

THE IMPACT OF DIGITAL IMPLANT TECHNOLOGY ON MEDIUM-SIZED LAW  
ENFORCEMENT AGENCIES

Article

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Sacramento, California

June 2002

The introduction of implanted digital chip technology surfaced more than 15 years ago as a means of positive pet identification. Pet identification chips produced by Destron Fearing, use an implanted digital chip to store a specific identification number.<sup>1</sup> The identification number corresponds to information about the pet such as the pet's name, owner's name and address. Passing a scanner over the animal detects the presence of a digital chip, and if present, receives the stored information. Pet identification chips do not have tracking capabilities and are limited solely to animal identification. Until recently, only animals were implanted with digital chips. Refinements in technology and functionality of digital chips led to experimental implantation in humans in 1998.

The first human recipient of an implanted digital chip was Professor Kevin Warwick. Professor Warwick, the chairman of the Cybernetics Department at the University of Reading in England had a digital chip implanted in his forearm in August of 1998.<sup>2</sup> The implant contained a radio transponder, electromagnetic coil and digital chip circuitry sealed in an inert glass capsule. The capsule is 23 millimeters long and 3 millimeters wide. Transmitting a radio signal to the transponder generates an electrical current in the coil that drives the circuitry. The implanted digital chip transmits a unique code to a computer that can open doors, turn on lights, heaters and in a digitized voice greet Professor Warwick when he enters his office. In July 2001, Applied Digital Solutions announced beta testing of implant technology in humans. The implants are capable of allowing users to emit a homing beacon, have vital bodily functions monitored and confirm identity when making e-commerce transactions. The digital transceiver named "Digital Angel" sends and receives electronic data capable of continuous tracking by Global Positioning Satellite technology with the aid of a hand carried Global Positioning Satellite transmitter.<sup>3</sup>

Once implanted in the body, the movement of muscles electromechanically powers the implanted device. The device can be activated either by the wearer or by a monitoring facility.

The Global Positioning Satellite (GPS) system created the capability to determine position, velocity and time using satellite signals to compute positions in three dimensions. Precise locations on earth can be reliably pinpointed with this data. The GPS system consists of twenty-four satellites orbiting the earth in 12-hour cycles. Each satellite repeats the same ground track and configuration over any point approximately every twenty-four hours thereby maintaining constant satellite coverage. The orbital planes of the satellites are designed to allow between five and eight GPS satellites to be visible from any point on the earth at any given time. The GPS system requires four satellites to compute a location.<sup>4</sup>

The U.S. Department of Defense funds and controls the GPS system. The system was designed for and is operated by the U.S. military; however, thousands of civilian users worldwide use the GPS system. Airplanes, ships, vehicles and individuals use GPS for navigation and are the primary non-military users of GPS. The GPS receivers communicate directly with the satellites to determine precise receiver positioning. The cost of a GPS receiver varies based on the capabilities of the receiver. Inexpensive hand held receivers are available for under \$200 whereas other highly sophisticated GPS receivers can cost up to \$40,000.<sup>5</sup> GPS technology created the potential for individuals, vehicles and parcels possessing or containing a GPS receiver to be tracked anywhere in the world.

The marriage of digital implant technology with GPS tracking capability will significantly impact the effectiveness of law enforcement agencies to monitor and track persons, vehicles and articles. Digital implanted devices can become a means of positive personal identification.

## Need for Digital Implant Technology

Monitoring and supervising parole and probationers poses an enormous challenge to law enforcement agencies due to increasing caseloads and shrinking resources. Nationally, 3.8 million adult men and women were on probation at the end of 2000. That number signifies an increase of almost 70,000 probationers from the prior year.<sup>6</sup> The number of probationers will increase in the future fueled by increasing incarceration costs, prison overcrowding and the increasing use of mandatory minimum prison sentences. On average, each probation officer supervises approximately 258 adult offenders nationally compared to the ideal caseload of thirty probationers per probation officer. Caseload management remains the number one problem facing probation and parole agencies according to a national survey of probation and parole departments. Approximately twenty percent of the offenders assigned to probation have no personal contact with a probation officer.<sup>7</sup>

California state law requires registered sex offenders to register with the police agency serving the jurisdiction of their residence. Convicted sex offenders must register upon moving to the jurisdiction then annually. No routine tracking or monitoring of registered sex offenders occurs other than the annual residence registration. Serious risk sexual predators re-offend at alarming rates. Approximately 88,000 registered sex offenders resided in California in December 2000, an increase of 10,000 registrants from 1998. Nearly 47,000 of the registered sex offenders are child molesters.<sup>8</sup> The City of Roseville has 110 registered sex offenders living in the community. Thirty of the sex registrants in Roseville are not living at their address of record and their whereabouts remains unknown.

