

Hybrid chaos based communication system - a chaotically masked electronic message transduced to an optical carrier for transmission

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Synchronised chaotic systems are the basis of secure communication using a chaotic carrier for message masking. Systems demonstrated to date have used nonlinear electronic circuits or nonlinear laser systems to produce either an electronic or an optical chaotic carrier to which to add the data signal for masked transmission. The message can be recovered by virtue of a synchronised receiver only producing a match to the chaotic carrier, not the message. We have demonstrated a hybrid electronic/optical secure communication system for chaotic signal masking. We use an electronic circuit to generate a chaotic current signal in which a small message signal is added and masked. The combined chaos/message signal is added to the DC injection current of a semiconductor laser. The chaotic carrier plus message is reproduced as the output power variations of the laser which is transmitted optically. Transmission is by line of sight, free space propagation to an optical detector, although it is also possible to transmit via an optical fibre. A matched receiver electronic circuit synchronises only to the chaotic part of the photodetected signal. We show the successful transmission and recovery of a chaos masked message. We will present the advantages and disadvantages that this system has compared to all-optical or all-electronic chaos secure communication systems and also the prospects for further research and development.