

# SCGIRG Track 1: Smart and Safe Prescribed Burning for Rangeland and Wildland Urban Interface Communities

Xiaolin He Georgia State University  
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**EKPBA**  
Eastern Kansas Prescribed Burn Association

**GHPBA**  
Gypsum Hills Prescribed Burning Association

## Project Challenge

**Prescribed fires** have long been used by ranchers and farmers as a land management tool.

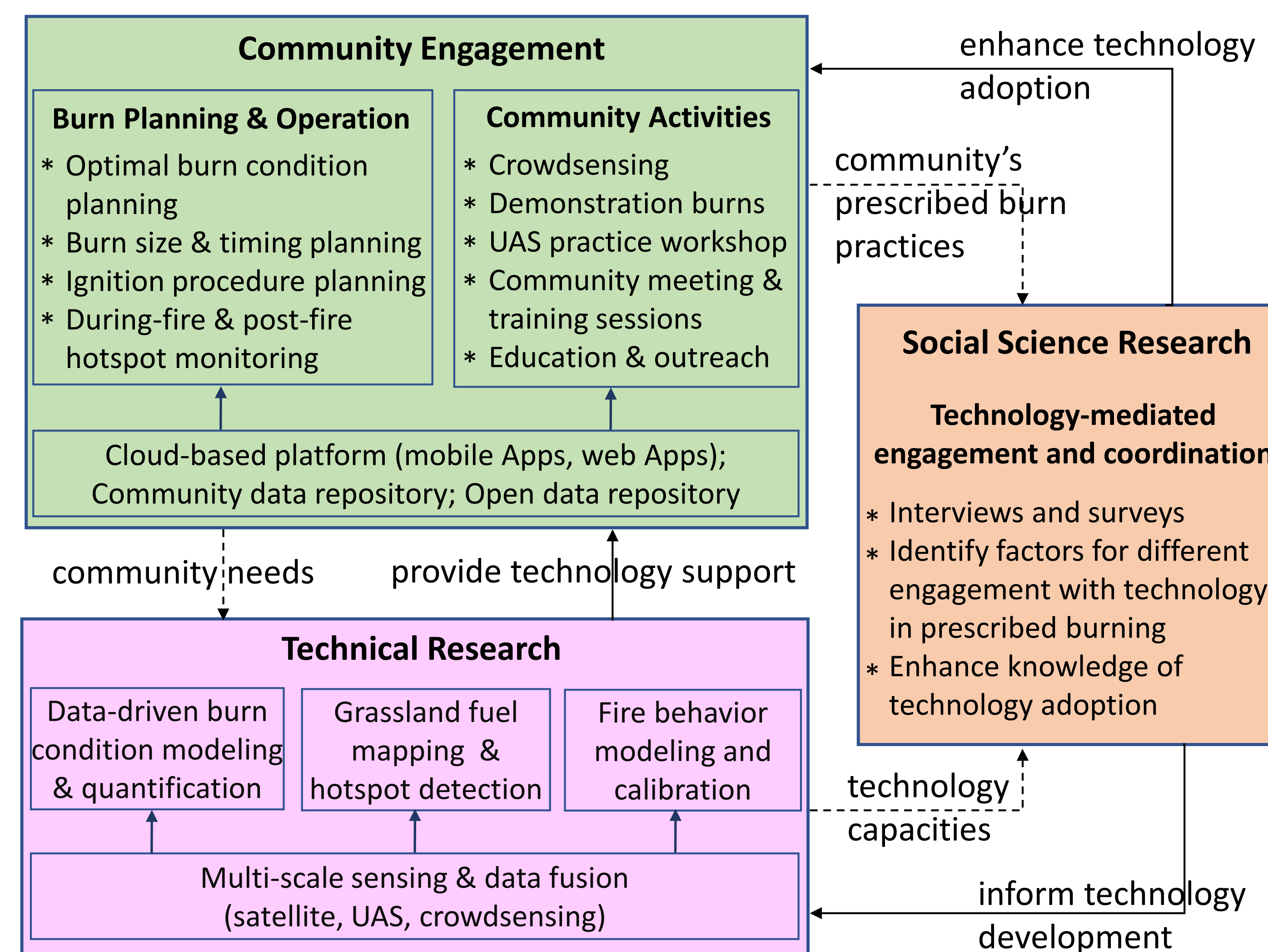
- To manage the *safety and environmental concerns* of prescribed burning, optimal planning and execution of prescribed fires are crucial.
- There is a **lack of planning tools as well as quantitative measures** to help prescribed burns.
- Many landowners also **lack a clear understanding of fire behavior and the ignition techniques** for carrying out prescribed burning in a safe and effective manner.



## Project Vision / Intellectual Merit

- This project develops an innovative *community sensing, planning, and learning infrastructure* to **support smart and safe prescribed burning** for communities that use prescribed fires for rangeland and wildfire risk management.
- The developed infrastructure will be integrated into a **cloud-based platform** to serve communities as a smart cyber connection to help landowners to
  - optimally plan and operate prescribed burns,
  - collect and share data about burning,
  - train fire operators to learn the most effective ways of burning.

