

HPM systems to combat IEDs.

CDT Ryan Kelley
Department Electrical Engineering and Computer Science
United States Military Academy
West Point, New York

Abstract:

This summer my AIAD at ARL Adelphi Labs focused on the use of high powered microwaves (HPM) to combat improvised explosive devices (IED). The goal of the project I worked on was to create a system that would set off the IEDs prematurely. In order to do this the HPM needed to couple to the leads of the computer chips. When coupling occurs a voltage is then created within the chip that can cause a false signal. That false signal is what is used to set off the IED.

The system is not intended to be some type of jamming system. Jamming systems for IEDs that are remotely detonated are already in development and will be fielded shortly. The HPM design is used for IEDs that are detonated by a timing device or some type of signal that does not need to be transmitted via the airwaves.

Our testing goal was proof of contest. That is to not develop a final product but to just prove that the actual use of HPM is reliable enough to be developed into a future system. Testing consumed the vast majority of my time while working on the project. To prove that the idea is actually feasible we tested systems in an anechoic chamber. We used highly directional microwaves aimed at an IED device and tested to see if it forced a false signal. Because of the complexity of HPM and the circuits and chips in IEDs it was necessary to test from all sorts of angles and distances. Each combination of angle and distance was meticulously recorded. That data was then entered into an excel spreadsheet. The spreadsheet calculated the power that was directed onto the IED as well as the actual power requirements used by the HPM generator. Since the project is new we learned a great deal about how capable HPM systems are against IED and exactly how IEDs are built and what they are capable of doing.

For lodging I stayed at the Fairfield Inn just a few miles from the ARL Adelphi campus. I was in a safe area and had no trouble getting to work. The work hours were very reasonable. Sometimes traffic in the DC area was bad but starting work early negated that issue. I had the weekends off and there was plenty of activities to do in Washington DC and College Park, Maryland. It is a very beautiful part of the country. I would definitely recommend having a POV while on the AIAD. I would also recommend brushing up a little on electromagnetic waves and fields as well as the concept of decibels. Overall I enjoyed my time and not only learned about engineering concepts but also what life is really like as an engineer and the leadership skills necessary to develop successful programs.