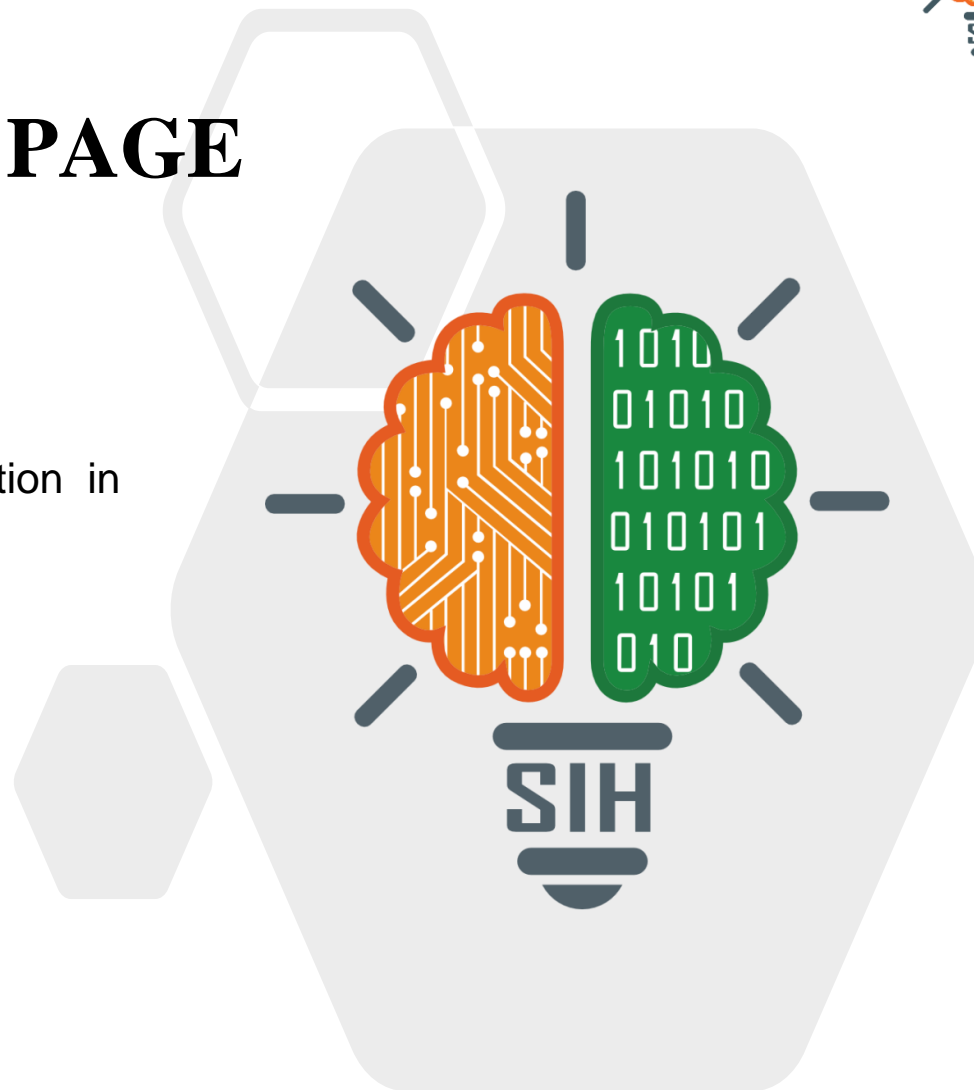




TITLE PAGE

- **Problem Statement ID** – SIH1566
- **Problem Statement Title** - Enhancing body detection in CSSR Operations Using Advanced Technology
- **Theme** - Disaster Management
- **PS Category** - Hardware
- **Team ID** - 17207
- **Team Name (Registered on portal)** – FlyingTigers



IDEA TITLE

Idea/ Solution:

A **drone-based system with sensors and modules** will capture CSSR site data, sending it to a ground station to generate **3D visuals** with potential human presence spots, aiding NDRF's SAR operations.

- **Subsurface Imaging: GPR module** detects objects beneath rubble, revealing hidden structures or victims.
- **Heat Signature Detection: Thermal/IR/Multi-spectral imaging** identifies heat signatures, indicating possible human presence even in low visibility conditions.
- **Electronic Device Location:** RF radiation module locates electronic devices, estimating the number of people trapped.
- **Real-time Monitoring:** Onboard motion camera continuously tracks motion, providing vital information for rescue operations.

Problem Resolution

- Drone **pinpoints human presence** under rubble with precision, **empowering NDRF teams**.
- Our drone revolutionizes SAR operations by **speeding up** the search for trapped individuals.
- Advanced drone modules **save time and lives** by rapidly locating trapped humans.

