PROJECT DESIGN PHASE-1 PROBLEM SOLUTION FIT

Project Title: Emerging methods for Early Detection of Forest Fire

Team ID: PNT2022TMID50802

Define CS, fit into CC

1 . CUSTOMER SEGMENT (CS)

→ Federal agencies (forest fire management) such as National Disaster Management. Authority(NDMA) USDA's Forest Service

→ The Department of the Interior's Affairs, Bureau of Land Management, Fish and wildlife Service and National Park Service.

→ People living around fire prone forest area.

6. CUSTOMER CONSTRAINTS (CC)

Major constraints are that there should a stable and uninterrupted network availability for the wireless sensor network to operate, High cost and power consumption of sensor nodes.

5. AVAILABLE SOLUTONS (AS)

Wireless Sensor nodes are deployed to detect fire in starting stage that cover entire forest area. UAV equipped with GPS are employed to localize the fire area in aerial images. In early days, Smoke alarms and watch towers are used .**Pros:** Lives could be saved . **Cons:** Network availability , high power consumption.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE/ PROBLEMS (J&P)

54.40% of forests in India are exposed to occasional fires,7.49% to moderate fires and 2.40% to severe fires. Fire detection system increases the response time as they alert the correct people to extinguish the fire in initial stage hence minimizing the destruction caused by forest fire.

9. PROBLEM ROOT CAUSE (RC)

Nearly 85% of wild land fires in the United States are caused by humans. Human-caused fires result from campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes and the intentional acts of arson. Lightning is one of the natural causes of fires. So fire detection system like wireless sensor nodes are essential to avoid such destructive event.

7. BEHAVIOUR (BE)

The fire detection is done on the basis of ARMSTRONG FIRE INDEX along with the values of gas sensors. In case of forest fire breaks out, a message to the concerned authority is sent first and then data collected will be uploaded in a database from the base station computer to an online website.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS (TR)

Natural cause: High temperature causes combustion of dry leaves, Lightning etc,.

Manmade: Unattended campfires, arson.

4. EMOTIONS: BEFORE / AFTER (EM)

BEFORE: Loss of biodiversity, Extinction of plants and animals, Loss of valuable timber.

AFTER: Flora and Fauna could be saved efficiently using the forest fire surveillance system.

10. YOUR SOLUTION (SL)

Fire detection using Wireless Sensor Network technologies normally deploy a large number of sensors densely that can observe fire prone area by gathering information, transform it into electrical signals, send it to a remote location to do analysis and rescue operations. Hence there is no need to build towers or complicated communication links. It can be deployed even in inaccessible places providing a real time information on forest fire at ignition instance.

8. CHANNELS OF BEHAVIOR (CH)

8.1 ONLINE: Collect the data and form a Dataset to compare the Temperatures of flame regions for forest fire detection.

8.2 OFFLINE: Having a proper spark arrestors, shovels , fire extinguishers and store a reservoir with water or sand.

Identify strong TR & EM