

## SMART Ammunition Ecosystem

Date: October 12th, 2019

### 1. Executive Summary

Dear Project Contributor,

First, to get this matter out of the way, contributions to this project are NOT tax deductible.

Thank you for taking the time to consider this project for your contribution. Please note that while the end goal is set at USD\$1,263,000 the Phase I elements of the project can be executed at USD\$250,000.

As a nation we cannot continue to wait for a political solution to try to end firearm violence. It is time to implement technologies which can help stem the flow of gun violence and make EVERY firearm a "smart gun".

Thank you again for your consideration,

The Smart Ammo Project Team

**This statement of work provides the level effort for the development of the SMART Ammunition Ecosystem.**

#### SMART Ammunition Ecosystem Defined

The SMART Ammunition Ecosystem is broken out in two phases.

Phase I tamper-resistant passive RFID registered traceable ammunition with the following subcomponents.

- Patent Pending tamper-resistant "survivable" passive RFID ammunition casings.
  - Engineering tamper-resistant cavity ensures survival of RFID tag after firing for law enforcement traceability if needed.
- Database to allow for the association of SMART ammunition to the end-user.
  - Allows law enforcement to track ownership of ammunition
  - Ownership can be transferred to another lawful user via point of sale or home access to the Ammunition Safety Database.
- Requires no modifications to legacy firearms.

Phase II improved SMART Ammunition and SMART magazine

- Improved SMART Ammunition will have the following characteristics
  - Retains tamper-resistant "survivable" passive RFID in the casings.
  - SMART Ammunition introduces intelligent primers (the component which detonates the ammunition).
    - SMART Ammunition default state is disabled
    - Requires SMART magazine to enable SMART ammunition for firing.
  - Continues to use the same Ammunition Safety Database as Phase I.
  - Chambers (loads) in all legacy firearms but cannot be fired without the SMART magazine.

- SMART magazine
  - SMART magazine is the only way SMART ammunition can be enabled to fire.
  - SMART magazine will interface with the Phase I Ammunition Safety Database and only allow SMART ammunition which is registered for the owner of the SMART magazine.
    - SMART magazine reads the pass RFID from each SMART round and matches them to the end-user registration it has downloaded from the Ammunition Safety Database. If ammunition queried via the RFID is not in the SMART magazine end-user registration list it will not enable those rounds to be fired.
    - SMART magazine can be disabled when syncing to the Ammunition Safety Database if the user is flagged to be disabled by public safety authorities. All associated SMART ammunition is flagged from being transferable or enabled for firing.
    - SMART magazines can be disabled via geofencing.
    - SMART magazine has public safety definable registration interval to enhance public safety.
    - SMART magazines can be disabled via RF signal for firearm restricted zones.
    - SMART magazine can report usage to the Ammunition Safety Database.
    - Smart Magazine can be linked-to Smartphone/smart devices to allow for real-time public safety interaction.
  - SMART magazines work in legacy firearms without modifying the firearm.

## 2. Scope of Work

Smart Ammo Project has assembled a senior team of engineering professionals skilled in program management, information technology, and ballistics. These senior resources will also manage 3rd parties such as CNC and electronic competent manufacturing.

### 2.1. Description of Activities

Under the terms of this effort, Smart Ammo Project will execute the following activities:

#### Phase I

##### SMART Ammunition and Database

- Create functional Phase I tamper-resistant passive RFID registered traceable ammunition cases.
- Create functional field useable SMART ammunition readers with database interface for registration validation.
- Create a functional Phase I Ammunition Safety Database with supporting Phase II tables for use with the SMART magazine.
- Provide supporting live-fire testing documentation for survivability testing of SMART ammunition.
- Providing supporting documentation/build and run books.
- Update patent documents as needed.

