This project seeks to mainly analyze the technological content inside the polygraph and explore whether the working principles of the polygraph are valid and sound enough to aid in detecting deception. Meanwhile, the psychological, biological and social developments and changes that have impacted the growth of the polygraph will also be examined. We expect that the outcome of this project will be helpful for criminal investigation, psychological studies and the policy-making in regulating proper application and use of the polygraph.

The polygraph, more commonly known as the "lie detector machine" is one of the most controversial inventions ever made, with many critics in the scientific community questioning its accuracy and reliability. Some even consider it a "pseudoscience", which is something that is seemingly scientific yet lacks scientific method and supporting evidence. Nonetheless, polygraphs are extensively used for interrogation, both by governmental agencies such as the FBI, CIA, police departments, federal and state governments, as well as numerous private agencies. It has become an inseparable part of interrogation processes regardless of the fact that it is not 100% reliable. According to the Encyclopedia Britannica, the polygraph was named on the list of greatest inventions for 2003, those which "have had profound effects on human life for better or worse". (Wikipedia,2012)

The polygraph we have today is a result of a long history of research development. It seems unbelievable that the origin of the polygraph can be traced back to the three hundred B.C. in Greece where one physician was able to examine and distinguish lies by measuring a person’s pulse (Zhang, 2008). The concept of lie detection is as old as history itself, and mankind has sought several ways to distinguish lies from the truth in suspects, particularly in crime situations. Several techniques have been developed over time to verify truth and detect deception, many of which were primitive in their concept, and some of which were ridiculous and cruel. However, all of them were based on the theory that liars, when confronted, experienced some sort of physical reaction that could somehow be detected and measured.
The modern history of the clinical polygraph starts with a device built by Sir James Maceknzie, M.D., in 1892. This device was solely invented for medical purposes and for medical examinations. It had the capability to simultaneously record undulated tracings of the vascular pulses by a stylus revolving onto a drum of smoked paper. It had nothing to do with lie detection, yet set the basis for the modern polygraph. (Galianos, 2006) It is interesting how an invention that was originally intended for medical purposes was later utilized for uses such as lie detection. Advancements in psychology, medicine, and law allowed for an invention that previously existed as a medical tool to be utilized for something such as law enforcement.

The polygraph we have today and which was created for the purpose of lie detection was originally invented in 1921 by John Augustus Larson, a medical student at the University of California at Berkeley and a police officer of the Berkeley Police Department in Berkeley, California. Again, it follows the assumption that basic physiological processes in the human body show measurable change or interruption when a person is lying, since lying requires effort and can bring about nervousness or tension.

Today, there are two types of polygraphs, analog and computerized, with the computerized one being very widespread. The structure of the polygraph is simple. It is made up of several medical instruments joined together, each intended to measure a certain physiological activity in the respondent's body, including blood pressure, heartbeat rate, respiration rate, and electrical resistance or galvanic skin response. Components of the polygraph are a computerized monitor, a galvanometer, or pneumograph (Bonsor, 2012). Mainly three parts, the sensor, the main engine and the microcomputer, constitute a whole polygraph. The sensor is connected to the body surface to gather the information of the physiological parameters; the main engine is an electronic component which averts the collected analog signal by the sensor into digital signal; lastly, the microcomputer stores and analyzes the input digital signal and reaches the detection conclusion (Bonsor, 2012). The sensor has three antennas which detect different aspects of the physiological changes; the electric transducer put on the finger is used for measuring the dermal resistance; the respiratory transducer is a stretching sensor, tied to the breast for measuring the respiration; the pulse/blood transducer is pressure-sensitive, worse on the wrist or the arm for measuring the pulse and blood pressure. (Kong 2006)
The respondent being interrogated is first asked a number of control questions to record a particular baseline reading for that person, and for each of their physiological processes. That is, their normal heart rate, blood pressure, and other measures the device will compare any changes against. Next, as questions get asked and the respondent answers, any changes that occur such as increased blood pressure, faster heartbeat rate or intense respiration are recorded and displayed by the polygraph, and can thus allow the interrogator to indicate when the respondent is suffering the "nervousness of lying". This theory has been widely criticized since a large number of factors could cause such physiological changes (such as anger, sadness, fear, or embarrassment, to name a few). Throughout history, many innocent people have failed polygraph tests while many guilty people passed it, keeping most of the scientific community very skeptical about it. Some people are better actors than others and can thus fool polygraphs, and sometimes culture or upbringing can affect the way someone lies or tells the truth.

The collection of information for this project will be mainly based upon interviews with different actors in relation with polygraphs, including a polygraph engineer, a police officer, a psychological researcher, and an individual who has experienced a polygraph test, in order to collect the varied angles of information about it. Additionally, we will seek previous literature on how the polygraph works, how it is used, how it has developed, and how its technology influences its validity in detecting liars and so forth, and what controversies are being held about it and whether they are influencing its further development or usage.

References