Technology Research Priorities
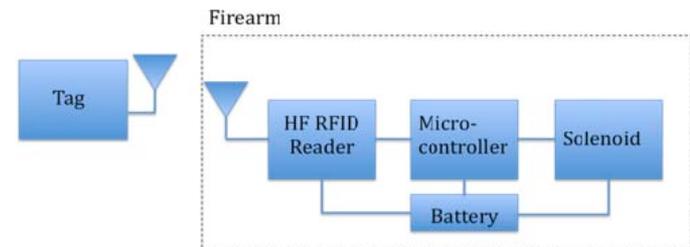
Joe Dowling, GM, GT-Ireland

Georgia Tech Ireland

- Founded in 2006, GT-Ireland is a collaboration between the Georgia Tech Research Institute (GTRI) in Atlanta, and two Irish Universities in Galway (NUIG) and Limerick (UL).
- An applied research center, with a focus on the transition of research from academia to industry.
- Local expertise in the areas of wireless/RFID, software and cyber security.

Smart Guns / Personalized Firearms

- GT-Ireland developed a number of proof of concept smart guns in collaboration with Triggersmart, an Irish startup.

- Technology used is Radio Frequency Identification (RFID).

- A custom designed miniature RFID reader was developed and integrated into a number of different firearms, including handguns and assault rifles.

- Off-the-shelf RFID tags are used in wearable rings or bracelets. Implantation of tags under the skin is also possible.

- Locking mechanisms based on miniature solenoids and stepper motors.

- Technology is at the proof of concept stage, commercialization is possible within 1-2 years.
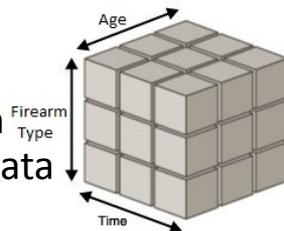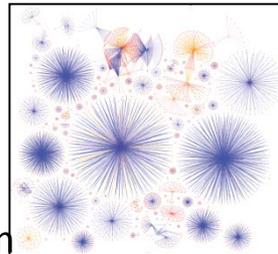
Research Priority #1: Smart Guns

- Areas of research:
  - Biometrics (fingerprint/palm/grip recognition)
  - Low power wireless integration (RFID and other)
  - 'Ruggedization' of electronics and locking mechanisms
  - Onboard power sources, including energy scavenging

- Additional 'smart' features:
  - Sensors to prevent accidental discharge
  - Sensors to predict and prevent/discourage suicide
  - Using wireless technologies to disable firearms in exclusion zones (schools, campuses, government buildings)
  - Automatic notification of safety and maintenance issues

- Reasons why smart guns can reduce firearm related violence:
  - Not a panacea, but can make a positive impact in certain areas
  - Reduce incidents where law enforcement officers are shot with their own gun
  - Child safety – decrease the number of child injuries and fatalities
  - Reduction in accidental discharges during cleaning and maintenance

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Research Priority #2: Using Technology to improve epidemiology of fatalities/injuries

- There are a number of national and regional data sources available. Some prominent examples are;
    - National Violent Death Registry System (NVDRS), 16 states, 25% of gun deaths
    - CDC Web-based Injury Statistics and Reporting System (WISQARS)
    - National Electronic Injury Surveillance System (NEISS), sample of 100 hospitals
    - Weapons Related Injury Surveillance System (WRISS), limited national coverage
    - FBI Uniform Crime Reporting (UCR) & NIBRS systems, 17000 city and state law enforcement agencies
- The National Information Exchange Model (NIEM) could be used to collect and aggregate the information from the various databases
    - NIEM has been developed and deployed to overcome the challenges of exchanging information across state and city government boundaries.
    - All 50 states and 19 federal agencies are committed to using NIEM in some form
- Emerging data visualization and analytics techniques can significantly improve the usefulness of this data, particularly for large data sets
    - Taking advantage of research in computer graphics, image processing and high performance computing to gain a greater understanding and insight into the data
    - An example of this is data cubing, which allows exploration and analysis of a collection of data from many different perspectives

Age

Firearm Type

Time

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Research Priority #3: Technology to enhance gun safety education

- Use new media and the emerging technologies to reach a wider cross section of potential firearm users.

- Some examples are:
  - Social media
    - Online health and safety campaigns
    - Re-enforce firearm safety messaging
    - Sharing of gun safety tips from experts
  - Tablet/Smartphone apps
    - Augmented reality to illustrate safe gun use and maintenance
    - Video analysis of safe gun handling and usage

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In Summary: Priority Research Topics

1. Smart Gun /Personalized Firearms

2. Using visualization and data analytics to improve gun violence epidemiology

3. Technology to enhance gun safety education

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