Innovation and Uniqueness

- **Safer Search:** Drones reduce surface contact risk.
- **Informed Rescue:** 3D visuals aid navigation planning.
- **Accurate Count:** RF radiation detects trapped individuals.
- **Hazard Alert:** Gas sensors ensure safe rescue

Algorithms Development:

OpenCV, TensorFlow, PyTorch, VTK [Visualization ToolKit] - Core Technologies used for 3D visualization, Machine Learning, Data Analysis and Computer Visions

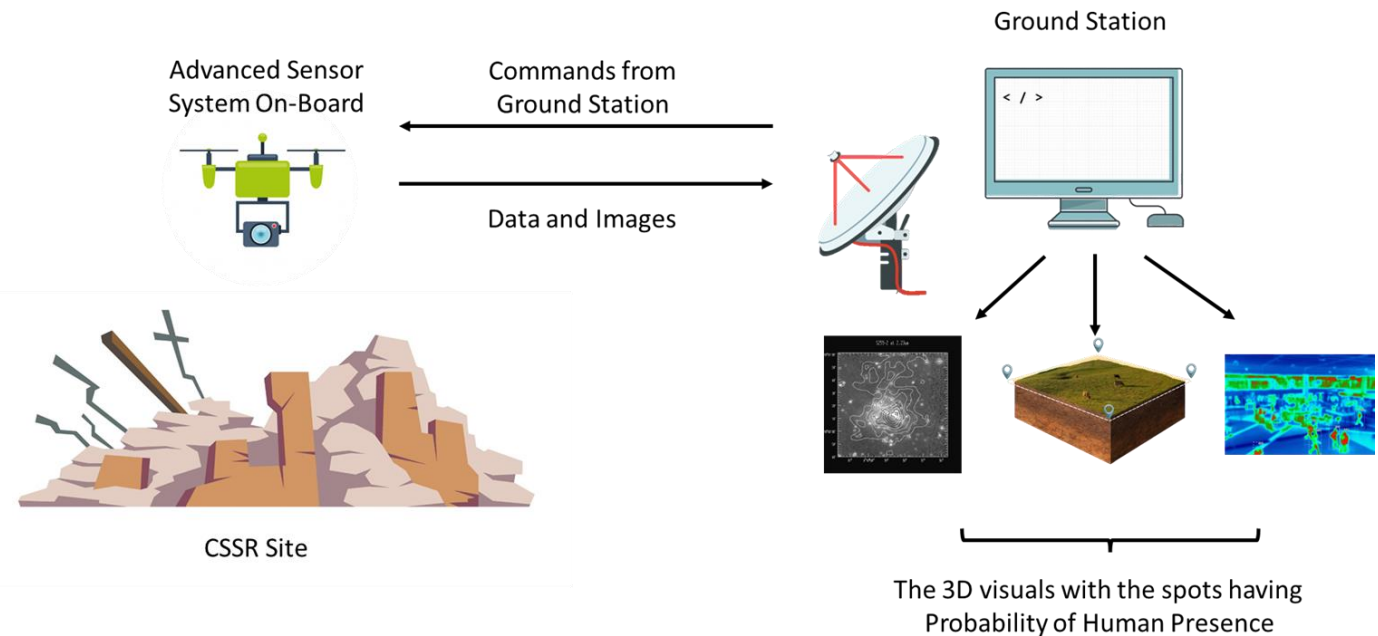
Hardware Implementation:

Pixhawk Flight Controller, MicroController: STM32, Infrared Thermal Cameras, Gas Sensors, GPS module.

Communication:

Customized Copper Antenna, RF communication Module

PROCESS FLOW ARCHITECTURE



- **Technological advancements:** UAVs, sensors, and Data analytics have become increasingly sophisticated, making it possible to collect and process data efficiently.
- **Enhanced safety:** UAVs can operate in hazardous environments, **minimizing risks to human rescuers.**
- **Successful Implementation:** Drones are already implemented in various fields like agriculture, etc making it a reliable option.

- **Operational Challenges:** Operating drones requires a **trained remote pilot**, meaning that specialized skills and training are necessary to manage UAVs effectively.
- **Technical Challenges:** Drones can face **limitations in data transmission and communication.** This includes potential issues with the reliability of transmitting data back and forth between the UAV and the operator.
- **Environmental Challenges:** **Weather conditions**, such as windstorms, can affect the operational efficiency of UAVs. Adverse weather can disrupt or limit the effectiveness of drone operations.

IMPACT AND BENEFITS

Target Audience

- NDRF Dept.
- NGOs

Time Efficiency

- Reduce Manual Probing Time

Work Efficiency

- Quick Deployment
- Effective Labor

Easy Machine Human Interface

- Easy Understandable UI

Early Medical Assistance

- Timely Locating Victims will lead Early Medical Assistance

3D visuals

- Effective inputs for strategic Planning and deployment

Smart Sensor Technology

- GPR
- Thermal/IR cams
- Gas Sensor
- IMSI

- Research Paper By: Bethanne Janney for Implementation of Drone based GRP [Click Here](#)
- Datasheets of various Hardware Components such as: Lidar, RF module, Cameras, Gas Sensors, etc. [Click Here](#)
- YouTube on Photogrammetry for 3D visualizations [3D mapping] [Click Here](#)
- Drone Laws, 2021 by DGCA [Click Here](#)