## Integrative Research



- Technical research** on multi-scale sensing and data fusion, data-driven burn condition modeling, grassland fuel mapping & hotspot detection, and fire behavior modeling and simulation;
- Social science research** that addresses the knowledge gap on how communities engage with and coordinate burn practices through the use of technology;
- Community engagement** that develops tools, data repositories, and activities to support communities' smart and safe prescribed burning.

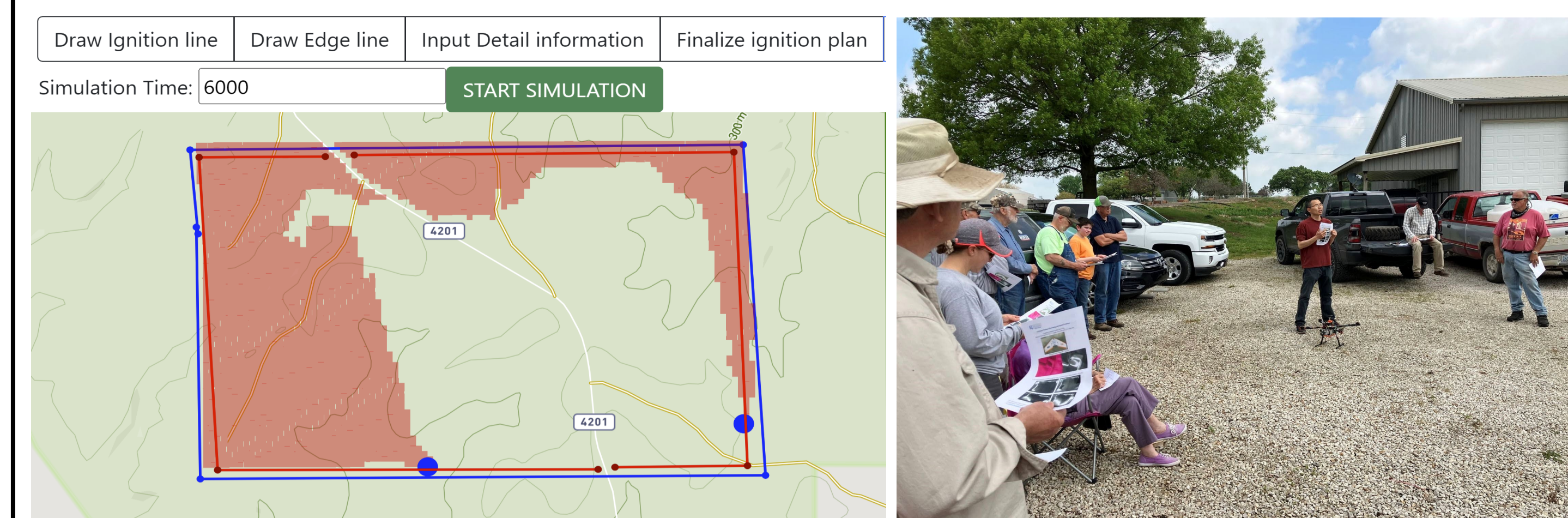
## Broader Impact

The catastrophic wildfires in recent years ask for new ways to manage wildlands and reduce wildfire risk. A paradigm of **community-based burning** is emerging, where landowners work together to carry out prescribed burns on privately-held lands.

- This project supports smart and safe prescribed burning for a wide variety of communities.
- It also promotes technology awareness for building smart communities in rural areas.
- It develops new programs (including a prescribed fire-UAS field trip program) to support STEM education in local high schools.

## Major Outcomes / Progress

- Kickoff meeting** of the project was held on 10/05/2023.
- A prototype web application has been developed (<http://firesim.cs.gsu.edu:3000/>) for supporting **map-based prescribed fire simulation**.
- An early prototype of **LocateHotSpotFire** sensing payload has been selected and installed on a Quadcopter UAS for grass fire data collection.
- Identified existing **fire risk indices** that could be used for prescribed fire management.
- Developed an initial **crowdsensing plan** and data fusion scheme for heterogeneous data.
- Initial survey** conducted to identify distinguishing characteristics between the two Prescribed Burn Association communities.
- Joined the **EKPBA annual meeting** and discussed the plan for the proposed research collaborations and extension activities.
- Identified two high school instructors to collaborate on the **Annual Demonstration Burn** events for supporting rural STEM learning.



## Future Goals

<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>Optimal burn condition planning</li> <li>Burn size and timing planning</li> <li>Ignition procedure planning</li> <li>During-fire &amp; post-fire hotspot monitoring</li> </ul>	<p><b>Activities</b></p> <ul style="list-style-type: none"> <li>Crowdsensing</li> <li>Annual demonstration burn event</li> <li>Annual DIY UAS practice and fly workshop</li> <li>Community meetings and training sessions</li> <li>Education &amp; outreach</li> </ul>
<p><b>Cloud-based Platform</b></p> <ul style="list-style-type: none"> <li>Integrate the planning, crowdsensing, and visualization tools.</li> <li>Web Apps and mobile Apps</li> </ul>	<p><b>Data Repository</b></p> <ul style="list-style-type: none"> <li>Community data repository</li> </ul>