## Phase II

### SMART Magazine

- Create functional SMART magazines for AR15 / M16 and AK47 platforms for field demonstrations and testing.
- Create code and embedded systems for SMART ammunition.
- Create code and embedded systems to interface with the Ammunition Safety Database.
- Create code and embedded systems to update Ammunition Safety Database with data from the SMART magazine.
- Create code and embedded systems to enable SMART ammunition for firing.
- Create code and embedded systems to enable the ability for SMART magazine to be disabled by public safety authorities.
  - Geofencing
  - Real-time disablement request
  - RF signal
  - Registration action / Ammunition Safety Database

### SMART Ammunition Enhanced Phase II

- Create functional disable by default SMART ammunition
- Allow SMART ammunition to be enabled only via interaction with the SMART magazine.
  - Interaction with SMART magazine will be determined through the build and research process. Some areas of additional consideration below:
    - Frequency resonance activation, RF activation.
    - Inductive circuit power.
    - Ammunition detonation is being considered via a piezoelectric event or firing pin pass-through.
    - Micro electro-mechanical engagement of primer.
    - Embedded power source.
- Ensure all designs chamber in legacy firearms without modification.
- Provide supporting live-fire testing documentation for survivability testing of SMART ammunition.
- Providing supporting documentation/build and run books.
- Update patent documents as needed.

## 2.2. Deliverables

Smart Ammo Project will work to deliver items as defined in the deliverable table on estimated in the schedule as defined in the Master Project Schedule during the execution of this effort. Smart Ammo Project deliverables will include the following:

Phase	Item	Comment
Phase I	SMART ammunition	Phase I SMART ammunition will be limited to tamper-resistant passive RFID registered traceable ammunition cases
Phase I	Ammunition Safety Database	Phase I Ammunition Safety Database will include but not be limited to the following; Customer ID, Customer Photo, ammunition ID, SMART magazine ID, Custom flags for user-defined actions.
Phase I	Documentation	Provide engineering documentation for software and hardware created for Phase I. Update patent applications as needed. Provide end-user documentation as agreed to by Smart Ammo Project.
Phase II	SMART ammunition - Enhanced	Phase II SMART ammunition enhanced will chamber in all legacy firearms, is in a default state of disabled, contains feature of Phase I and requires SMART magazine to be fired from legacy firearms.
Phase II	SMART Magazine	Phase II SMART magazine will provide the following base functions; Allow the firing of SMART ammunition enhanced (disableable ammunition), only fire ammunition registered to the user, ability to be disabled by public safety authorities.
Phase II	Documentation	Provide engineering documentation for software and hardware created for Phase I. Update patent applications as needed. Provide end-user documentation as agreed to by Smart Ammo Project.

In the unlikely event that the Smart Ammo Project team is unable to deliver the technology / solution as defined, the project team will assign all issued and pending patents for the effort to the public domain. The team will also provide all related documentation to and test data for the effort to the public domain.

## 3. Assumptions and Basis for Proposal

The statements in this section are considered in the ensuing cost estimate. Changes in the underlying assumptions may make it necessary to request additional funding.

### 3.1. Hardware / Software and Staffing

- 1) Smart Ammo Project will provide in-house basic machining and board-level manufacturing. The definition of basic is non-CNC machining and breadboard level electronics prototyping. All advance CNC and or surface mounted electronic builds will require 3rd parties to execute these services as needed.
- 2) Smart Ammo Project will purchase or lease all required SDKs and equipment needed for in-house development activities.
- 3) Smart Ammo Project will staff the following resources in-house:
  - a) Senior Engineer and program manager - Fulltime.
    - i) Skills include; Ballistics, coding and board-level design.
  - b) Senior Engineer - Fulltime.
    - i) Skills include; Ballistics, coding and board-level design.
  - c) Senior AutoCAD specialist - Part-time.
    - i) Solidworks expert

- 4) Contract resources in the following areas:
  - a) CNC machining.
  - b) Surface mount electronics prototyping.
  - c) 3d printing.