The FBI reported, in its annual Uniform Crime Reports (UCR), that 11.6 million Part 1 crimes were committed in 2000.<sup>9</sup> Murder, non-negligent manslaughter, forcible rape, robbery,

aggravated assault, burglary, larceny-theft, motor vehicle theft and arson makeup UCR Part 1 crimes. The Crime Victimization Survey revealed an estimated 25.9 million crimes occurred in 2000.<sup>10</sup> The Crime Victimization Survey includes crimes not reported to law enforcement agencies. Police departments arrested an estimated 2.2 million persons for committing Part 1 crimes in 2000.<sup>11</sup> The future ability of law enforcement officers to electronically track the movements of known offenders would provide leads for police officers when investigating new crimes.

The California Department of Corrections reported it housed an average of 158,759 prisoners daily in 2000 and supervised a daily average of 121,188 parolees. Fifty-four percent of the parolees were violated and returned to prison for violations of parole conditions or for committing new offenses.<sup>12</sup> Additionally, the California Youth Authority incarcerated 14,351 youth offenders and supervised 6,092 parolees.<sup>13</sup> Nationally, 725,500 offenders were on parole in 2000.<sup>14</sup> Of those, 43% were returned to jail or prison and 10% absconded.

The Center for Missing and Exploited Children reported 876,213 missing person cases in 2000 in the United States. Experts estimate 85-90% of all missing persons are children and youths. The number of children reported missing to the FBI National Crime Information Center was 2,100 per day in 2000.<sup>15</sup> Police personnel spend countless hours trying to locate missing and runaway persons every month.

The California Attorney General reported 81,291 runaway children in 2000. A stranger kidnapped fifty-one children and 1,938 children were victims of parental abductions. Another 644 children were missing under suspicious circumstances indicating a stranger abduction.<sup>16</sup> The inability of law enforcement agencies to quickly find runaway children subjects the runaways to potential harm. As an example, a seventeen-year-old female resident in Roseville

ran away and was missing for 8 months. Tragically, she was discovered deceased due to complications from childbirth. The female and her adult boyfriend tried to deliver the baby at home to prevent her from being detained as a runaway. The unborn child also died. The boyfriend hid both bodies and fled the area.

Alzheimer's disease patients who wander away and become lost frequently require law enforcement resources to aid in the search. Nationally, 360,000 new cases of Alzheimer's disease are diagnosed each year. Fourteen million Americans will be afflicted with this disease by the year 2050 according to recent estimates.<sup>17</sup> Roseville Police officers are regularly summoned to look for missing Alzheimer's patients. Fortunately, most Alzheimer's patients are found unharmed; however, in one recent Roseville case the patient took the family car and disappeared. The abandoned car was found the following day near Folsom Lake. Sadly, the patient died from exposure.

### Current Technology

Law enforcement agencies partnered with private enterprise to use wireless technology to expand resource capability. Small transmitters secured to the ankles of probationers are effectively used throughout the country as an alternative method to incarceration. Ankle transmitters are effective in confining the movement of supervised offenders on house arrest, yet these systems have limitations. The restrained person wears a tamper proof transmitter strapped to their ankle that sends a continuous signal to a receiver connected to the offender's home telephone. The offender's telephone sends an electronic alert to the supervising probation agency if the offender moves beyond the predetermined perimeter, generally 150 feet. This type

of surveillance system effectively monitors offenders while they are at home; however, it does not provide any location information while the offender is outside the perimeter.<sup>18</sup>

Alzheimer's patients who wander away are sometimes located with wireless technology. Care Trak Inc. utilizes an electronic transmitter, worn as a wristwatch, to locate missing patients. The transmitter broadcasts a constant electronic signal up to one mile away. A mobile locate receiver tunes into the missing person's individual radio signal allowing a hand held directional antenna to detect the direction of the signal. An alert signal sounds louder as the directional antenna moves closer to the transmitter. The short signal tracking distance (one mile) limits the effectiveness of this system. Delays in discovering that a person is missing and the time required to start a search compound the potential for locating the patient within the limited search range.<sup>19</sup>

The LoJack Corporation developed wireless tracking technology for locating stolen vehicles. Automobile owners purchase the LoJack transmitters and install the transmitter in their vehicle. The transmitter in the LoJack equipped vehicle electronically activates whenever a police agency anywhere in the country enters the vehicle identification number into the National Crime Information Center Stolen Vehicle System. Law enforcement agencies working cooperatively with LoJack install trackers in their police vehicles and aircraft. The trackers can locate the transmission signal from several miles away.<sup>20</sup>

