ALGIRDAS ANTANAS AVIŽIENIS

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MCMXXII

Išsilavinimas 360°

1932 - 1940

ALGIRDAS ANTANAS AVIŽIENIS

BORN JULY 8, 1932 IN KAUNAS, LITHUANIA SON OF ARMY OFFICER AND TEACHER. HOME - SCHOOLED WITH FRIEND ARUNAS, READS AT AGE 4

1940 - 1944

SOVIET RED ARMY OCCUPIES LITHUANIA IN JUNE 1940. AVIŽIENIS FAMILY RETURNS TO FAMILY FARM. GERMAN ARMED FORCES TAKE LITHUANIA JUNE 1941. RED ARMY APPROACHES LITHUANIA IN FALL 1944 AND FAMILY FLEES WESTWARD IN TWO-HORSE WAGON, LATER BY TRAIN.

1944 - 1945

FAMILY ASSIGNED TO WORK ON FARM IN BAVARIA. U.S. ARMY TAKES VILLAGE WITHOUT FIGHT MAY 7 1945. LITHUANIAN REFUGEES REFUSE RETURN TO USSR UN SETS UP CAMPS FOR "DISPLACED PERSONS“. OUR "DP CAMP" IS IN ABANDONED MONASTERY NEAR CATHEDRAL TOWN EJCHSTAETT.

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1945 - 1950

DP LITHUANIANS SET UP SCHOOLS, SPORTS CLUB, CHOIR, LANGUAGE CLASSES, BOY AND GIRL SCOUTS. IN 1949 THE USA, CANADA, AUSTRALIA START ACCEPTING IMMIGRANTS FROM THE DP CAMPS

1950

A LOT OF LITHUANIANS HAD IMMIGRATED TO THE USA SINCE 1880s. OUR FAMILY GETS A SUPPORT GUARANTEE FROM A LITHUANIAN SOCIETY IN CHICAGO AND WE BOARD A TROOP TRANSPORT SHIP WITH "GREEN CARDS". WE REACH NEW YORK HARBOR ON MARCH 3, 1950 AND ARRIVE IN CHICAGO BY TRAIN THE NEXT DAY.

1950 - 1955

NEXT MORNING I TAKE A WALK AND SEE A BUILDING WITH SIGN "HELP WANTED".
I ENTER AND BECOME A MATTRESS MAKER AT "SUPERIOR SLEEPRITE CORPORATION"
HOPING TO START COLLEGE NEXT YEAR.

ON JULY 8 I AM 18 AND GOOD FOR MILITARY SERVICE AS THE KOREAN WAR BEGAN IN JUNE. STUDENTS COULD SERVE AFTER GRADUATION, SO IN JUNE 1951 I ENTER THE U.OF ILLINOIS TWO YEAR "NAVY PIER" CAMPUS IN CHICAGO.

IN JAN. 1953 I MOVE TO U. ILLINOIS IN URBANA-CHAMPAIGN AND IN AUGUST 1954 I RECEIVE B.S. DEGREE IN E.E. WITH HIGH HONORS AND A FELLOWSHIP FOR M.S.E.E. I GET IN JUNE 1955. I LEARN PROGRAMMING "ILLIAC 1" AND LOGIC DESIGN OF DIGITAL CIRCUITS THAT YEAR.

FOR MILITARY SERVICE I ACCEPT A JOB AT THE JET PROPULSION LABORATORY JPL OF CALTECH THAT WAS DESIGNING THE MISSILE "SERGEANT“ WITH A NUCLEAR WARHEAD FOR U.S. ARMY.

AT JPL I USE MY KNOWLEDGE OF DIGITAL DESIGN TO IMPLEMENT A REMOTE TARGET DATA SETTING UNIT WITH INDEPENDENT READOUT TO CHECK THE SETTING - MY FIRST ERROR DETECTION DESIGN.

1956-1960

AS REWARD FOR MY GOOD DESIGN JPL GRANTS ME A LEAVE TO RETURN TO THE DIGITAL COMPUTER LAB (DCL) AT U.ILLINOIS FOR PH.D. STUDY ADVISED BY PROF. JIM ROBERTSON WHO DESIGNED THE ARITHMETIC UNIT FOR "ILLIAC 1" AND WAS DOING ONE FOR "ILLIAC 2".

MY PH.D. THESIS WAS ON "SIGNED-DIGIT" ARITHMETIC WITH A CARRY-FREE ADDITION ALGORITHM THAT IS STILL USED TODAY. I RECEIVED THE PH.D. IN JUNE 1960, AND MY PAPER ON THAT ALGORITHM WAS ACCEPTED BY THE FIRST IFIP WORLD CONGRESS HELD IN MUNICH IN 1962.

I RETURNED TO A "NEWBORN" JPL IN SEPTEMBER 1960. WHEN NASA WAS FOUNDED IN 1980, JPL WAS FUNDED TO BUILD SPACECRAFT TO FLY PAST AND EXPLORE THE PLANETS OF OUR SOLAR SYSTEM. FORTUNATELY, THERE WERE NO "SERGEANT" MISSILES WITH NUCLEAR WARHEADS TO WORRY ABOUT ANYMORE.