### 3.2. Project-Level Assumptions

- 1) Smart Ammo Project primary research and development activities will take place in Arizona, California and South Dakota.
- 2) Smart Ammo Project technical team will provide a status for the SMART Ammunition Ecosystem every two weeks.
- 3) Phase I SMART ammunition and Ammunition Safety Database will be tested/deployed pending Phase II development completion.

### 3.3. Transfer of Information

Smart Ammo Project will provide technical transfer of information sessions to partners who will commercialize the Phase I and or Phase II SMART ammunition ecosystem.

## 4. Change Control Process

Expansions or contractions in project scope, changes to the project timeline, modifications to Smart Ammo Project responsibilities, and other actions will be included in project/effort status.

## 5. Terms and Conditions

### 5.1. Fees and Expenses

Smart Ammo Project proposes the Services described in this SOW in a Time and Materials model.

All travel and living expenses incurred will be billed at actual cost and must adhere to the scope and intent of the effort.

All deviations in the defined characteristics, features, and qualities of the initial high-level deliverables, as well as any subsequently identified requirements, will be documented, disclosed and reviewed by the Smart Ammo Project team.

### 5.2. Labor and Cost

#### Labor and Cost Phase I

Task Name	Deliverables	Work (Hrs)
<b>Phase I</b>		
SMART Ammunition	Phase I SMART ammunition will be limited to tamper-resistant passive RFID registered traceable ammunition cases.	520.00
Phase I Database	Deploy functional Ammunition Safety Database.	360
Phase I CAD resource	Complete drawings	100
Phase I Documentation	Complete project documentation as described in SOW.	80
Contract resources	CNC and board-level manufacturing and 3d printing.	Fixed
<b>Total hours</b>		<b>1060.00</b>
Travel and Living Expenses:		N/A

**Labor and Cost Phase II**

<b>Task Name</b>	<b>Deliverables</b>	<b>Work (Hrs)</b>
<b>Phase II</b>		
SMART Ammunition Enhanced	Phase II SMART ammunition enhanced will chamber in all legacy firearms, is in a default state of disabled, contains feature of Phase I and requires SMART magazine to be fired from legacy firearms.	1,666.67
SMART Magazine	Phase II SMART magazine will provide the following base functions; Allow the firing of SMART ammunition enhanced, only fire ammunition registered to the user, ability to be disabled by public safety authorities.	1,666.67
Phase I Database integration with Phase II SMART magazine	Test and integrate the Ammunition Safety database with Phase II SMART magazine.	250
Phase II CAD resource	Complete drawings	500
Phase II Documentation	Complete project documentation as described in SOW.	160
Contract resources	CNC and board-level manufacturing, 3d printing	Fixed
<b>Hours Total:</b>		<b>4,243.34</b>

**5.3. Project Delays**

If at any time during the performance of this project Smart Ammo Project technical team identifies blocking issue(s) to the success of the project, the issue will be documented and presented to the team as a whole and notified in the bi-weekly reports.

## 5.4. Schedule

Phase	ETA to complete	Comments
Phase I SMART Ammunition & Ammunition Safety Database	90 to 120 days after funding	Dependencies on 3rd RFID SDK delivery.
Phase II SMART Ammunition Enhanced and SMART Magazine	12 to 16 months after funding Targeted stretch goal of 9 months.	Dependencies on 3rd party manufacturing lead times must be confirmed and completion date adjusted accordingly.

## 5.5 Confidentiality

The Smart Ammo Project all members of Smart Ammo Project are bound not to disclose details of the SMART Ammunition Ecosystem project.

## 5.5. Subcontractors

Smart Ammo Project will be using the following Subcontractors for this SOW:

Name	Role	Subcontractor
TBD	3d printing	
TBD	CNC machining service	
TBD	Board level prototyping	

Should additional Subcontractor resources be added during the term of this effort, Smart Ammo Project members will be notified in writing.