Electronic Tracking Systems Inc. (ETS) contracts with law enforcement agencies and private business for property tracking. Miniature transmitters are secreted in property likely to be stolen. Moving the property activates a mercury switch in the transmitter causing the transmitter to broadcast an electronic signal. Police vehicles and aircraft equipped with tracking devices can receive the signal from up to a mile away. The tracking equipment registers

direction and approximant distance to the transmitter. Multiple police vehicles equipped with the tracking devices can triangulate the location of the signal.<sup>21</sup>

The Roseville Police Department contracts with both LoJack Corporation and Electronic Tracking Systems to use their wireless tracking systems. Roseville police officers have recovered several stolen vehicles by using the LoJack tracking system. One notable case involved a stolen vehicle transported through Roseville on a train. The LoJack trackers picked up the electronic signal as the train passed through Roseville. Officers regularly recover stolen property equipped with Electronic Tracking Systems transmitters. A robbery suspect was shot and killed after officers tracked an ETS signal to the car he was driving. The officers attempted to stop the car however the driver sped away. The pursuit ended when the driver crashed into another vehicle. The driver shot at the pursuing police officers who returned fire and killed the suspect. The suspect was responsible for several Sacramento area bank robberies.

Pro Tech Monitoring, a Florida based GPS surveillance company, contracts with several law enforcement agencies for satellite monitoring of convicted offenders. The use of the Pro Tech Monitoring technology is new to law enforcement. The offender wears a transmitter secured the offenders ankle. The transmitter sends a signal to a GPS locator, referred to as the box. The box weighs about four pounds and resembles a transistor radio. The offender must carry the box with him at all times and not be more than 100 feet from the box. The box reports the offender's location to the monitoring agency through the cellular telephone network. This technology greatly expands law enforcement's ability to track and monitor offenders; however, the system has several deficiencies. The cellular telephone network has limited coverage areas preventing the constant tracking of the offender's movements. Florida authorities monitor approximately 600 offenders with Pro Tech Monitoring.<sup>22</sup>

Public acceptance and judicial approval of implanted electronic tracking systems may pose the single greatest obstacle to the tracking of humans by implanted digital devices with GPS tracking technology in the future. Many opponents to electronic tracking cite civil liberty violations as of paramount concern. The security of tracking system data against unauthorized access and the illegal use of individual tracking information pose challenges to law enforcement as the use of these systems increase.

### Futures Research

To determine the future potential of digital implant technology a diverse group of individuals was assembled to generate ideas in a structured, non-threatening environment. The group consisted of individuals and stakeholders with varying backgrounds, experiences and expertise. The Nominal Group Technique (NGT) process was used by the individuals and stakeholders as the method for future forecasting.

### Key Strategies

Ideas and suggestions offered by the panel were used to develop the following key implementation strategies.

#### Strategy One

The use of implanted digital devices will stir considerable controversy and pale to the controversy experienced with the introduction of microchip implants in pets years ago. Law enforcement agencies should focus the introduction of this technology on a voluntary basis and initially avoid any mandated programs. This strategy will accomplish several objectives. First,

it will introduce the technology to willing recipients thus avoiding potential court challenges. Targeting a specific group for voluntary implantation may be an important strategy. An effective marketing plan could involve educating outdoor enthusiasts, for example, on their increased safety by the reduced time, effort and cost to find lost hikers or snowmobilers. Publicity of successful implant tracking cases will build confidence in the system and demonstrate the benefits of GPS monitoring. Broadcasting tragic incidents where the use of implanted digital tracking devices could have prevented the tragic result will aid in generating support.

Law enforcement agencies will need to work cooperatively with private vendors marketing the technology. Law enforcement managers and private vendors can cooperatively design implant devices that meet the unique needs of law enforcement. The devices will have to be affordable for the individual and the law enforcement agency.

## Strategy Two

Police executives should lobby the state legislature to enact laws mandating the implantation of GPS tracking devices in all sex registrants classified as serious or high-risk offenders and parolees convicted of violent crimes. By working collaboratively with organizations such as the Polly Klass Foundation, The National Center for Missing and Exploited Children and other law enforcement agencies, the law enforcement executive will gain lobbying support for electronic tracking laws. Obtaining support from the California Department of Corrections Parole Unit and local probation departments to provide testimony to the legislature on the ineffectiveness of the current parole and probation systems may prove to be an effective strategy.

Law enforcement managers can create a sense of urgency by publicizing the number of sex registrants, probationers and parolees whose whereabouts are unknown. Detailing the recidivism rates for sex offenders and parolees will help demonstrate the need and urgency for GPS tracking. The police executive should consider citing circumstances when this technology would have prevented tragic results to build public support for mandated digital chip implantation of sex offenders and parolees.

