tested with an uncooled sensor array which resulted in a thermal camera core prototype. This core is then applied in a product prototype for human temperature screening camera system which was aimed at the screening of human targets at a way point for elevated body temperature who were to be suspected likely to have Covid-19. Very impressive camera performance was measured. This system can be further used in any industrial applications requiring non-contact temperature measurements. Focal plane array sensor is been loaded on a custom designed and fabricated cryo dewar which will be later integrated with the readout electronics designed for the individual sensor array in an attempt to demonstrate the standalone prototype of indigenous thermal camera. Presently it is connected to lab bench electronics tested for successful imaging. I have registered a company and incubation is in process.

#### Publications:

- Raveesh Gourishetty; Saranya Reddy Shriram; Debi Prasad Panda; Subhananda Chakrabarti, (2022), IEEE Transactions on Electron Devices (Volume: 69, Issue: 7, July 2022).
- Shriram, Saranya Reddy; Gourishetty, Raveesh; Chakrabarti, Subhananda, (2022), Micro and Nanostructures, Volume 165, May 2022, Article number 207189.
- Shriram, S. R., Gourishetty, R., Panda, D., Das, D., Dongre, S., Saha, J., & Chakrabarti, S. (2022). Infrared Physics & Technology, 104047.
- Shriram, S. R., Panda, D., Kumar, R., Saha, J., Tongbram, B., Mantri, M. R., & Chakrabarti, S. (2021). Optical Materials, 114, 110817.
- Shriram, S. R., & Chakrabarti, S. (2021, August). In Low-Dimensional Materials and Devices 2021 (Vol. 11800, p. 118001C). International Society for Optics and Photonics.
- Dongre, S., Panda, D., Das, D., Gazi, S., Kumar, R., Biswas, M., ... & Chakrabarti, S. (2021, August). Nanoengineering: Fabrication, Properties, Optics, Thin Films, and Devices XVIII (Vol. 11802, p. 118020W). International Society for Optics and Photonics.
- Panda, D., Singh, A., Kumar, A., Saha, J., & Chakrabarti, S. (2021, March). Physics and Simulation of Optoelectronic Devices XXIX (Vol. 11680, p. 116801M). International Society for Optics and Photonics.
- Shriram, S. R., & Chakrabarti, S. (2021, April). High Power Lasers and Applications (Vol. 11777, p. 117770Y). International Society for Optics and Photonics.
- Kumar, R., Saha, J., & Chakrabarti, S. (2021, March). Physics and Simulation of Optoelectronic Devices XXIX (Vol. 11680, p. 116801K). International Society for Optics and Photonics

#### 5. Concluding remarks

The proposed activities are completed with positive results with all projected milestones being met. A satisfactorily working prototype of uncooled thermal camera is realized. Preliminary working prototype of cooled thermal camera is also realized. The further focus is to complete the development of a fully indigenous cooled camera prototype.