I WAS ASSIGNED TO THE "PLANETARY GRAND TOUR" PGT PROJECT. IT IS THE GRAVITY-ASSISTED FLYBY OF THE OUTER PLANETS JUPITER, SATURN, URANUS, NEPTUNE. IF NOT LAUNCHED IN 1976-78, THE NEXT PGT ALIGNMENT OF THOSE PLANETS WOULD BE IN 175 YEARS. THE TIME OF PGT TO REACH NEPTUNE WAS 12 YEARS.

JPL HAD BUILT AND LAUNCHED "MARINER" SPACECRAFT THAT HAD FLOWN BY MERCURY, VENUS, AND MARS. THEY HAD LASTED UP TO 3 YEARS WHILE USING "GROUND COMMANDS" FROM EARTH FOR MAINTENANCE OF ON-BOARD SYSTEMS. IN THE PGT GROUND COMMANDS COULD NOT BE USED BECAUSE THE DURATION OF COMMUNICATION WAS TOO GREAT.

JPL WAS BUILDING THE SPACECRAFT **TOPS** AS "**T**HERMOELECTRIC **O**UTER **P**LANET **S**PACECRAFT". **TOPS** FLIGHT TO NEPTUNE WOULD TAKE 12 YEARS, THEREFORE THE ON-BOARD COMPUTER HAD TO SURVIVE 12 YEARS OF UNATTENDED OPERATION.

I WAS ASSIGNED TO DESIGN THE COMPUTER FOR **TOPS** WITH AN ACCEPTABLE PROBABILITY OF SURVIVING DURING 12 YEARS OF FLIGHT. USING MY PAST TRAINING AND IMAGINATION I PROPOSED A FULLY AUTONOMOUS ON-BOARD COMPUTER FOR **TOPS**. I NAMED IT "**STAR**" FOR "**S**ELF-**T**ESTING **A**ND **R**EPAIRING" COMPUTER.

APPROVED, I STARTED TO BUILD A MODEL OF **STAR** IN A LARGE CABINET WHERE A PART COULD BE REPLACED WITH A FAILED ONE FOR TESTS OF **STAR** RECOVERY PROCESSES.

SOON I LEARNED THAT UCLA HAD A DIGITAL COMPUTER DESIGN RESEARCH GROUP. I GAVE A TALK THERE AND WAS INVITED TO TEACH A COURSE. JPL APPROVED AND IN FALL 1962 I HAD A PART-TIME POSITION AS AN ASSISTANT PROFESSOR AT UCLA.

IN NOVEMBER 1967 I PRESENTED THE PAPER "DESIGN OF FAULT-TOLERANT COMPUTERS" AT CONFERENCE ***FJCC.*** IT INTRODUCED TERM "FAULT TOLERANCE" AND DESIGN OF **STAR** THAT IS ALSO DOCUMENTED IN THE PATENT U.S. 3,517,171 AND IN *IEEE TRANSACTIONS ON COMPUTERS* PAPER IN 1971.

BAD NEWS CAME TO JPL IN DECEMBER 1971. THE SPACE SHUTTLE BUDGET WAS GROWING AND NASA COULD NOT SUPPORT BOTH. THE **TOPS** PROJECT WAS CANCELLED.

THE PLANETARY GRAND TOUR SURVIVED BECAUSE JPL HAD TWO "MARINER" SPACECRAFT THAT NEEDED NEW ON-BOARD COMPUTERS TO SURVIVE THE 12 YEARS OF PGT DURATION.

ONLY SOME FEATURES OF **STAR** COULD FIT IN THE NOW "VOYAGER" NAMED TWO SPACECRAFT THAT WERE LAUNCHED IN 1977, VISITED THE FOUR OUTER PLANETS AND ARE STILL COMMUNICATING WITH EARTH FROM OUTSIDE OF SOLAR SYSTEM.

THE U.S. NATIONAL SCIENCE FOUNDATION DECIDED TO SUPPORT THE TRANSFER OF FAULT TOLERANCE RESEARCH TO UCLA AND IN 1972 AWARDED A FIVE YEAR GRANT FOR THE *"DEPENDABLE COMPUTING AND FAULT-TOLERANT SYSTEMS LABORATORY"* DIRECTED BY ALGIRDAS AVIŽIENIS UNTIL 1994. "N-VERSION PROGRAMMING" WAS THE NEW BIG PROJECT AT THE DC/FTS LABORATORY.

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TO CONCLUDE: WHY FOUND THE IFIP WG 10.4 WHEN THERE IS A STRONG IEEE TC - FTC ?

MY ANSWER: ALL OF ABOUT 50 IFIP MEMBER COUNTRIES SHOULD HAVE ACCESS TO OUR RESEARCH AND OTHER ACTIVITIES.

MY CONTACT WITH IFIP: I PRESENTED PH.D RESEARCH RESULTS IN 1962 AT *THE FIRST IFIP WORLD CONGRESS,* LATER JOINED WG ON COMP. SYSTEMS.