### Strategy Three

Law enforcement managers must work cooperatively with digital implant research and design units to identify characteristics best suited for law enforcement's needs. Frequently law enforcement agencies settle for generalized systems and adopt them as best as possible to a law enforcement application. The police agency executive must ensure adequate security measures are in place to guarantee confidentiality of the operating systems. The development of a user controlled implanted device for persons who voluntarily receive an implant may reduce the hesitation of some persons to accept the technology.

### Conclusion

The use of digital implant chips holds great hope for many people yet strikes paranoia in others. The anticipated reaction to implanted digital devices could mirror the reaction to the first artificial heart implantation in a human. What seemed unnatural and immoral at the time receives little attention or criticism today. Will the implantation of digital chips, capable of GPS tracking and medical monitoring, follow the same path as the artificial heart, from resistance to acceptance?

Prototypes of digital implant devices are currently available; however, more research and design modifications are necessary. The Global Positioning Satellite System functions as intended. Human and societal acceptance remains the missing link. Externally worn GPS tracking devices are generally accepted and used to a limited extent today. Cellular telephones and some automobiles have GPS tracking capabilities. Automatic vehicle locator (AVL) systems are increasing in popularity in the public and private sector. Some law enforcement agencies in Florida use GPS trackers to monitor some offenders. The resistance to the insertion of a foreign electronic monitoring device into the body will pose the greatest challenge. Medical use of implanted devices for monitoring the health of a person and immediately reporting serious health changes to the medical provider may bridge initial reluctance to the voluntary use of implanted devices.

Human implanted digital devices will almost certainly first be introduced to users on a voluntary basis. The people volunteering for implanted digital devices can be separated into two groups. The first group includes people who decide to be implanted for their own personal safety. The reasons could range from medical monitoring to fear of kidnapping. The second group of volunteers will likely consist of incarcerated persons who volunteer to the implanted device as a means to secure an early release from jail. Contained in this group would be convicted persons who volunteer for the implanted device to avoid incarceration. The voluntary use of implanted devices will reduce the likelihood of court challenges.

The individuals voluntarily using tracking devices will likely be responsible for the initial purchase or lease of the equipment and monthly service charges. On-Star, Care Trak, LoJack and Electronic Tracking Services charge the voluntary user for the equipment and service they provide. Cellular telephone and pager providers operate on a similar basis. The marketing of

implanted digital devices probably will be handled in a similar manner. The user will purchase the device and subscribe with a private vendor for monitoring service. Law enforcement agencies will contact with digital implant providers on a fee basis. Persons volunteering for implanted devices as a means to avoid incarceration will probably pay a monthly fee to the law enforcement agency and not contract directly with a service provider.

Cost factors may limit availability and use for this technology. The NGT panel forecast an economic recession. Local governmental agencies frequently operate on limited budgets and are often dependent on Federal and State grant programs for financial assistance. Any limitation on funding sources may impact the ability of law enforcement agencies to adopt and use this technology. The cost for legislative mandated tracking of convicted offenders and sex registrants could be charged to those implanted with the devices. Persons required to use implanted tracking devices, but lacking the necessary funds may necessitate governmental assistance.

Judicial approval of mandated implant tracking remains a significant potential obstacle to the implementation of mandated GPS tracking systems. Legislative mandated use will most likely involve those persons convicted of serious sexual offenses regardless of parole or probation status. Legal challenges claiming violation of privacy and civil rights are highly probable. The mandatory use of implanted devices for all persons is highly improbable. The increased ability of government tracking and monitoring of citizens with implanted GPS technology systems creates privacy issues far beyond those addressed in current case law decisions. While the NGT panel believed the mandatory use of implanted digital devices would survive judicial scrutiny, some restrictions might be imposed. Increased acts of terrorism in the United States may result in a shift in public opinion toward stronger governmental controls and a relaxing of privacy concerns.

Medium sized police agencies will be impacted by the use of implanted digital devices in a number of ways. The greatest potential will involve the voluntary use of implanted devices by persons avoiding incarceration. Those persons can be closely monitored by law enforcement and quickly located when necessary. Comparing the known offender tracking information with GIS crime mapping information will identify any monitored person who was at the location of a crime when the crime occurred. The ability to immediately identify possible suspects greatly impacts law enforcement's potential effectiveness. People who become lost or kidnapped will be quickly located by law enforcement if they have a GPS tracking transmitter. Law enforcement agencies will realize the same benefits with externally worn GPS trackers, but those systems will have a higher potential for manipulation by the wearer.

## NOTES

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